Astron. Astrophys. Suppl. Ser. 117, 227-254 (1996)

# Determination of effective temperatures for an extended sample of dwarfs and subdwarfs (F0-K5)\*

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Received May 22; accepted July 27, 1995

Abstract. — We have applied the InfraRed Flux Method (IRFM) to a sample of 475 dwarfs and subdwarfs in order to derive their effective temperatures with a mean accuracy of about 1.5%. We have used the new homogeneous grid of theoretical model atmosphere flux distributions developed by Kurucz (1991, 1993) for the application of the IRFM. The atmospheric parameters of the stars cover, roughly, the ranges:  $3500 \text{ K} \leq T_{\text{eff}} \leq 8000 \text{ K}$ ;  $-3.5 \leq [\text{Fe/H}] \leq +0.5$ ;  $3.5 \leq \log(g) \leq 5$ . The monocromatic infrared fluxes at the continuum, and the bolometric fluxes are derived using recent results, which satisfy the accuracy requeriments of the work. Photometric calibrations have been revised and applied to estimate metallicities, although direct spectroscopic determinations were preferred when available. The adopted infrared absolute flux calibration, based on direct optical measurements of angular stellar diameters, sets the effective temperatures determined using the IRFM on the same scale than those obtained by direct methods. We derive three temperatures,  $T_J$ ,  $T_H$  and  $T_K$ , for each star using the monochromatic fluxes at different infrared wavelengths in the photometric bands J, H, and K. They show good consistency over 4000 K, and no trend with wavelength may be appreciated. We provide a detailed description of the steps followed for the application of the IRFM, as well as the sources of the errors associated to the different inputs of the method, and their transmission into the final temperatures. We also provide comparison with previous works.

Key words: stars: fundamental parameters — stars: Population II — stars: subdwarfs — stars: general

## 1. Introduction

The stellar effective temperatures might be, in principle, determined following a fundamental or *direct* method based on the combination of the bolometric fluxes and the angular diameter measurements according to the equation:

$$T_{\text{eff}} = (\frac{4}{\sigma})^{1/4} \theta^{-1/2} F_{\text{Bol}}^{1/4},$$
 (1)

where  $\sigma$  is the Stefan-Boltzmann constant,  $\theta$  is the angular diameter of the star, and  $F_{\rm Bol}$  is the bolometric flux measured on the surface of the earth.

However, in practice, we need atmosphere models to perform secondary corrections to both the angular diameter measurement (limb darkening) and  $F_{\rm Bol}$  (interstellar absorption). The Sun is obviously the only exception, since its limb darkening can be empirically determined, and its interstellar absorption is negligible. In any event, the main difficulty affecting the *direct* procedure is the limited number of stars with a reliable measurement of their angular

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diameter (see for instance Table 4 from Mozurkewich et al. 1991). This problem is remarkably severe for the low main sequence, as there are no direct measurements of angular diameter for stars later than F5V, with the above mentioned exception of the Sun. For this reason, relatively large uncertainties still remain on the scale of stellar effective temperatures in the low main sequence, especially when the effect of metallicity is considered.

Thus, we are compelled to use *semi-direct* methods, which require, as a basis, atmosphere models in addition to observational information (see the review by Böhm-Vitense 1981). Among the different methods of this type the Infrared Flux Method (hereafter IRFM; Blackwell et al. 1990, and references therein) seems especially adequate to analyse the temperatures of F, G, and K stars. The IRFM has been successfully applied to different samples of population I stars (e.g. Blackwell et al. 1990; Bell & Gustafsson 1989; Saxner & Hammarbäck 1985). However, the works based on the IRFM devoted to metal poor stars (Magain 1987; Arribas & Martínez-Roger 1987, 1989) are restricted to rather limited samples.

The present paper is part of a long term programme aimed to a better definition of the scale of temperatures

 $<sup>^\</sup>star \text{Table 4}$  is only available in electronic form at CDS Tables 1-3 are also available via ftp 130.79.128.5

Table 1. The calibration of q- and R- factors versus metallicity,  $\log(g)$  and effective temperature in  $\lambda_{\text{eff}}=1272.5$  nm (band J), computed using models by Kurucz (1991, 1993). The units of R-factors are (nm)

		[Fe/I	<u>I]=0.50</u>	[Σέ/H	f=0.00	Fe/F	Ī <b>]</b> =-1.II	[Fe/U	[]=-2.0	· [Fe/I	J]=-3.0	[Fe/F	(]=-3.5
$T_{ef}$	$l\nu g(g)$	q(J)	$log(R_J)$	j(J)	$lag(R_{J})$	q(i)	$log(R_{J})$	q(J)	$log(R_f)$	$\overline{g(J)}$	$log(R_J)$	q(I)	$log(R_J)$
3500	4.00	1.0108	3.19600	1.0114	3.32780	1.0117	3,25910	1.0088	5.30328	1.0108	3.26472		_
3500	5.00	1.0130	3,20769	1.0126	3.23314	1.0713	3.25911	1.0091	3.29874	_		_	_
3750	4.00	1.0116	0.22553	1.0104	3.25863	1.0116	3.27961	1.0107	3.28295	1.0101	3.28289	1.0101	3.28121
3750	5.00	1.0133	3.23491	1.01723	3.28000	1.0115	3,27746	1.0105	3.28179		_	_	_
4000	1.110	1.0127	3.26184	1.0104	3.28485	1.0098	3.30197	4.0098	3,30538	1.0096	3.30587	1.0101	33305112
4000	5.00	1.0134	3.26360	1,0118	3.28772	1.0112	3.29982	1.0103	3,30448			_	_
4250	1.00	1.0110	3.29432	1.8118	3.31003	1.0096	3,32287	1.0099	3.32965	1,0097	3-33162	1.00099	3.33284
4250	5.00	1.0143	3.39331	1.8116	3.31139	1.0100	3.32423	1.0096	3.03045	1.0093	3,00396		
4500	1.00	1.0153	3.32227	1.0127	3.33544	1.0099	3.34908	1.0090	3,05719	1,0090	3.98207	1.0089	3,56356
4500	5.00	1.0154	3.32178	1.0124	3,33545	1.0098	3,34937	1.0093	3.35863	1.0093	3,36355	1.0093	3.36496
4750	4.00	1.0(6)	3.35022	1.0134	3.36348	4.0100	3.37906	1.0083	3.35917	1.6080	3,39460	1.0082	3.39627
4750	5.00	1.01,64	3.35047	1.0131	3.36358	1.0100	3.37815	1.0090	3.38952	1.6087	3,39551	1.0086	3.39743
5000	4.110	1.0163	3.38036	1.0138	3.39394	1.0100	3.41156	1.0083	0.42289	1.0080	0.42904	1.0080	3,43000
5000	5.00	1,0170	3.38078	1.0137	3.39440	1.0101	3.41047	1.0085	3.42258	1.0085	3.42892	1.0079	3.43067
5250	1.00	1.0166	3,41261	3.0141	3,42859	1.0096	3.44617	1.0082	0.45863	1.0077	3.46469	1,0076	3.46606
5250	5.00	1.0174	3.41282	1.0140	3.47685	1.0095	5.44491	1.0083	3.45797	1.0081	3.46427	1.0081	3,46552
5500	4,00	4.0108	3 44698	1.0140	3.46098	1.0094	3.45180	1.0081	3,49427	1.5078	3.50020	1.0077	3,50134
3500	6.00	1.0173	3.44647	1.0139	5.46974	1.0094	3.48067	1.0082	3,49368	1.0079	8,50023	1.0079	3.50120
5750	4.00	3.0108	3 48326	1.0104	3.49657	1.0097	3.51767	1.0084	3.53000	1.0080	3.53513	1.0080	3,53632
5750	5.00	1.0165	3.48180	1.6133	3.49609	1,0096	3.51676	1.0081	0.53009	1.0078	0.53595	1.0077	3,53714
6000	1.00	1.0164	3.51836	1.0134	3.53200	1.0096	3,55044	1.0086	0.56496	1.0083	0.58055	1.0082	0.57064
6000	5.00	1.0161	3.51741	1,0131	3,53169	1.0097	3.55341)	1.0084	3.58613	1.3080	3.57010	1.0079	3.57223
6250	1.00	1.0156	3.55398	1.0131	3.56781	1.0098	3.58846	1.0090	3.59884	08000	3.60324	1.0086	3.60424
6250	3.00	1.0154	3,55329	1.0131	3,36737	1.0097	3,55942	1.0088	3.60122	1.9884	3.60595	1.0082	3,60701
6500	4.00	1.0156	3.58941	1.0120	8.60338	1.0097	3.62284	1.0092	3.63226	1.0090	3.63617	1.0090	3.63706
0500	5.00	1.0144	3.38912	1.0115	3.60342	1.0093	3.63197	1.0088	3.65570	1.0085	3.64011	1,0087	3.61095
6750	4.00	1.0141	3 62538	1.0111	3.03876	1.0088	3.65693	0800.1	3,66529	1.9082	3.66895	1.0082	3,60976
6730	5.00	1.0106	3.62471	1.0106	3.63912	1.0083	3,65966	1.0089	3.66066	1.0076	3.67373	1.0077	3.67454
7000	4.600	1.0102	3,00083	1.0108	3.67340	1,0076	0.69043	1.0072	3,69826	1.9075	3,70130	1.0073	3,70206
7000	5.00	1.0117	3.66015	1.0096	3.67105	1.0073	3.69368	1.0065	3,70300	1.9059	3,70684	1.0058	3,70762
7250	4.00	1.0123	3.89664	1,0095	3,70831	1.0069	0.72063	1.0058	0.73100	1.0050	3,73084	1.0000	0.73421
7250	5.00	1.0100	3.69541	1.0072	3,70925	1.0061	3,73009	1.0050	3,73576	1.0051	3,73899	1.0047	3.73971
7800	4.00	\$.000.3	3.73444	1.0063	3,74712	1.0059	0.79715	1.0047	3,76413	1.0044	3,76047	1.0048	3,70079
7800	5,60	1.0075	. 3.73000	1.0059	3,74321	1.0037	3,70023	1.0034	3.76786	1.0032	3,77089	1.0035	3,77!24
7750	4,68)	1.0072	3.77085	1.0944	3,78257	1.0022	0.79767	1.0013	3,80445	1.0019	3,80077	1.0016	3.80738
7750	5.00	1.0054	3,73327	1,00035	3,77748	1.0018	3,79300	1.0020	3,79959	1.0014	3,80247	1.0016	3.80281
8000	4,00	1.0058	3.80008	1.0000	3.81798	1.0008	3.83178	1.0004	3.83765	1.0004	3.82083	1.0000	3.84044
8800	5.00	0.9997	3.80371	1.0001	3.81155	1.0000	3.82530	0.9998	0.83155	1,0000	3,83368	0.9995	3.83429
\$250	4.00	1.0046	3.84277	1.00021	3.85333	0.9996	3.86656	0.9991	3.87194	0.9991	3.87373	0.9992	3.87400
8250	5,00	0.99หล	3,83933	0.99653	3,85113	0.9939	3.86589	0,9952	0.86044	0.9973	3,86587	0.9974	3.86617

for F, G, and K dwarfs and subdwarfs, using the IRFM. This work is relevant to three main topics: (a) analysis of the global behaviour of atmosphere models (e.g., Magain 1987), (b) the correct interpretation of the observed HR diagram (e.g., Arribas & Martínez-Roger 1988, 1989), and (c) fine spectroscopic analysis for abundance determinations of metal poor stars (e.g., King 1994).

The general programme has been focussed on the improvement of the different factors which affect the accuracy in the definition of the temperature scale. Firstly, the sample of selected stars has been substantially enlarged compared to previous works (up to almost 500 stars). This point is particularly important in order to properly sample wide ranges in colour and metallicity. The accurate infrared photometry required for the application of the IRFM was measured for 75% of the stars in the sample (Alonso et al. 1994a, Paper I). Secondly, due to the sensitivity of the IRFM temperatures to the infrared absolute flux calibration considered, this subject was revised in Alonso et al. (1994b, Paper II). There, a new absolute

calibration for the infrared flux of Vega, which scales the IRFM temperatures to those derived by direct methods, is proposed. Thirdly, a method to obtain bolometric fluxes for metal poor stars was devised in Alonso et al. (1995, Paper III). Last, but not least, we have used the improved grid of atmosphere models computed recently by Kurucz (1991, 1993).

This paper provides detailed information on the procedure followed to derive the effective temperatures for the whole sample. The paper is laid out as follows. Section 2 explains the practical implementation of the IRFM. The theoretical and observational inputs of the method, as applied here, have been separated in order to discuss the influence of errors in the derived temperatures. Thus, Sect. 3 analyses the theoretical R- and q-factors, and the observational inputs are discussed in Sect. 4. This section also includes a description of the criteria adopted to collect the sample of stars, a revision of photometric calibrations to estimate the metallicity, and the correction of interstellar extinction. The effective temperatures are derived

**Table 2.** The same that Table 1 for  $\lambda_{\text{eff}} = 1635.0 \text{ nm}$  (band H)

		Γe/I	I]±0.50	[Γe/I	<u>[_0.00</u>	· ¬ <del>Fe/l</del>	· 1.0	[Fe/I	H]=-2.0	Fe/F	H)=3.0	[Fe/I	P=-3.5
$T_{ej}$	4gg(g)	q(H)	$log(R_H)$	$\frac{1}{2}(H)$	$log(R_H)$	q(H)	$log(R_H)$	$\gamma(H)$	$log(R_H)$	q(H)	$log(R_H)$	5(11)	$log(R_H)$
3500	1.00	1.8855	3,22461	1.0710	3,29196	1.0572	9,05050	1,0558	3,40373	1.0522	3,36670	_	
3500	5.00	1.0577	3.30645	1.0550	3.33420	1.0552	3,05579	1.0562	3,40015	_	_	_	_
3740	1.00	1.0813	3.27000	7.0795	3.30519	1.0578	3.58672	1.0486	3,41153	1.0444	3 41967	1.0418	3 42357
3750	5.00	1.0618	3.33578	3.0536	3,37801	1.0483	3,40675	1.0466	5.41366	_	_		_
4000	1.00	1.0725	3,33562	1.0740	3.34393	1.0556	3.39405	1.0483	3,44312	1.0373	3.47083	1.0838	3.48011
4000	2700	1.0637	3,36533	1.0378	3.40463	1.0459	3,44771	1.0413	3,46268	_	_	_	_
4250	4.00	1.0623	3.40413	1.0629	3.40631	1.0589	3.43010	1.0158	3.47769	[.0338]	3,51515	1.0306	3.52892
4250	5,00	1 0599	3.41079	1.0578	3.42979	1.0486	3.47230	1.0384	3,50456	1.0316	3,32539	_	_
4590	4.00	1.0520	3,47101	1.0522	3,47245	1.0489	3,49194	1.0416	3.52341	1.0335	3.55807	1.0318	3.56514
4500	5.00	1.0522	3,46793	1.0517	3.47403	1.0465	0.50464	1.0055	3,54761	1.0278	3,57000	1.0261	3,58300
1750	4.00	1.0426	3.53488	1.04.11	3.53646	1.0410	3.55421	1.0068	3,57979	1.0328	3.59017	1.0319	3.60341
17511	5.130	1.0438	3.52861	7.0435	3,53363	1.0467	3.55529	1.0026	3.59400	1.0370	3.01848	1.0263	3,63325
5000	4.00	1.0349	3,59552	1.03/48	3,59855	1.0349	3.51329	1.0328	3.63455	3.08017	3.64691	1.0305	3.61878
5000	5.00	1.0361	3.58981	1.0367	3.59330	1.0845	3.51349	1.0298	3.64271	1.0264	3.68031	1.0262	3.66277
5250	4.00	1.0277	3.65441	1.0290	3.65615	1.0303	3.67122	1.0221	3.68812	1.0287	3.69488	1.0287	3.69601
5250	5.00	1.0396	3.64750	1.0300	3.05203	1.0298	3.67001	1.0266	3.69392	1.0255	3,70304	1.0255	3.70556
5500	4.0N	1.0325	0.70927	1.0238	3.71246	1.0262	3.72601	1.0261	0,73905	1.0265	3,74350	1.0267	0.74428
5500	5.00	1.0237	0,703%0	1.0244	3,70833	1.0254	3.72583	1.0239	3.74386	1.0241	3,74941	1.0238	9,75138
57511	4.011	1.0185	3.76271	1.012001	3.76593	1.0224	0.77988	1.0235	9.78928	1.0240	0.79211	1.0243	9.79275
5758	5.00	1.0190	3.75695	1.0200	3.76171	1.0217	3.77843	1.0218	3.79200	1.0222	3.79566	1.0223	3.79631
6600	41.00	1.0149	3.81351	1.0165	3.81775	1.0191	3.83037	1.0204	3.83758	1.0207	3.84048	1.0208	3.84119
60-00	5.00	E.0147	3.80859	1.016u	3.81377	1.0186	3.52919	1.0198	8.83904	1.0199	3.81258	1.0192	3.81339
6250	4.00	1.0123	3.86315	1.0136	3.86848	1.0163	3.57899	1.0172	3.88494	1.0174	3.88762	1.0175	3.88823
6250	5,00	2.0111	3,85858	1.0125	3.86451	1.0156	3.87745	1.0165	3,88548	1.0169	3,88860	1.0170	3.88927
6500	4.00	1.0096	3.91178	1.0108	3.91666	1.0135	3.92616	1.0144	3.93139	1.0147	3.93371	1.0147	3.93425
6500	5,00	1.0079	3,99716	1.0094	3.91263	1.0127	3.92446	1.0159	3,93008	1.0142	3,90076	1.0143	0.93434
6750	4.00	1.0074	9.95819	1.0084	3,96932	1.0211	3.07205	1.0118	3.97671	1.0119	0.97885	1.0120	0.97931
6750	5,00	1.0052	3,95350	1.0065	3,95930	1.0100	3,90970	1.0110	3.97574	1.9112	0.97820	1.0113	0.97871
70110	4.00	1.0060	4.00303	1.0067	4.00B27	1.0089	4.01650	1.0092	4.021112	1.0094	4.02274	1.0094	4.02318
7000	5.00	1.0028	3.99828	1,0007	4.00433	1.0070	4.01417	1.0079	4.01956	1.0080	4,02160	1.0081	4,02200
725D	4.001	1.0043	4.04670	1.0048	4.05220	1.0070	4.05900	140070	4.06405	1,0074	4,065641	1.0075	4,06594
7250	5,400	1.0009	4.04182	1.6013	4.04816	1.0040	4.05751	1.0049	4.06215	1.9052	4.06412	1.0052	4.06455
75110	4.401	1.0008	4.09372	1.0002	4.09954	[.005]	4.(0366	1,0055	4.10620	1.0058	4.10755	1.0058	4.110788
7500	5.110	0.9380	4.08471	0.9984	4.09078	1.0019	4.09945	1.0022	4.10385	1.0024	4.10505	1.0025	4.10597
7750	4.4111	0.9991	4.19608	0.9991	4.14254	1 0010	4.15009	1 0020	4.15462	1.0016	4.15643	1.0023	4.15642
7750	5.1111	0.9957	4.12825	11.9966	4.13211	0.9980	4.14090	0.9994	4.14475	1.00001	4.14807	0.9999	4.74657
8000	4.101	0.9989	4.17849	0,9974	4.18476	1.0004	4.10202	0.9997	4.19086	1.0000	4.19818	8,9998	4.19861
8000	5.1111	0.9914	4.17145	11.9935	4.170332	0.9965	4.18][[	0.9967	4.18485	11.9971	4.18613	0.9976	4.18614
8250	4.100	0.9985	4.21874	0.9973	4.2252£	0.0989	4,25395	0.0986	4.29779	0.9988	4.23907	0.9993	4.23906
5250	5.00	0.9893	4.21363	8571	4.22014	0.9808	1.22567	0.9921	4.32954	11.9941	4.22578	11.9949	1.22581

in Sect. 5, where the internal consistency of the method and the uncertainties affecting  $T_{\rm eff}$  are assessed. The final temperatures are compared to common determinations of previous works in Sect. 6. Finally, in Sect. 7, the main results are briefly summarized.

In a forthcoming paper, we will provide and discuss the calibrations  $T_{\rm eff}$ -colours-[Fe/H], as well as the mean intrinsic colours for dwarfs and subdwarfs.

#### 2. The implementation of the IRFM

The InfraRed Flux Method (Blackwell et al. 1990) uses the quotient between the bolometric flux  $(F_{\rm Bol})$  and the monochromatic flux at a chosen infrared wavelength of the continuum  $(F(\lambda_{\rm IR}))$ , both measured at the surface of the earth, as indicator of  $T_{\rm eff}$ . This quotient is the so-called observational R-factor  $(R_{\rm obs})$ . The theoretical counterpart derived from models,  $R_{\rm theo}$ , is obtained as the quotient between the integrated flux  $(\sigma T_{\rm eff}^4)$  and the monochromatic flux at  $\lambda_{\rm IR}$   $(F_{\rm mod}(\lambda_{\rm IR}))$ , at the surface of the star. Thus

the basic equation of the IRFM reads:

$$R_{\text{obs}} = \frac{F_{\text{Bol}}}{F(\lambda_{\text{IR}})} = \frac{\sigma T_{\text{eff}}^4}{F_{\text{mod}}(\lambda_{\text{IR}}, T_{\text{eff}}, [\text{Fe/H}], g)} =$$

$$= R_{\text{theo}}(\lambda_{\text{IR}}, T_{\text{eff}}, [\text{Fe/H}], g), \qquad (2)$$

where the explicit dependence on metallicity, surface gravity, and  $\lambda_{\rm IR}$  is taken into account. The IRFM only requires from models the correct prediction of the continuum IR fluxes (note that the bolometric flux at the stellar surface is fixed by the value of  $T_{\rm eff}$ ). This requirement seems relatively easier to fulfill, if compared to those demanded by other semi-direct methods. In particular, free-free and bound-free transitions of H<sup>-</sup> ion, the main source of the continuum opacity in the IR for F,G and K stars, are relatively well understood. Therefore, in principle, the dependence on models is not a critical point to the IRFM, at least for spectral types earlier than late K where the IR opacity due to molecular bands is of minor importance. Another advantage of the IRFM, as explained in Sect. 4.1,

**Table 3.** The same that Table 1 for  $\lambda_{\text{eff}} = 2175.0 \text{ nm}$  (band K)

		[Fe/I	I]=0.50	[Fe/I	I]=0.00	Fe/F	न]=-1.0	Fe/F	H]=-2.⊔	[Fe/f	H]=-3.0	[Fe/1	H]=-3.5
$T_{ef}$	$log(\mathfrak{g})$	q(K)	$log(R_{ m K})$	q(K)	$log(R_K)$	q(K)	$log(R_K)$	g(K)	$log(R_{E'})$	q(K)	$log(R_K)$	g(K)	$log(R_K)$
3500	4.00	1.0481	3.62077	1.0390	0.67040	1.0340	3.71134	1.0270	3.80720	1.0261	3.72061		
3500	5.00	1.0415	3.67386	1.0352	3,69621	1.0316	3.71324	1.0253	3.79841	_	_	_	_
37511	4.00	1.0442	3.68243	1.0379	3.71302	1 0312	3,76466	1.0260	3.78006	£.0237	3,78449	1.0230	9.78616
3750	5.00	1.0383	3.74570	1.03390	3.75590	1-0253	3,77601	1.0250	3.78119		-		
1000	4.00	1.0410	3,75541	1.0362	3.78628	1.0287	3.80318	1.0243	3.82875	1.0226	0.84448	1.0223	3.84980
4000	5.00	1.0362	5.77543	1.0310	3.50467	1.0261	8.83105	1.00233	3.84071				
4250	4.00	1.0378	3.83777	1.0343	3583286	1.11275	3.84872	1.0226	3,87759	1.0218	0.89022	1.0217	3,90884
4250	5,00	1.0309	3.83328	1.0293	3.54842	1.0238	3.87605	1.0221	3.89458	1.0217	3.99679	_	_
4500	4.00	1.0345	3.89700	1.0309	3.90121	1.0254	3.91266	1.0317	3.93235	1.0207	3.95498	1.0208	3.95942
4500	5,00	1,0311	3.89437	1.0274	3.90181	1.0225	3.92219	1.0211	3.94782	1.0209	3.96536	1.0211	3.96969
1750	4.90	1.0304	3.96302	1.0279	3.96679	J.0207	3.97732	1.0205	3 99602	1.0200	4.00734	1.0202	4.00900
4750	5.011	1.0277	3.95866	1.0248	3.98410	1.0210	3,97810	1.0204	4.00200	1.0207	4.01704	1.0200	4.02038
3000	4.00	1.0266	1.02573	1.0250	4.02859	1.0216	4.03988	1.01196	4.115472	1.0197	4,06150	1.0198	4.06273
5000	5.00	1.0243	1.02745	1.01225	4.02637	1.0208	4.03902	1.0198	1.05822	1.0202	4.06821	1.0203	4.06975
5250	4.00	1.0230	4.03477	1.0221	4.08605	1.0199	4.10008	1.0194	4.31123	1.0197	4.11577	[1.9197]	4.11661
5250	5.00	1.0212	4.08121	1.0202	4.08603	1.0197	4.09862	1.0198	1.11309	1.0398	4.13913	1.9199	4.12089
5500	4.00	1.0[97	4.14173	1.0100	4,14541	1.0188	4.13743	1.0192	4.16594	1.0192	4.16946	1.0191	4.17154
5500	5.00	1.0176	4.13860	1.0178	4.14344	1.0188	4.13641	1.0196	4.16095	1.0196	4.17167	1.0194	4.17386
ā750	4.00	1.0163	4.19646	1.0188	4.20034	1.0181	4.21059	5.0185	4.21878	1.0184	4.32314	1.0182	4.22382
5760	5.00	1.0143	1.19439	1.0154	4.19889	1.0181	4.20925	7.0188	1.21954	1.0185	4.32462	1.0184	4.22519
6000	4.00	1.0134	1.21928	1.0145	1.25344	1.0168	4.26399	7.0173	1.26973	1.0173	4.27404	1.0173	4.27468
6000	5.00	1.0115	4.24731	1.0134	4.25197	1.0166	4.26245	3.0177	4.27046	1.0177	4.27516	1.0170	4.27578
6250	4.00	1.0115	4,29954	1.0130	4.303141	1.0156	4.31339	1.0163	4.32077	1.0164	4.32337	1,0165	4.32378
6250	5.00	1.0093	4.39826	1.0112	4.30184	1.0145	4.31316	1.0158	4.32174	1.0161	4.32444	1.0161	4.32505
8500	4.00	1.0100	4.34713	1.0115	4.35227	1.0100	4.30210	$1.01 \div 4$	4.09897	1.0140	4.37126	1.0146	4.37176
6500	5.00	1.0032	4.34032	1.0092	4.05116	1.0125	4.30224	1.0103	4.37017	1.0136	4.37262	1.0138	4.37311
6750	1.00	1.0083	4.39470	1.6098	4.39997	0.0118	4.40947	1.0126	1.41564	1.0128	4.41770	1.0130	4.41810
6780	5.110	1.30140	4.39381	1.0086	4.89929	1.0163	4.41194	1.0313	1.41698	1.0118	4.41918	1.0119	4.41966
7000	1.00	1.0066	4.141111	1.0077	1.44638	1.0103	4,45648	1.0108	1.46099	1.0108	4.46230	1.0109	4,46269
7000	5.00	1.9012	4.44002	1.0n37	1.44576	1.0075	4.45739	1.0087	1.46243	1.0087	4.46391	1.0689	4.46451
7250	4.00	1.0043	4.48659	1.0055	4.49174	1.0078	4.56131	1.0086	1,50533	1.0084	1.50652	1.0685	1.30682
7250	5.00	0.9982	4,18525	1.0004	4.49814	1.0041	4.50223	1.0951	4,50618	1.0053	4.50817	1.0056	4.50840
7600	4.00	0.0065	4.50801	0.9984	4.54425	1.0058	4.54521	1.0055	1.51912	1.0061	1.55019	1.0063	1.55038
7300	5.00	0.9951	4.52939	0.9973	4,53652	1.0007	4.54575	1.0015	4.549.37	1.0020	4.55108	1.0021	4.55130
7750	4.00	0.9970	4.58211	0.0973	E.58901	1.0000	4.59797	1.0001	4.60170	1.0003	4.60329	1.0003	4.60361
7750	5.00	0.9918	4.57381	0,9932	4.57984	0.0969	4.58346	0.9978	1.59166	0.9980	4,59333	0.0083	4.59340
8000	4.00	0,0050	4.62493	0.9957	4.63164	0.9985	4.64932	0.9986	1.64381	0.2987	4.64527	0.9987	4.64554
8000	5.00	0.9840	4.62367	0.9883	4.32291	0.9924	4.62991	0.9936	4.03323	0.9940	4.63458	0.9941	4.03472
8250	4.00	0.9954	4.66672	0.9949	4.67282	0.9976	4.68100	0.9978	4.08481	0,9978	4.68616	0.9978	4.68639
6250	5.00	0.9818	4.66525	0.9829	4.67207	0.9851	1.68070	0.9853	4.68246	0.9891	4,97007	0.9894	4.07609

is the large sensitivity of R-factors to the effective temperature ( $R \sim T_{\rm eff}^3$ ) and their slight dependence on the secondary atmospheric parameters. Therefore, the uncertainties in the derived effective temperature associated to errors in the gravity and metallicity assignment are small compared to those due to the determination of the bolometric and monochromatic fluxes.

The monochromatic fluxes are obtained by applying the relation

$$F(\lambda_{\rm IR}) = q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g) [F_{\rm cal}(\lambda_{\rm IR}) 10^{-0.4(m-m_{\rm cal})}]$$
(3)

where m and  $m_{\rm cal}$  are, respectively, the magnitudes of the problem and standard star,  $\lambda_{\rm IR}$  is the selected wavelength at the infrared (which should be close to the maximum transmission of the photometric band),  $F_{\rm cal}(\lambda_{\rm IR})$  is the absolute flux of the standard star at  $\lambda_{\rm IR}$ , and  $q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g)$  is a dimensionless factor which corrects the effect of the different curvature of the flux density distribution, across the filter window, between the stan-

dard and the problem stars (see Sect. 3.2 for further details).

Table 5. The influence of the reddening and the uncertainty in the Calibration of the Absolute Flux in the IR (CAFIR) on the temperatures derived using IRFM. The errors induced by the uncertainties on the absolute flux calibration are slightly overestimated, since the change in the bolometric flux has not been taken into account

			Erro	on $T_{e_j}$	f (%)	
Input parameter	Егтот	3500	4000	5000	6000	7500
E(B-V)	0.05 mag	2.1	1.6	2.6	3.6	4.5
CAFIR J [Fe/H]= $0.0$	3 %	2.75	3	2	1.4	1.2
CAFIR J $[Fe/H]=-3.0$	3 %	3.25	2.75	2	1.4	1.2
CAFIR H [Fe/H]=0.0	4 %	6	1.6	1.4	1.2	1.2
CAFIR H [Fe/H]=-3.0	4 %	1.75	2	1.75	1.2	1.2
CAFIR K [Fe/H]=0.0	4 %	2.4	1.4	1.4	1.2	1.2
CAFIR K $[Fe/H]=-3.0$	4 %	1.6	1.6	1.4	1.2	1.2
CAFIR mean		2.0	1.7	1.6	1.25	1.2

The separation of observational inputs and theoretical factors for the implementation of the IRFM is provided

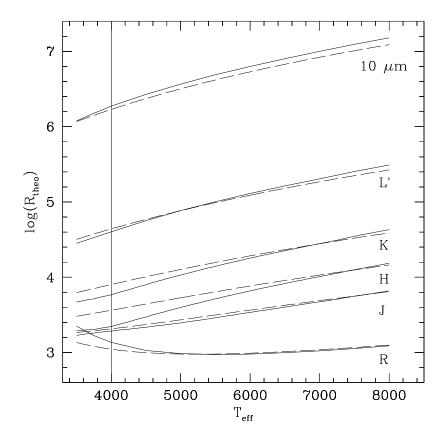


Fig. 1.  $R_{\rm theo}$  factors computed using solar metallicity models developed by Kurucz (1991). The wavelengths considered are  $\lambda_R = 790$  nm,  $\lambda_J = 1272.5$  nm,  $\lambda_H = 1635$  nm,  $\lambda_K = 2175$  nm,  $\lambda_{L'} = 3690$  nm, and a point in the far IR at  $10~\mu m$ . The dashed lines correspond to  $R_{\rm theo}$  factors derived from blackbody flux densities. The vertical line ( $T_{\rm eff} = 4000~{\rm K}$ ) shows the lower limit of applicability of IRFM with these models

Table 6. Mean accidental errors of the effective temperature derived applying the IRFM in the band K

			Err	or on $T_{\sigma f}$	(%)	
Input parameter	Error	3500 K	4000 K	5000 K	6000 K	7500 K
$qR_{the\phi}$	5 (%)	3	1.5	1.5	1.5	1.5
log(g)	$0.5  \mathrm{dex}$	2	1.5	0.1	0.1	0.1
[Fe/H]	$0.3~{ m dex}$	1	0.75	0.15	0.15	0.15
Total		3.3	2	1.5	1.5	1.5

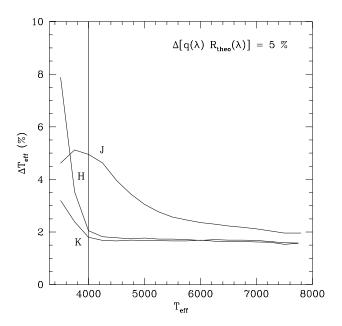
by substituting relation (3) in Eq. (2) as follows,

$$\begin{split} \frac{F_{\rm Bol}}{F_{\rm cal}(\lambda_{\rm IR})10^{-0.4(m-m_{\rm cal})}} = \\ = q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g) R_{\rm theo}(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g) \end{split} \tag{4}$$

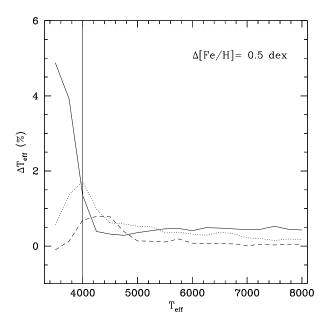
Once [Fe/H] and  $\log(g)$  are known for a certain star, the observational quantities on the left-hand side of Eq. (4) determine the star's effective temperature by comparing to the theoretical information from models on the right-hand side. It is worthy to notice that in a strict sense, models are also needed to obtain the integrated flux in order to

**Table 7.** Comparison between the temperatures derived in the present work (Col. 2) and those derived by Saxner & Hammarbäck (1985) (Col. 3). The mean difference  $T_{\rm IRFM}-T_{\rm SH85}$  is  $5\pm63$  K

Star	$T_{IRFM}$ (K)	$T_{SH85}$ (K)	$\Delta T$	$\Delta T$ (K) (%)
HR0458	6155	6140	15	0.24
HR0483	5874	5810	64	1.09
HR0937	5996	5890	106	1.77
HR1101	5998	5940	58	0.97
HR1543	6482	6470	12	0.19
HR1729	5847	5810	37	0.63
HR1983	6260	6260	0	0.00
HR2085	7013	7160	-147	-2.10
HR2852	7020	7060	-40	-0.57
HR2943	6579	6640	-61	-0.93
HR4540	6095	6120	-25	-0.41
HR4785	5867	5810	57	0.97
HR5447	6770	6760	10	0.15
HR5634	6571	6570	1	0.02
HR5868	5897	5890	7	0.12
HR5914	5774	5870	-96	-1.66
HR5933	6233	6220	13	0.21
HR8905	5954	5870	84	1.41



**Fig. 2.** Uncertainty on the IRFM temperature induced by an error of 5% in the observational quotient  $\frac{F_{\rm Bol}}{F_{\rm cal}(\lambda_{\rm IR})10^{-0.4(m-m_{\rm cal})}}$ 



**Fig. 3.** Uncertainty on the IRFM temperature induced by an error of 0.5 dex in [Fe/H]. Solid line: change from [Fe/H]=0 to [Fe/H]=-0.5; dotted line: change from [Fe/H]=-1.5; dashed line: change from [Fe/H]=-2.5 to [Fe/H]=-3

complete the missed flux in the UV and far IR, however, these corrections are small (see for instance Petford et al. (1991) and Paper II).

# 3. Model information: The R- and q-factors

The theoretical flux density distributions used in this work to implement the IRFM were obtained using Kurucz's (1991, 1993) new models. Blackwell and Lynas-Gray (1994) have also used them for the application of the IRFM. These models are widely described in Kurucz (1991). Here we briefly summarize their features concerning the aims of the present programme:

- 1. The major difference concerning opacities is the use of new iron group atomic lines, which are expected to diminish the problem of the missing opacity in the UV (Magain 1987). The computed opacities consider the effect of 58 million lines both atomic and molecular (which increases in a factor of roughly 30 the number in old models). Diatomic molecules considered include H<sub>2</sub>, SiO, CH, NH, OH, MgH, SiH, C<sub>2</sub>, TiO, CN and CO. Regrettably the effects of triatomic molecules, as water vapor, are not considered. In the range 1.75-2.1  $\mu m$  the contribution to the opacity from water vapour has great influence on the IR flux of cool stars ( $T_{\rm eff} \leq 4500$  K), specially for solar abundance. This fact sets a lower limit at late K stars for the applicability of the IRFM using these models (see Sect. 5).
- 2. The physics remains essentially the same that in older Kurucz's models (see Kurucz 1979a, b) since the problem of the opacity has been paid major attention. However, the new models contain slight improvements in the treatment of convention including approximative overshooting. The mixing length to scale height ratio  $(\alpha/H)$  adopted is 1.25. The solar metal abundances are those derived by Anders & Grevesse (1989). The microturbulent velocity is 2 km/s.
- 3. From a practical point of view, the new models sample physical parameters in a denser grid: Abundances are sampled in 0.1 dex steps from [Fe/H]=1.00 to [Fe/H]=-0.5, and in 0.5 dex steps from [Fe/H]=-0.5 to [Fe/H]=-4.0. Gravities are sampled in 0.5 dex steps and temperatures in 250 K steps under 8000 K.
- 4. Model fluxes are sampled in 1221 points covering a wavelength interval from 9 to 160000 nm. The resolution ranges within 1 nm in the UV, 2 nm in the visible and the band J, 5 nm in the band H and 10 nm in the band K. The sampling in the near IR implies a remarkable improvement as far as previous models are concerned, which allows to avoid interpolations.

# **3**.1. $R_{\text{theo}}(\lambda_{\text{IR}})$ factors

The flux density distributions of models described in the previous section have been used to calculate  $R_{\text{theo}}(\lambda_{\text{IR}})$ 

**Table 8.** Comparison between the temperatures derived in the present work (Col. 2) and those derived by Magain (1987) (Col. 3). The mean difference  $T_{\rm IRFM}-T_{\rm M87}$  is  $112\pm56~{\rm K}$ 

Star	$T_{IRFM}$ (K)	$T_{M87}$ (K)	$\Delta T (K)$	$\Delta T$ (%)
HD19445	6050	5933	117	1.93
$\mathrm{HD64000^{(1)}}$	5441	5370	71	1.36
HD74000	6224	6135	89	1.40
$\mathrm{HD84937^{(2)}}$	6330	6210	120	1.90
HD94028 <sup>(3)</sup>	6001	5777	224	3.73
HD108177	6034	6026	8	0:01
HD132475	5788	5614	174	3.00
HD140283	5691	5607	84	1.47
BD +42 2667 <sup>(4)</sup>	6059	5955	104	1.71
HD201891	5909	5761	148	2.56
HD219617	6012	5918	94	1.56

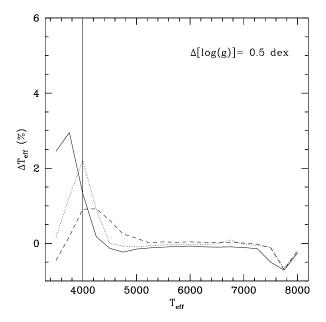
- (1) G090-025
- (2) G043-003
- (3) G058-025
- (4) G180-024

**Table 9.** Comparison between the temperatures derived in the present work (Col. 2) and those derived by Bell & Gustaffson (1989) (Col. 3). The mean difference  $T_{\rm IRFM}-T_{\rm BG89}$  over 4500 K is  $-49\pm75$  K

Star	Tirem (K)	T <sub>BL94</sub> (K)	$\Delta T$ (K)	$\Delta T$ (%)
HR219	5817	5839	-22	-0.38
HR753	4718	4775	-57	-1.21
HR4785	5867	5861	6	0.10
HR4983	5964	6024	-60	-1.01
HR7503	5763	5826	-63	-1.09
HR7504	5767	5664	103	1.79
HR4496	5342	5552	-210	-3.93
HR7462	5227	5253	-26	-0.50
HR1325	5079	5114	-35	-0.69
HR1084	5076	5156	-80	-1.58
HR8832	4805	4896	-91	-1.89
HR8085	4323	4463	-140	-3.24
HR8086	3865	4252	-387	-10.01

factors, as defined in Eq. (2). The closest wavelengths to the effective wavelengths of the J, H, and K photometric bands sampled by the models were selected ( $\lambda_J=1272.5$  nm,  $\lambda_H=1635.0$  nm and  $\lambda_K=2175.0$  nm). The effective wavelengths were computed considering the instrumental response of the TCS system (Paper I), and the atmospheric transparency (Manduca & Bell 1979; Glass 1985; Mountain 1983). Tables 1-3 contain the theoretical values of  $\log(R)$  for these three wavelengths. Effective temperatures cover the range 3500-8250 K, surface gravities cover the range  $\log(g)=(3.5, 5.0)$ , and metallicities cover the range (0.5, -3.5).

Figure 1 shows the  $\log(R)$  factors for solar metallicity. In addition to R-factors corresponding to the three wavelengths selected in this work, those corresponding to the R band (Johnson 1966) at  $\lambda_R = 790$  nm, L' from TCS system (Paper II) at  $\lambda_{L'} = 3690.0$  nm, and a far



**Fig. 4.** Uncertainty on the IRFM temperature induced by an error of 0.5 dex in  $\log(g)$ . Solid line: [Fe/H]=0.0; dotted line: [Fe/H]=-1; dashed line: [Fe/H]=-2

IR point at 10004.0 nm have been also plotted to display their overall properties. The correlation of gradient  $\Delta \log(R_{\rm theo})/\Delta T_{\rm eff}$  with wavelength may be appreciated in the figure (i.e. the sensitivity of R-factors to temperature increases with wavelength). The relation  $\log(R_{\rm theo}) - T_{\rm eff}$  is double-valued for the band R, which implies that it is useless to apply the IRFM in the considered  $T_{\rm eff}$  range.

Among the three wavenlengths considered in this work, the  $R_J$  factors are the least sensitive to temperature, especially for  $T_{\rm eff}$  lower than 5000 K. The sensitivities of the  $R_H$  and  $R_K$  are comparable, although as will be discussed in Sect. 5, temperatures lower than 4000 K derived using  $R_H$  are less reliable, due to the uncertainty associated to the minimum of the H<sup>-</sup> opacity reached in this band. The variations induced by the change in metallicity or surface gravity are only important for  $T_{\rm eff}$  lower than 4250 K. In particular, the variation of R-factors in the range  $\log(g) = 4 - 5$  is almost negligible. For this reason, the assignation of gravity has been done in a somewhat rough fashion, which satisfies nevertheless the accuracy requeriments of this work.

# **3**.2. $q(\lambda_{\rm IR})$ factors

The use of broad band photometry to obtain the IR monochromatic fluxes requires the application of the

so-called q-factors introduced in Eq. (3), and defined as

$$q(\lambda_{\rm IR}) = \frac{\int_{\lambda_1}^{\lambda_2} K_{\rm cal}(\lambda, \lambda_{\rm IR}) T(\lambda) d\lambda}{\int_{\lambda_1}^{\lambda_2} K(\lambda, \lambda_{\rm IR}) T(\lambda) d\lambda},$$
 (5)

where  $T(\lambda)$  is the instrumental transmission of the photometric system, which includes the detector response, the optical system of the telescope and photometer, and the absorption of the atmosphere. The function  $K(\lambda, \lambda_{\rm IR})$  is the stellar flux density normalized to the value of flux density at  $\lambda_{\rm IR}$ , and  $(\lambda_1, \lambda_2)$  is the bandpass of the system (see Appendix 1 in Paper II for further details). The q-factors allow to cope with the problem of deriving the flux in a specific wavelength from the filter-integrated flux in the whole photometric band. An optional approach to this problem is described in Saxner & Hammarbäck (1985).

Ideally, q-factors should be determined from spectroscopic data, considering a set of stars sampling homogeneously the domain of physical parameters in  $T_{\rm eff}$ ,  $\log(g)$  and [Fe/H]. Unfortunately the data-base of registered IR spectra is insufficient to make this approach realistic. In practice, we can rely on a grid of models to compute q factors. Tables 1-3 contain q-factors for bands J, H and K, ordered according to temperature, gravity and metallicity. The physical parameters adopted to generate the model for the calibration star (Vega) were  $T_{\rm eff} = 9610$  K,  $\log(g) = 3.95$ ,  $[{\rm Fe/H}] = -0.25$ . Note that the q-factors imply secondary corrections in most of the range studied.

# **3**.3. Sensitivity of $q \times R$ to the effective temperature

The separation of terms in Eq. (4) (i.e. theoretical elements in the right-handside, and observational data in the left-handside) provides a simple way of analysing the influence of errors on the derived temperatures. Tables 1-3 contain the calibration of R- and q-factors generated with Kurucz's new models as a function of temperature, metallicity and surface gravity. These relations allow to determine the errors induced by the different variables on the derived temperatures.

Figure 2 shows the error in temperature induced by a variation of 5% in factor  $q \times R$  (the theoretical counterpart to the quotient  $F_{\rm Bol}/F(\lambda_{\rm IR})$ ). As it may be appreciated, the change in temperatures derived using  $R_H$  and  $R_K$  factors is approximately constant over 4000 K: 1.5–2% for  $T_H$  and 1.5% for  $T_K$ . The change of  $T_J$  varies from 5% at 4000 K to 2% at 8000 K. Hence,  $R_J$  is the worse indicator of  $T_{\rm eff}$  for the application of the IRFM, and will only be used over 5000 K.

Figure 3 shows the influence of an error of 0.5 dex in metallicity on the temperature derived applying the IRFM in the band K. Over 4200 K the average error is under 0.25%.

Figure 4 shows the influence of an error of 0.5 dex in  $\log(g)$  on the temperature derived in the band K. The changes in temperature are practically negligible between 4200 K and 7500 K. Between 4000 K and 4200 K the change amounts 1-2%. Over 7500 K the change may amount -0.5%.

#### 4. Observational inputs for the IRFM

In the following paragraphs the different observational inputs which enter the application of the IRFM will be commented. First of all, we provide a description of the sample of stars collected for this program.

# **4**.1. The selection of the sample

The stars of the sample were extracted mainly from three independent photometric surveys: Sandage & Kowal (1986), Carney & Latham (1987) and Schuster & Nissen (1988). These works are involved with the study of different properties of halo field stars, and provide broad band UBV and Strömgren photometry. The selected sample of stars covers the entire range of effective temperature and metallicity observed in the main sequence of globular clusters, and intermediate and old disk clusters (i.e. late spectral types of luminosity class V and VI). The stars of the sample range practically 0.3 < (B-V) < 1.7, 0.1 < (b-y) < 1.0, and  $0.0 < \delta_{0.6}(B-V) < 0.3$ , which roughly implies -3.5 < [Fe/H] < 0.5. After the measurement of IR photometry (Paper I), the stars with (V - $K) \ge 4.2$  were discarded since the practical limit in temperatures of the models is around this value (equivalent to  $\sim 3500$  K). A subsample containing dwarfs, and all the subdwarfs from the Catalogue of Spectroscopic Abundances (Cavrel de Strobel et al. 1992) with [Fe/H] < 0, observable from the Teide Observatory ( $66^{\circ} > \delta > -28^{\circ}$ ) has also been included in order to revise the published relations [Fe/H]=  $f((b-y), m_1, c_1, \delta_{0.6}(U-B), (B-V)...)$ . The revisions will provide good estimates of the metallicity for the remainder of the stars of the programme (see Sect. 4.5). A number of stars in the sample are in the input catalogue of the Hipparcos mission. The sample also contains a group of metal poor stars whose parallaxes have been accurately determined (Sandage 1983; Laird et al. 1987; Van Altena et al. 1988).

The dwarfs and subdwarfs from Carney (1983a, b) not common to Paper I were incorporated in order to increase the sampling of the metallicity range for types F0-K0. It is noteworthy the good quality of Carney's photometry, and also the close similarity of TCS and CIT infrared systems. The dwarfs contained in the list of calibration stars of the TCS (Kidger 1992) not measured for this programme have also been incorporated into the sample. Some stars contained in the study of M dwarfs by Legget (1992) with  $(V-K) \leq 4.0$  were initially

Table 10. Comparison between the temperatures derived in the present work (Col. 2) and those derived by Blackwell & Lynas-Gray (1994) (Col. 3). The mean difference  $T_{\rm IRFM}-T_{\rm BG89}$  is  $-31\pm58$  K

Star	$T_{IRFM}$ (K)	$T_{BL94}$ (K)	$\Delta T$ (%)	$\Delta T (K)$
HR0509	5388	5316	-1.34	72
HR0219 *	5817	6044	3.90	-227
HR0937	5996	6042	0.77	-46
HR1101	5998	5977	-0.35	21
HR1325	5079	5163	1.65	-84
HR1729	5847	5947	1.71	-100
HR5447	6770	6763	-0.10	7
HR5634	6571	6617	0.70	-46
HR5986	6158	6169	0.18	-11
HR8905	5954	6050	1.61	-96

<sup>\*</sup> This spectroscopic binary star has been discarded in the computation of the mean difference.

included in the sample, but their cool temperatures (3500-

4000 K) are well under limit of validity of the models due to the problems associated to the computation of molecular opacities (Kurucz 1991). Finally, some bright population I stars from Saxner & Hammarbäck (1985) and Bell & Gustafsson (1989), and population II stars from Arribas & Martínez-Roger (1989), who provide temperatures obtained by applying the IRFM, have been included in the sample in order to make comparisons.

In summary, the final sample consists of nearly 500 stars. This number clearly surpasses that of the previous works devoted to the study of the scale of temperatures of low main sequence, especially those which analyse metallicity effects.

#### **4**.2. The IR monochromatic fluxes

The determination of monocromatic fluxes at a wavelength of the IR continuum requires, from the observational side, the measurement of IR photometry for the problem stars with respect to a standard whose absolute flux be well determined. By using the results summarised in Sects. 4.2.1 and 4.2.2, we have determined the monochromatic fluxes in  $\lambda_J$ ,  $\lambda_H$  and  $\lambda_K$  for each star in the present sample, which are listed in Table 4.

#### **4**.2.1. The IR photometry

The programme of broad band photometry in the near IR is described in Paper I. There, the photometric system of the TCS was characterized and the transformation equations into/from different photometric systems were established. The J, H and K magnitudes were measured for 75% of the stars in the sample, with an accuracy in the order of 0.02 mag. For the remainder of the stars, the photometry was obtained from the literature (Carney 1983a, b; Legget 1992; Kidger 1992; Saxner & Hammarbäck 1985; Bell & Gustaffson 1989), after checking that these works had a similar level of accuracy.

The isolated effect of the photometric errors on the  $T_{\rm eff}$  determination can be inferred from Sect. 3.3, taking into account Eq. (4).

#### **4**.2.2. The absolute calibration of the IR flux

In Paper II, a semiempirical method was devised to determine the absolute calibration of the flux of Vega in the near IR (from J to L). This absolute calibration sets on the same scale the temperatures derived applying the IRFM with new Kurucz's models and the mean direct temperatures derived from angular diameters measurements. When compared to the results of the only sofar empirical calibration, summarised by Mountain et al. (1985, M85), a clear trend with wavelength may be appreciated (+0.2% in the band J, -1.5% in the band Hand -4.5 in the band K). This point suggests that the IR fluxes for Vega by M85 are overestimated towards the longest wavelengths. However, it is worth noticing the good agreement (within 1%) with the semiempirical calibration for Vega provided by Walker & Cohen (1992), the theoretical one by Dreiling & Bell (1980) and the 'selfconsistent' calibration by Blackwell et al. (1991).

The errors in the absolute IR flux calibration have different effects on the temperatures derived by mean of the IRFM, depending on the photometric band (Table 5). The errors of the absolute IR flux calibration were estimated 3% in the band J, and 4% in the bands H and K. Over 4000 K the effect of these errors is practically a shift in the zero point of the temperatures scale. Considering that the above errors correlate in the three bands, the shift in the zero point of the temperature scale would amount 1.2-1.7% over 4000 K. However if, as it is most likely, the errors in the three bands are uncorrelated, the shift of the zero point is around 0.4-0.9%. Although the indetermination of the zero point of the scale is common to all kind of methods used to derive temperatures, the method adopted in Paper II to fix the absolute calibration of the

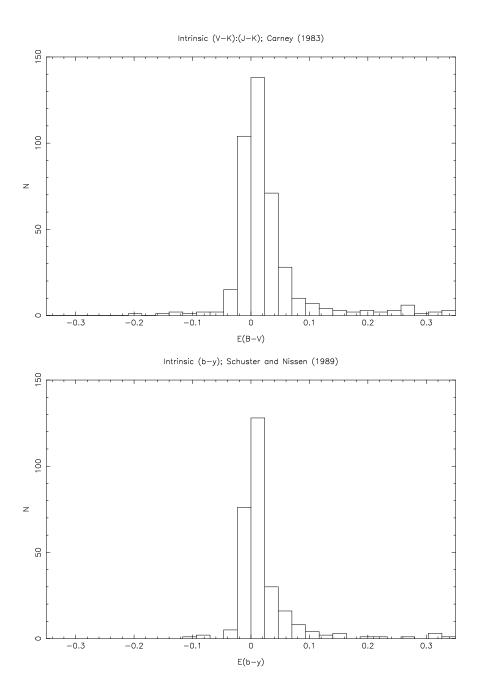


Fig. 5. Top: extinction histogram (E(B-V)) obtained applying to the stars of the sample the method based on the intrinsic colours (V-K):(J-K) (Carney 1983). Bottom: extinction histogram (E(b-y)) obtained applying to the stars of the sample the method based on the intrinsic relations Strömgren photometry- $\beta$  index (Schuster & Nissen 1989)

flux in the near IR was designed in order to minimise this error.

## **4**.3. The bolometric fluxes

For the spectral types studied in the present work, nearly all the flux arriving at the edge of the earth atmosphere passes through the atmospheric windows. Petford et al. (1988) report an accuracy of the order of 2% when compar-

ing  $F_{\rm bol}$  derived directly from calibrated spectra to  $F_{\rm Bol}$  obtained integrating UBVRI photometry. Therefore, the bolometric flux might be obtained from broad band photometry for each star in the sample. However, photometric calibrations of the type provided by Blackwell & Petford (1991) represent a more practical, and as accurate approach. Unfortunately, this calibrations do not include the effect of the metallicity, being only valid for Population I stars. In order to overcome this difficulty, we provided in

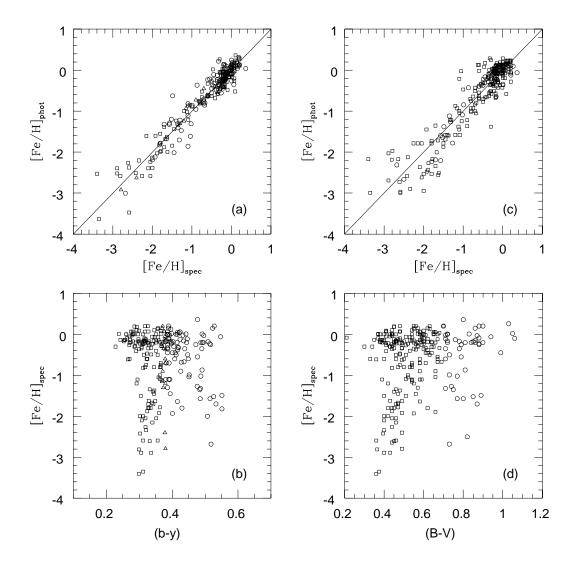


Fig. 6. a) Comparison between spectroscopic values of the metal abundance (Cayrel de Strobel et al. (1992) and Beers et al. (1991)) and values derived using the calibration by Schuster & Nissen (1989) revised according to expressions (6) and (7). Circles: calibration for F stars, squares: calibration for G stars, triangles: stars in the overlapping range of F and G calibrations. b) Range of colour covered by the revised calibration by Schuster & Nissen (1989). c) Comparison between spectroscopic values of the metal abundance (Cayrel de Strobel et al. 1992 and Beers et al. 1990) and values derived using the calibration by Carney (1979) revised according to expressions (9) and (10). Squares: (B - V) > 0.7, circles: (B - V) < 0.7. d) Range of colour covered by the revised calibration by Carney (1979)

Paper III calibrations of the bolometric flux as a function of K, (V - K) and [Fe/H] for main sequence stars of spectral types F, G and K, which grant the overall level of accuracy expected for the final temperatures derived in this work. It should be noted that these calibrations are ultimately based on the optical absolute flux calibrations of Vega by Hayes & Latham (1975) and Tüg et al. (1977), and the IR absolute flux of Paper II. The bolometric fluxes assigned to the stars in the sample are listed in Table 4.

#### **4**.4. The reddening correction

Most of the stars in the sample should not be significantly affected by the interstellar absorption, since are distributed close in the solar neighbourhood. However, in some cases reddening corrections need to be applied. Therefore, E(B-V) has been estimated for each star in the sample. When these values have been considered significant, the colours have been corrected according to the extinction law  $(A_{\lambda} = f(A_{V}, \lambda))$  compiled by Landolt-Börnstein (1982c). Two independent methods

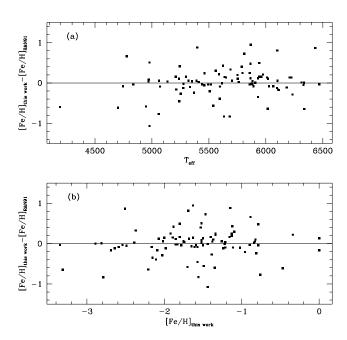


Fig. 7. a) Differences between the metallicities adopted in this work and those derived by Ryan & Norris (1991) versus effective temperature. b) The same that in a) versus metallicity. The differences show no apparent trends either with temperature or metallicity

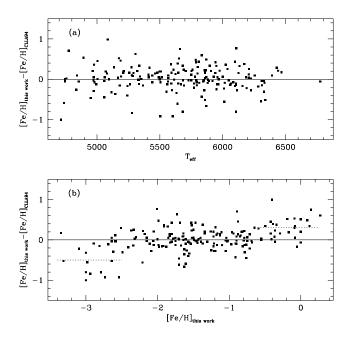


Fig. 8. a) Differences between the metallicities adopted in this work and those derived by Carney et al. (1994) versus effective temperature. b) The same that in a) versus metallicity. No trend may be appreciated with temperature. However, our [Fe/H] estimate is 0.5 dex higher for [Fe/H] < -2.5, and 0.3 dex lower for [Fe/H] > -0.5

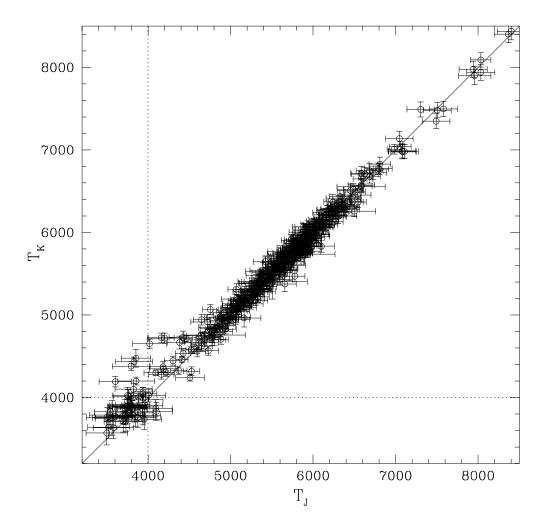


Fig. 9. Comparison between  $T_J$  and  $T_K$ . The dotted lines mark the lower limit ( $T_{\text{eff}} = 4000 \text{ K}$ ) where models begin to falter due to the lacking of molecular opacity sources. It is worth notice the progressive departure of the points from the diagonal towards the cooler stars

have been considered for determining E(B-V). The first one is based on the intrinsic relation (V-K):(J-K) (Carney 1983a), considering E(V-K)=2.72 E(B-V) (Savage & Mathis 1979). The histogram obtained with all the values within the application range is presented in Fig. 5. The second method is based on the  $\beta$  index and Strömgren photometry. Schuster & Nissen (1989) have calibrated E(b-y) with an accuracy of 0.015 mag. The result of applying this calibration to the stars of the sample is showed in the histogram of Fig. 5.

Moreover a number of stars of the sample have extinction estimations determined by other authors (Laird et al. 1987; Beers et al. 1990) based on reddening maps by Burnstein & Heiles (1982). The correlation between the different methods is acceptable for E(B-V) < 0.1 mag,

over this value it worsens.

When Strömgren and  $\beta$  photometry was available the method by Schuster & Nissen (1989) was preferred, considering  $E(B-V){=}0$  for  $E(b-y){<}0.025$ , and  $E(B-V){=}1.37$  E(b-y) otherwise (Crawford 1975). The values taken from the literature, and those determined by means of the intrinsic relation (V-K):(J-K) were considered for the remainder of the stars. Table 4 contains the reddening value assigned to each star in the sample. Note that only a relatively reduced number of stars (about 15 percent) needed reddening correction.

The first line of Table 5 shows the change in temperature induced by  $E(B-V){=}0.05$  mag when applying the IRFM. The effect is stronger for hot stars which emit most of their flux in the visible/UV wavelength range.

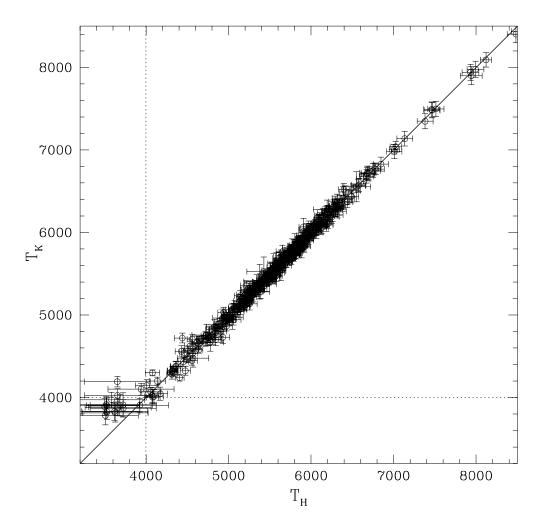


Fig. 10. The same that Fig. 9 for  $T_H$  and  $T_K$ . Notice the small dispersion around the diagonal line over 4000 K

## 4.5. Metallicity and surface gravity

The effective temperature determination by means of Eq. (4) requires an estimation of the star metallicity and surface gravity. These parameters, however, need not to be very accurate as commented in Sect. 3.3. In particular, it may be concluded that 0.5 dex and 0.3 dex uncertainties in  $\log(g)$  and [Fe/H], respectively, are sufficient to obtain temperatures within an accuracy of 2% (see Table 6). Therefore, regarding the surface gravity, it is enough to consider an average surface gravity  $\log(g)=4.5$  for the subdwarfs. However, taking into account the effect of  $T_{\rm eff}$  on the stellar radius, we have preferred to assign log(g) = 5for the cooler stars, and  $\log(g)=4$  for hotest population I stars. These values are compatible with those provided in the reviews by Popper (1980) and Andersen (1991) for dettached binary systems formed by main sequence stars. The gravities adopted for the stars of the sample are listed in Col. 2 of Table 4.

Unfortunately, only a limited number of stars in the sample had their metal abundance determined from fine spectroscopic analysis included in the Catalogue of [Fe/H] determinations by Cayrel de Strobel et al. (1992). Therefore for the remainder of stars, photometric metallicity calibrations based on  $\delta_{0.6}(U-B)$  index (Carney 1979), and on Strömgren photometry (Schuster & Nissen 1989), were adopted.

Instead of apply directly these calibrations, we have checked their validity and accuracy. For this purpose, 252 dwarfs and subdwarfs from Cayrel de Strobel et al. (1992) were considered. For each star we assign an averaged abundance giving preference in the weights to recent data based on solid state detectors. We also included, in that group for checking the photometric calibrations, 45 dwarfs from Beers et al. (1990) common to our sample. We have found slight differences between the photometric calibrations and the spectroscopic values which are

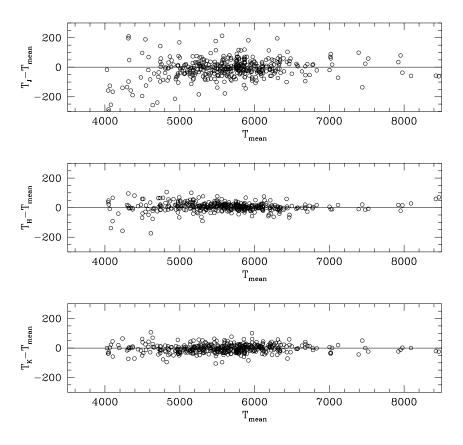


Fig. 11. Differences  $T_J - T_{\text{mean}}$  (top),  $T_H - T_{\text{mean}}$  (center) and  $T_K - T_{\text{mean}}$  (bottom) versus effective temperature adopted. No apparent trend may be appreciated

commented below.

(a) Strömgren photometry calibration. (Schuster & Nissen 1989): 238 stars with spectroscopic determination of the abundance are within the ranges of the calibrations by Schuster & Nissen (1989). The following corrections were applied:

$$[{\rm Fe/H}]^{\rm F}_{\rm phot} = 0.82 [{\rm Fe/H}]_{\rm spec} - 0.08, \; \sigma = 0.18, {\rm dex} \; n = 150, \eqno(6)$$

$$[\text{Fe/H}]_{\text{phot}}^{\text{G}} = 0.93 [\text{Fe/H}]_{\text{spec}} - 0.01, \ \sigma = 0.21, \text{dex } n = 105,$$

where the superindex refers to the calibration of type  $\dot{F}$  and G stars. The zero correction is practically negligible, whereas the correction of the slope may imply differences of 0.3-0.5 dex. If we consider both calibrations altogether, the correction should be:

$$[\text{Fe/H}]_{\text{phot}} = 0.85 [\text{Fe/H}]_{\text{spec}} - 0.04, \ \sigma = 0.22, \text{dex } n = 238.$$
(8)

This result agrees with the conclusion by Schuster & Nissen (1989) that their calibrations should perhaps require a slight correction to adjust the revised spectroscopic

values (they propose a multiplicative factor of correction for their calibration of 1.15 which roughly coincides with our correction).

(b) Broad band photometry:  $\delta_{0.6}(U-B)$  (Carney 1979): 259 stars with spectroscopic determinations are within the range of the calibration of  $\delta_{0.6}(U-B)$  index by Carney (1979). This calibration has been extended to the limit permitted by the deblanketing vectors provided by Sandage (1969). Correction differs according to colour.

$$[\text{Fe/H}]_{\text{phot}} = 0.83 [\text{Fe/H}]_{\text{spec}} - 0.02, \ \sigma = 0.28 \text{ dex},$$
 (9)  
 $n = 212, \ (0.35 < (B - V) \le 0.7),$ 

$$\begin{split} [\text{Fe/H}]_{\text{phot}} = 1.03 [\text{Fe/H}]_{\text{spec}} + 0.10, \;\; \sigma = 0.25 \; \text{dex}, \;\; (10) \\ n = 48, \;\; (0.7 \geq (B-V) < 1.1), \end{split}$$

Figure 6 shows the comparison, after corrections, between the spectroscopic and photometric values of the abundance, and the ranges of colour and metallicity covered. Notice the loss of sensitivity, with increasing

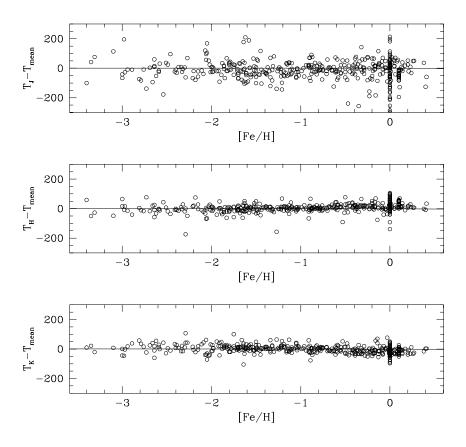


Fig. 12. The same that Fig. 11 versus [Fe/H]

metallicity, in both calibrations.

In summary, the metallicity has been assigned in a twofold way: Firstly, spectroscopic determined [Fe/H] (Cayrel de Strobel et al. 1992), with a mean accuracy within 0.15 dex, have been preferred. Secondly, the revised calibrations by Schuster & Nissen (1989) (accuracy within 0.2 dex) and Carney (1979) (accuracy within 0.3 dex) were applied to the stars lacking fine spectroscopic analysis.

For the M stars extracted from the compilation by Legget (1992), metallicity has been assigned according to their kinematical classification (i.e. [Fe/H]=0 for young disk stars, [Fe/H]=-1 for young disk to old disk transition stars, and [Fe/H]=-1.5 for old disk stars).

The assigned metallicities are listed in Col. 3 of Table 4.

## 4.5.1. Comparison to other determinations

Our work share 92 and 186 stars in common with the extensive surveys of Ryan & Norris (1991; R&N91) and

Carney et al. (1994; CLLA94) respectively. Both works provide a good basis to check the scale of metallicity adopted here.

In Fig. 7, we compare our [Fe/H] estimates to the abundances derived by R&N91 based on a calibration of the Ca II H and K line absorption. The mean difference [Fe/H]<sub>This work</sub>—[Fe/H]<sub>R&N91</sub> is 0.01 dex with  $\sigma=0.37$  dex. The scatter of the differences is compatible with the internal errors of both works. No trend of the differences may be appreciated either with temperature (Fig. 7a) or with metallicity (Fig. 7b).

The comparison of the abundances adopted by us with those derived by CLLA94, based on the cross correlation of high resolution low S/N spectra with model templates, shows a fairly good agreement in the range from  $[{\rm Fe/H}]{=}{-}2.5$  to  $[{\rm Fe/H}]{=}{-}0.75$ . However, noteworthy differences appear for  $[{\rm Fe/H}]{<}{-}2.5$  and  $[{\rm Fe/H}]{>}{-}0.5$ . The overall mean difference  $[{\rm Fe/H}]_{\rm This\ work}{-}[{\rm Fe/H}]_{\rm CLLA94}$  is 0.01 dex with  $\sigma=0.31$  dex. No trend with temperature may be appreciated in the differences (Fig. 8a), however there exists a clear correlation with metallicity (Fig. 8b).

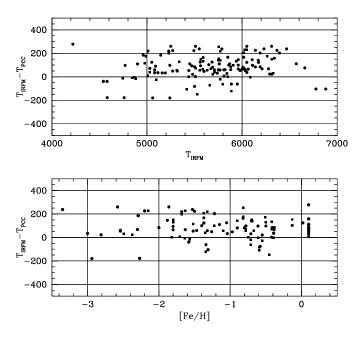


Fig. 13. Differences between the temperatures derived in this work ( $T_{\rm IRFM}$ ) and those derived by Peterson & Carney (1979; Squares), and Carney (1983; Circles).  $T_{\rm PCC}$  are, in average, 100 K cooler than those derived in the present work. There exists a slight trend with temperature. The differences have a slight slope amounting approximately 100 K between the extreme points of the overlaping range

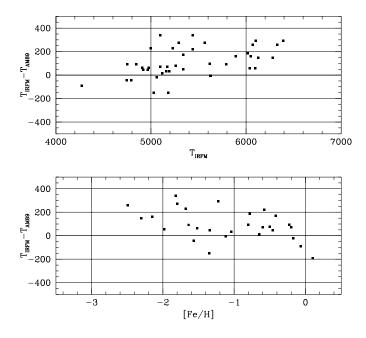


Fig. 14. Differences between the temperatures derived in this work ( $T_{\rm IRFM}$ ) and those derived by Arribas & Martínez-Roger (1989).  $T_{\rm AM89}$  are, in average, 150 K cooler than those derived in the present work. There exist clear trends with temperature and metallicity. The differences may be explained taking into account the different models and absolute flux calibration of the IR flux adopted in both work

On the one hand, our [Fe/H] estimate for the most metal defficient stars ([Fe/H] < -2.5) is 0.5 dex higher in average than [Fe/H]<sub>CLLA94</sub>, which implies a difference of  $\pm 0.2\%$  in the temperature derived using the IRFM. On the other, our [Fe/H] estimate for stars with [Fe/H]> -0.5 is 0.3 dex lower in average, which implies a difference of  $\pm 0.4\%$  in temperatures derived using the IRFM.

# 5. The temperatures determination

According to the procedure described in previous sections, we have derived three effective temperatures for each sample star by applying the IRFM in the IR wavelengths considered (Eq. 4). The individual values  $T_J$ ,  $T_H$  and  $T_K$ , with their errors are listed in Table 4.

Figures 9 and 10 present the comparison between the temperatures obtained in the three different bands taking  $T_K$  as a reference. The individual errorbars allow to appreciate that the dispersion is compatible with the estimated errors derived from the uncertainties in the input parameters of the IRFM. As expected, the uncertainties are greater for temperatures obtained from  $R_J$  factors, due to the lesser sensitivity of the IRFM in this band, and the greater photometric error in the measurement of J. The consistency of  $T_J$ ,  $T_H$  and  $T_K$  is good over 4000 K, however under this temperature there exist noteworthy discrepancies due to the fact that  $R_J$ - and  $R_H$ -factors lose their sensitivity to temperature in this range.

The final temperature was derived as the mean of  $T_J$ ,  $T_H$  and  $T_K$  weighted with the inverse of their errors:

$$\overline{T_{\text{IRFM}}} = \frac{\frac{T_J}{(\Delta T_J)} + \frac{T_H}{(\Delta T_H)} + \frac{T_K}{(\Delta T_K)}}{\left[\frac{1}{\Delta T_I} + \frac{1}{\Delta T_H} + \frac{1}{\Delta T_H}\right]}.$$
(11)

In order to estimate the error of the mean temperature, a linear transmission of the errors was considered, given that the errors in each band are not totally independent:

$$\Delta T_{\text{IRFM}} = \frac{3}{\left[\frac{1}{\Delta T_J} + \frac{1}{\Delta T_H} + \frac{1}{\Delta T_K}\right]},\tag{12}$$

where the error in the temperature of each band is defined by

$$(\Delta T_i)^2 = \left[\frac{\Delta T_i}{\Delta [q(\lambda_i)R(\lambda_i)]}\right]^2 (\Delta [q(\lambda_i)R(\lambda_i)])^2 + \left[\frac{\Delta T_i}{\Delta [\text{Fe/H}]}\right]^2 (\Delta [\text{Fe/H}])^2 + \left[\frac{\Delta T_i}{\Delta \log(q)}\right]^2 (\Delta \log(q))^2$$
(13)

Over 5000 K, the temperatures in the three bands enter the average with similar weight. In that range, the assignation of weights automatically takes into account the unlike sensitivity of the IRFM in the different bands

and the individual quality of IR photometry. However, under 5000 K only  $T_H$  and  $T_K$  has been considered in the average, since  $R_J$  is a very insensitive indicator of temperature for the cooler stars. Under 4000 K, only  $T_K$  has been considered. This is due to the fact that the coolest models show in the band H a local maximum of flux which is not observed in IR spectra (Lançon & Rocca-Volmerange 1992). The mean error in the final temperatures is around 1-2%. Notice however, that the uncertainties in the temperatures derived under 4000 K are greater than the errors determined from Eq. (12) due to the dificulties of models in this range caused by the absence of important sources of opacity associated to some molecules. Likewise, the IRFM is difficult to apply at temperatures over 8000 K (five stars of the sample have such high temperatures) because as these stars emit a substantial proportion of energy at short wavelengths, the correction for insterstellar extinction and the determination of the bolometric flux are rather uncertain. For these reasons, the temperatures outside the range 4000 K <br/>  $T_{\rm eff}$  <8000 K have a lower level of accuracy (perhaps a most adequated estimation is the duplication of the size of the errorbars quoted in Table 4 for these temperatures).

We show in Figs. 11 and 12 the differences of  $T_J$ ,  $T_H$  and  $T_K$  from the mean temperature adopted. Over 4000 K they follow approximately a normal distribution both with effective temperature and metallicity.

#### 6. Comparison with other determinations

In this section, we provide the comparison of our temperatures with those derived by other authors for common stars of the sample. Furthermore a detailed analysis of the scale of temperatures derived from the present work will be done in a subsequent paper by considering the mean relations  $T_{\rm eff}$ :[Fe/H] and photometric colours UBVRIJHK and uvby- $\beta$ .

The Sun and Procyon, the only dwarfs later than F5 whose diameters has been measured by optical methods, are included in the sample. The agreement between their IRFM temperatures and the direct ones is excellent. In fact, the IRFM provides 6579 K for Procyon, close to the direct temperature (6510 K) obtained considering its angular diameter (Hanbury-Brown et al. 1974; Mozurkewich et al. 1991) and its bolometric flux (Code et al. 1976). Regarding the Sun, the value derived from the IRFM determination is 5763 K. This good agreement is a consequence of the procedure followed for scaling the effective temperatures obtained from the IRFM, since the absolute calibration in the near IR was established on the basis of empirical diameters measurements. In addition, it is worthy to notice that the mean temperatures of solar analogue stars (espectral types G0/2V, [Fe/H] $\sim 0$ ,  $(B-V)\sim$ 

0.63) is close to the solar value (5743 $\pm$ 100 K vs. 5780 K for the Sun), and the same for stars of types F3/5V, [Fe/H] $\sim$ -0.05,  $(B-V)\sim$  0.43 similar in their features to Procyon (6578 $\pm$ 150 K vs. 6510 K).

The works by Peterson & Carney (1979), and Carney (1983a) (hereafter PCC), based on spectrophotometric analysis, contain respectively 43 and 64 stars common to our sample whose range of temperatures and metallicities is similar to that analysed in the present programme. Figure 13 shows the difference  $T_{\rm IRFM}-T_{\rm PCC}$  versus temperature and metallicity. PCC temperatures are, in average, 100 K cooler than those derived in the present work. No significant trend of the differences with metallicity may be appreciated. However there could exist a slight slope along the axis of temperatures amounting approximately 100 K between the extreme points of the overlaping range. This difference is compatible with the uncertainty of the zero point. The different models considered might also explain the observed discrepancies.

There are 18 stars common to the work by Saxner & Hammarbäck (1985, SH85) devoted to F stars and based on the application of the IRFM. The good agreement is noteworthy as can be appreciated from Table 7. The differences are compatible with the errors of both works, and the average residuals only amount  $5\pm63$  K ( $T_{\rm SH85}$  are cooler).

The work by Magain (1987) based on the IRFM presents 11 stars in the metallicity range (-1, -3). The mean difference  $T_{\rm IRFM} - T_{\rm M87}$  is  $112\pm 56$  K (Table 8) which implies a shift of 1.9% in the zero point of the temperature scale. This work adopts the IR absolute flux calibration provided by SH85 which is very close to ours (+0.3% in J and +1.8% in K), so the differences of the models considered in each work should account for the shift of the zero.

There are 28 stars common to the work by Arribas y Martínez-Roger (1989, AM89), based on the application of the IRFM using the empirical absolute flux calibration of the IR flux of Vega derived by Mountain et al. (1985), and models by Kurucz (1979) and Gustaffson et al. (1975). The systematic differences found both with temperature and metallicity (Fig. 14) may be explained taking into account that the models used in the present work include new oppacities, and also to the problems of the IR absolute flux calibration derived by Mountain et al. (1985) as described in Paper II.

Bell & Gustafsson (1989, BG89) present 13 dwarfs common to the present sample. BG89 temperatures are based on the IRFM corrected using IR synthetic colours. Over 4500 K the differences listed in Table 9 are compatible with a zero point shift of  $56 \text{ K } (T_{\text{BB89}})$  are hotter). For

the coolest stars, where models loses reliability, differences are stronger. The discrepancies are explained taking into account the differences in the bolometric fluxes considered in both works (see Paper III).

Blackwell & Lynas-Gray (1994, BLG94) have recently applied the IRFM using the new Kurucz's models to a sample of Population I stars. Although only 11 dwarfs are common to the present sample and consequently possible systematic differences are difficult to ascertain, that work is a good source for comparison, given that the main difference respect to the present work is the IR absolute flux calibration. BLG94 adopt the theoretical calibration of the IR flux of Vega provided by Dreiling & Bell (1980), which differ less than 1% in all the bands from that adopted here. Table 10 shows the differences. In average,  $T_{\rm BLG94}$  are 31 K hotter than ours (the spectroscopic binary HR 219 has been discarded in the mean), this shift in temperature ( $\sim 0.6\%$ ) is compatible with the slight difference in the bolometric fluxes (around 1.5%), as analysed in Paper III.

# 7. Summary

The IRFM has been applied to a sample of approximately 500 main sequence stars later that F0, which cover the metallicity range (0.5, -3.5). Near IR monochromatic fluxes have been used in order to derive  $T_J$ ,  $T_H$  and  $T_K$ for each star. The uncertainties of the input parameters needed to apply the IRFM and the induced errors on the three temperatures derived have been computed. The consistency of the temperatures derived in the three different bands is fairly good over 4000 K. The final temperature for each star in the sample has been derived considering the mean of  $T_J$ ,  $T_H$  and  $T_K$  weighted with the inverse of their errors. From the analysis of the systematical errors associated to the uncertainty of the absolute flux calibration in the near IR, the expected indetermination of the zero point of the scale of temperatures should be around 1%. However the good agreement between the IRFM and direct temperatures for the Sun and Procyon suggests a lower uncertainty. The mean estimated precision for the final temperatures, considering the effect of both systematical and accidental errors, is around 1.5%. The comparison with other works shows slight discrepancies which may be explained considering the differences induced by the improvements adopted in the application of the IRFM: The new atmosphere models, the absolute IR flux calibration and the determination of the bolometric fluxes.

Acknowledgements. We are grateful to Dr. R.L. Kurucz for providing us a magnetic tape with his models, and to Prof. B.W. Carney for his remarks and comments concerning several points of this work. We are also grateful to the referee Prof.

D.E. Blackwell for his comments and suggestions which have certainly improve this paper. This work has been supported by the DGICYT under contracts PB90-0548 and PB91-0526.

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Table 4. The input parameters needed to the application of the IRFM for each star of the sample. Column 1: Identification, the Giclas number has been preferred when available HD, BD, HR and GJ numbers were used otherwise. The stars are ordered in right ascension. Column 2: Surface gravity. Column 3: Metallicity. Column 4: Bolometric flux in (erg cm<sup>-2</sup> s<sup>-1</sup>). Column 5: Interstellar redenning. Column 6: Monochromatic flux in the band J in  $(10^2 \text{ erg cm}^{-2} \text{ s}^{-1} \text{ nm}^{-1})$ . Column 7: q-factor in the band J. Column 8: Temperature derived in the band J (units are K). Column 9: Error in  $T_J$  computed considering errors in  $F_{\text{Bol}}$ ,  $F_J$ ,  $\log(g)$  and [Fe/H]. Columns 10-13: The same that Cols. 6-9 for the band H. Columns 14-17: The same that Cols. 6-9 for the band K. Column 18: The weighted mean temperature derived from  $T_J$ ,  $T_H$  and  $T_K$ . Temperatures in brackets have not been considered in the mean as explained in Sect. 5. Column 19: Mean error computed considering linear transmission of errors from Cols. 9, 13 and 17. Temperatures under 4000 K are given in parentheses without estimation of the total error because of the uncertainties of the model fluxes in this range

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4.00		-2.05	1.8246-11	10.0	1,7586-12	1,000	5280	951	2,523e-13	1017	6240	ę	8.8426-14	1.515	1188	82	6234	D0
# 500 - 3.09		90.0	1.0840-00	0,00	7.202e-11	25	[] []	3	1.9598-11	1.044	#1. 1.	2	11-8158-1	1.07	1713	8:	ee r igir igir igir	:: 3
4.00 - 0.2, 1.752241 0.00 1.752421 1.022 (4779) 5.00 0.000 0.000 7.75021 0.00 5.152442 1.023 (4779) 5.00 0.000 0.000 7.75021 0.00 5.152442 1.023 (4774) 4.50 - 2.00 2.000 0.000 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.00 0.000 0.000 0.000 0.000 4.50 - 0.000 0.000 0.000 0.		3.08	2.5088-11	0.00	9.2336-12	1.539	2222	279	1.8776-13	1.020	0000	3:	1.744-12	3.5	61.5	6	4	N 4
4.50		# 2	11-9282.8	8 8	11 - 00 A - 14	71.7	G 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	6 6	1.2229-12	1.012	10.1	8 2	9.3244-17	1207	* 1	3 33	197	2 2
4.50 -2.1, 2.4024.1 0.00 0.00 0.000.1 1.038 0.000.4 4.50 0.00. 2.4024.1 1.008.1 1.000.2 1.000.		1000	7 7200-11	88	0.1.00.10 0.1.00.10		[41cm]	9 70	01-2000-2	1 050	7.17	1 5	0.00000	180	027.6	2	1283	3.5
# 50 -1.09 8.28F=12 0.01 2.148e-12 1.039 0.034 4.50 -1.09 0.029 4.50 -1.09 0.029 4.50 -1.09 0.029 4.50 -1.09 0.029 4.50 -1.09 0.029 4.50 0.02 0.02 0.029 4.50 0.02 0.02 0.029 4.50 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0		-2.30	2.4526-11	00'0	C. 8486-18	1.038	72.00	124	2.0280-13	1.020	1989	15	1,3010-12	1.018	1163	113	2031	2
4.50 0.50, 1.008-11 0.07 2.525-12 1.008 6415 4.50 -2.00, 2.975-12 0.05 4.50 -2.00, 1.722-12 0.00 4.50 -2.00, 2.502-12 0.00 4.50 -2.00, 2.502-12 0.00 4.50 -2.00 4.50		-3.69	8.2678-12	0.05	3.14Be-12	1,039	22.5	176	1.1835-13	×157	3089	Ŧ	4.272e-19	1.017	6093	12	6100	3
4.50 -2.80 5.759-12 0.05		6	1.000e-11	50.0	2,552e-12	1.008	6413	129	1.2888-13	1.016	3313	84	4.838+ 14	1.018	61.3	45	17557	8
4.00 0.02 6.756-23 0.00 0.784-11 1.01 0.057 4.20 -2.75 1.722-12 0.00 0.294-12 1.002 4.50 -2.88 4.844-12 0.00 1.0040-12 1.009 6.500 4.50 -2.88 4.844-12 0.10 1.004-12 1.009 6.500 4.50 -1.70 1.4875-11 0.00 4.450-12 1.009 6.500 4.50 -1.00 1.007 1.004-12 1.009 6.500 5.00 0.00 0.00 2.008-12 1.009 6.009 5.00 0.00 0.00 2.008-11 0.00 0.294-12 1.009 6.009		-2.90	5.959-12	0.03	ı	ı	I	I	8,351+-14	1 023	54.33	7.2	8,715e-14	191	5448	ą.	60,000	6.0
4.25 -22.76 0.000 4.5004012 1.002 10.002 4.25 4.26 0.00 4.5004012 1.003 10.002 4.25 4.26 4.26 4.26 4.26 4.26 4.26 4.26 4.26	•	0.02	6.9746-13	00.0	1,824r-15	1.613	0.687	186			:		A.56886-11	1.014	82.80	2	5996	101
4.50 -0.65 e.(86#-11 0.00 1.660#-12 1.011 4428] 4.50 -2.68 4.64#-12 0.10 1.100#-12 1.009 6500 4.50 -1.66 1.848#-11 0.00 4.63#-12 1.009 5.00 5.00 0.00 2.000 2.00#-11 0.00 1.22#-12 1.019 4.50 0.00 2.000 2.00#-11 0.00 1.22#-12 1.019 4.50 0.00 2.000 2.00#-10 0.00 1.22#-12 1.019 4.50 0.00 2.000 2.00#-10 0.00 1.2#-12 1.011 0.02#-1		10.4	1.722e-10	0,00	4,03006-12	1.018	0707	200	2.4430-12	07071	11117	5	3.9038-12	1.017	6839	8	6030	100
4.50 - 2.68 4.8444-12 0.10(201.2 1.008 6500 450 - 1.00 1.004 4.50 - 1.00 1.004 4.50 - 1.00 1.004 4.50 1.009 5.00 5.00 5.000 5.004 1.00		-0.65	4.088+-11	600	1.860e-12	1.011	4425	S	1.288=.12	1.043	4534	8	1.9364-19	1.036	45.39	Ş	0757 T	3
4.00 -171 1-4478-11 0.00 4-8259-11 1.009 5005 50 0.00 2.000-11 0.09 6.0444-13 1.009 3005 4.00 0.00 2.000-11 0.09 6.0244-13 1.009 3.009 4.00 0.00 2.000-11 0.00 4.000-12 1.001 3.001		69 ( 60 (	4,8440-12	0.10	03e.12	1.008	6500	258	F. 134.F 14	1015	525	230	3,2974-14	e :	7	5 2	6:00 <b>4</b>	77
2.00 0.00 2.000 1.000 1.000 1.000 1.000 0.		7.	11-97-6-11	000	7 T - 4 X M & - 4	200	6	177	2.4329-14 0.4004-14	1.0724	Man I	- 5	0.1000 a	a 14 5 & 3 =	6000	- 2	1001	3 5
100 C		300	2.000011	0000	27.67.6	1.612	373.1	2 20	8 50 Vis. 13	1000	7 D T T	7	51-20 <b>31</b> 55	1023	41.25	6	4000	2 2
1000 TEXT T-300000 DIV ST MARKET COURT DOOR		60.0	1.268e 15	0.00	4.5996-12	1.011	70000	8	2.5540-12	1.0.7	5582	ŗ.	B.450e-13	1.018	26.83	7.	5565	9
3 4.50 .2.54 2.423-11 0.00 1.1588-12 1.008 5270		2.84	2,4230-11	0.00	1.1.58e-13	1.018	6220	907	E.741e-13	1 025	5235	2	2.540 P. J.	1.030	5207	4.	5279	×

Table 4. continued

High   Control   Control	В	log(g)	[Fe/H]	FRol	E(B-V)	F	4J	IJ	$\Delta T_J$	FH	4H	7 H	$\Delta T_H$	FK	4K	$X_{\tau}$	N. D	Ттеап	t-mean
Color   Colo	G-079-042	4.50	-1.56	1.413e-11	0.00	4.420e-13	1.009	55.54 4 to 1	121	2.427e-13	1.024	5638	1.1	8.922e-14	1.019	5666	2.0	5634	d† 9 ac e
Color   Colo	HR1084	4.50	0.08	1.003e-08	0.00	3.885e-10	1.014	5090	142	I	I	I	I	9.178e-11	1.023	5046	62	5076	e c
Color   Colo	HR.1101	4.00	-0.12	5.186e-09	0.00	1.476e-10	1.013	6033	157	: 	T i		1 1	2.914e-11	1.015	5981	4.	20.00	101
Colored   Colo	HD22502	4.50	0.00	5.979e-11	0.00	4.432e-12	L	V3200	ì	2.058e-12	1.054	4464	51	7.310e-13	1.029	4542	36	4503	9 19
1,000   1,00	G080-015	#.00 1	-0.71	5.898e-10	0.00	1.778e-11	1.011	5779	123	9.657e-12	1.021	0.420	30 1-	3.547e-12	7.67	2308	2 :	00100	ò
15   15   15   15   15   15   15   15	G006-034	5.10	0.00	1.081e-10	0.00	6.158e-12	1.012	3556	80.7	5.510e-12	1 2	C3500	8	1.955e-12	1.000	00-00 00-00 00-00		(5(55) 5866	<del> </del>
Second Color   Color	11021200	4.00	70.7	1 4000-10	0.00	0.404e-10	1.000	Freeze	000	0.11001.0	100 L	1000	- 5	1 4070 10	650	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1 d	4842	
Fig.   E. Steps   C. Composition   C.	HD20329	4, 4 0 1	40.1-	1.453e-10	60.0	5.861e-12	200.1	[4600] 5028	80	5.1956-12 1.0045-10	1.030	40.40	2	4 8816.11	1001	5034	24	5040	. 60
The control of the	G000 018	9 Y	- 1.5- 1.8-1	5,511e-03	000	1 610 12	000	000	. 6	7 9745 13	1.00	8048	5 2	7.0016-11	1.041	5044	ť	8034	74
10	VB 17	, T	01.0	1 1456-10	000	3.936e-12	200	00000	1,50	2.112e-12	1.022	5619	4.2	8.089e-13	810.	5537	- 53	5561	t- oc
73         4.00         0.10         5.555c-10         0.00         1382c-11         10.02         65.75         11.00         67.95         89         20.75-22         10.00         67.95           4.00         0.10         5.255c-11         0.00         1382c-11         10.02         62.75         10.00         67.95         89         20.75-22         10.00         67.95           4.00         0.10         6.255c-11         0.00         12.75-22         10.00         62.95         81         20.75-22         10.00         62.95         81         20.75-22         10.00         62.95         81         20.00         82.95         82         80.00         82.95         82         80.00         82.95         80.00         82.95         80.00         82.95         80.00         80.00         82.95         80.00 </td <td></td> <td>9 4</td> <td>0.10</td> <td>1.6136-10</td> <td>00.0</td> <td>E.241e-12</td> <td>1.014</td> <td>2668</td> <td>122</td> <td>2.737e-12</td> <td>1.019</td> <td>5794</td> <td>. 6</td> <td>1.026e-12</td> <td>1.015</td> <td>5746</td> <td>; ;</td> <td>5749</td> <td>90</td>		9 4	0.10	1.6136-10	00.0	E.241e-12	1.014	2668	122	2.737e-12	1.019	5794	. 6	1.026e-12	1.015	5746	; ;	5749	90
11.5         4.00         0.10         1.535-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00         1.255-1.0         0.00	62 74	4.00	0.10	7.6024-10	00.00	1.7736.11	1.012	6684	163	8.370e-12	1.006	6749	. on	3.03Te-12	1.006	6750	8	6736	102
15   15   15   15   15   15   15   15	vA 21E	4.00	01.0	5.828e-10	00.0	1.3826.11	1010	6627	163	6.590e-12	1.007	6682	9 00	2.369e-12	1.007	6707	50	6681	102
5, 50         0.10         3.248-1.1         0.00         0.00         1.00         0.00	VB 40	. 4	0.0	1.3574.10	20.0	4 206e-12	1017	0.000	1,7	2.173e-12	1.017	5900	80	8.055e-13	1.014	5870	12	5868	91
5.6         (10)         (20)		8.5	0.00	1.5058-10	00.0	1 0579 1	1012	2000	101	K 128e-19	909	9099	) t	1 8704-12	1000	8508	0.8	6498	5
6.0         7.0         0.0         5.0         1.0         5.0         1.0         5.0         1.0 <td>VA 010</td> <td>8 9</td> <td>0.0</td> <td>4.200e-10</td> <td>00.0</td> <td>1,0016-11</td> <td>1010</td> <td>[4202]</td> <td>101</td> <td>1 0566 10</td> <td>0201</td> <td>, to 10</td> <td>- 78</td> <td>4 1916-13</td> <td>000</td> <td>4447</td> <td>, n</td> <td>40.00</td> <td>9 10</td>	VA 010	8 9	0.0	4.200e-10	00.0	1,0016-11	1010	[4202]	101	1 0566 10	0201	, to 10	- 78	4 1916-13	000	4447	, n	40.00	9 10
25.2.         10.0         10.0         20.0         20.0 <t< td=""><td></td><td>20.00</td><td>01.0</td><td>6 937m.11</td><td>00.0</td><td>1.000e11a</td><td>1.01</td><td>5005</td><td>127</td><td>1.500c-12</td><td>1.030</td><td>K235</td><td>5 2</td><td>5.941e-13</td><td>1.021</td><td>5173</td><td>3</td><td>5180</td><td>80</td></t<>		20.00	01.0	6 937m.11	00.0	1.000e11a	1.01	5005	127	1.500c-12	1.030	K235	5 2	5.941e-13	1.021	5173	3	5180	80
66.2         5.0         COLOR SEGRETION DO STREAM         CO	V A 300	9 5	01.0	2 0326-10	00.0	5.8596-12	4101	1500	157	2 949A-12	410	6118	4 60 - 80	1 090e-12	1 012	6093	1 15	6091	, <del>1</del> 6
717         50         60	44 600	5 5	01.0	0.6604.11	000	3 3304 10	10.	1 W	150	1 8540-12	1001	1,547	200	7 1934-13	1018	10 P.	67	5494	386
747         75	210	9 6	91.0	5.372e-11	9000	2 1-920-5 2 1-920-43	1015	5083	52	1.2634-12	1.032	5147	2.5	4.860e-13	1.022	5072	. 69	5102	æ
77.8         57.0         0.10         1775-19.1         17.0	v A 747	20.5	010	4.262e-11	00.0	1.713e-12	1.014	[4994]	136	1.052e-12	1.035	5057	7.0	4.084e-13	1.023	4973	61	5009	62
8.00         0.10         2.106e-12         0.00         2.10fe-12         0.00         2.10fe-12         0.00         2.10fe-12         0.00         2.10fe-12         0.00         0.10fe-12         0.00         0.00fe-12	v 4 748	4.50	0.10	1 7914-10	00.0	5 616e-12	1.014	ETAD	154	2.956e-12	1.018	5847	7.9	1.104e-12	1.015	5805	72	5816	91
4.00         0.32         3.1476-12         0.00         1.356-13         1.01         5.88         8.2276-13         1.02         6.58         1.02         2.400         1.03         2.400	vA 778	5.00	0.10	5.399e-11	0.00	2,100e-12	1.015	5095	135	1.240e-12	1.031	5193	72	4.770e-13	1.022	3115	63	5140	81
4,00         0.04         1.3745-09         0.00         4,001         1.03         58.00         1.03	G008-050	4.50	-0.32	3.168e-12	0.00	1.283e-13	1.012	[4883]	88	8.827e-14	1.041	4805	110	3.494e-14	1.026	4705	60	4740	18
4.50         0.04         1.374e-10         0.00         4.374e-10         0.00         4.20e-11         0.01         4.20e-11         0.01         4.20e-11         0.01         4.20e-11         0.00         4.20e-11         0.00         4.20e-11         0.00         4.20e-12         0.00         1.20e-12         0.00         4.20e-12         0.00         1.20e-12         0.00         1.20e-12<	HR1536	4.00	0.13	1.307e-09	0.00	4.031c-11	1.014	5830	148	2.177e-11	1.018	5830	 	8.030e-12	1.015	5812	9	5823	85
5.00         0.00         6.02         6.00 <th< td=""><td>HR1543</td><td>4.50</td><td>0.04</td><td>1.374e-08</td><td>0.00</td><td>3,341e-10</td><td>1.012</td><td>6541</td><td>162</td><td>I</td><td>I</td><td> </td><td>I</td><td>6.234e-11</td><td>1.011</td><td>6404</td><td>80</td><td>6482</td><td>107</td></th<>	HR1543	4.50	0.04	1.374e-08	0.00	3,341e-10	1.012	6541	162	I	I		I	6.234e-11	1.011	6404	80	6482	107
4.50         -2.01         3.544+11         0.00         9.540+11         0.00         9.540+12         1.01         6.084         107         4.718-24         1.019         6.099         77         1.704+31         1.016         6.684         107         7.724-13         1.019         6.084         107         1.018         6.099         77         1.724-13         1.019         6.084         10.01         10.01         6.084         10.01	GJ182	5.00	0.00	6.623e - 11	0.00	4.091e-12	l	<3500	I	3.403e-12	1	<3500	I	1.227e-12	1.034	3639	136	(3639)	;
4.50         1.108         2.758         1.09         2.758         1.09         2.758         1.09         2.758         1.01         6.849         7.3         1.748         1.01         6.849         7.3         1.748         1.01         6.849         7.3         2.078         1.01         6.00         1.509         2.00         1.059         2.208         1.01         6.00         1.509         2.208         1.01         6.00         1.509         2.208         1.01         6.00         1.509         2.208         1.01         1.01         2.208         1.01         0.00         2.709         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         2.71         1.01         0.00         0.71         0.71         0.71         0.71         0.71         0.71         0.71         0.71         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.72         0.	G084-029	4,50	-2.01	3.404e-11	0.00	8.901e-13	1.009	6084	107	4.719e-13	1.019	6000	9 6	1.704e-13	1.016	6141	80 2	6110	82
4.00         0.10         5.00         1.00 <th< td=""><td>020-960-0</td><td>4 ·</td><td>-1.95</td><td>3.738e-11</td><td>0.00</td><td>9.760e-13</td><td>1.010</td><td>6168</td><td>975</td><td>5.UZ9e-13</td><td>3.016</td><td>2073</td><td>25</td><td>1.188e-15</td><td>1.015</td><td>0 70 0 0 0 0 0 0 0 0 0</td><td>8 8</td><td>0770</td><td>- 4</td></th<>	020-960-0	4 ·	-1.95	3.738e-11	0.00	9.760e-13	1.010	6168	975	5.UZ9e-13	3.016	2073	25	1.188e-15	1.015	0 70 0 0 0 0 0 0 0 0 0	8 8	0770	- 4
4.50         1.61         5.296-12         0.00         3.479-13         1.00         (4.42)         1.72         2.24R-13         1.03         472         56         5.06-14         1.021         475         46           4.50         -1.61         5.238-12         0.00         3.479-13         1.011         [3642]         110         -1.624-10         1.000         2.376-14         1.012         4.50         -1.60         7.244-10         0.00         2.777-11         1.011         [36942]         2.11         0.02         2.376-14         1.025         3.575-14         1.025         3.527-14         1.025         3.527-14	GU64-U37	00.4	-1.19	0.0000-11	70.0	1.0556-12	1.008	0000	0 1 1 1 1 1	5. (45e-15	17071	0	3	2.0/96-10 0-110e-11	1.016	5840	3.5	0 X	4 8
4.50         0.09         5.2818-12         0.08         2.1318-13         1.014         [458]         1.01         1.417e-13         1.03         4.88         6.8         5.231c-14         1.025         4.88         6.9         5.231c-14         1.02         4.99         4.00         2.742e-10         1.00         3.777e-11         1.01         510         5.18         1.02         4.88         6.9         5.231c-14         1.02         4.99         4.00         4.724e-11         1.01         7.247e-13         1.02         5.269         89         6.00         2.777e-13         1.00         5.274e-10         0.00         2.777e-13         1.00         5.282e-11         1.024         5.287         4.7         4.7         1.02         4.00         1.00         2.214e-14         1.012         5.282e-11         1.024         5.287         4.7         4.745e-11         1.01         5.224e-14         1.01         5.01         1.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         5.02         4.02         5.02         5.02         5.02         5.02         <	GD86-039	4.50	-1.61	8.291e-12	0.00	3.4794-13	1 009	[4842]	122	2.2486.13	1.038	4723	92	8.501e-14	1.021	4750	1 9	4739	4
5.00         -1.50         7.424e-10         0.00         3.887e-11         1.01         3.884e-11         1.01         3.887e-11         1.01         3.887e-11         1.01         3.887e-11         1.02         6.250         -1.50         2.82e-12         1.02         3.87         1.7         1.02         3.87         1.2         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.87         1.02         3.88         3.89 <td>G096-038</td> <td>4.50</td> <td>-0.09</td> <td>5.281e-12</td> <td>0.03</td> <td>2.131e-13</td> <td>1.014</td> <td>[4938]</td> <td>101</td> <td>1.417e-13</td> <td>1.039</td> <td>4886</td> <td>8</td> <td>5.231e-14</td> <td>1,025</td> <td>4898</td> <td>3</td> <td>4892</td> <td>64</td>	G096-038	4.50	-0.09	5.281e-12	0.03	2.131e-13	1.014	[4938]	101	1.417e-13	1.039	4886	8	5.231e-14	1,025	4898	3	4892	64
4.00         0.020         9.7726-10         0.00         3.7776-11         10.102         5.1866-11         10.20         5.237         4.7         8.228-12         10.20         5.2766-10         0.00         3.7776-11         10.102         5.1806-11         10.20         5.2476-12         10.02         5.2476-12         10.02         5.2476-12         10.02         5.2476-10         0.00         5.2476-10         10.01         6.10         5.1206-11         10.20         5.2476-10         10.02         5.2576-11         10.02         5.2476-11         10.02         5.2476-11         10.02         5.2476-12	G099-015	5.00	-1.50	7.424e-10	0.00	3.687e-11	1.011	[3954]	211	3.314e-11	1	<3500	I	1.242e-11	1.027	3737	123	(3737)	I
4.50         1.39         2.476e-10         0.02         8.776e-13         1.00         5.150e-13         1.029         5.150e-13         1.029         5.150e-13         1.029         5.150e-13         1.029         5.150e-13         1.029         5.150e-13         1.029         5.252e-13         1.02	HR1925	4.00	-0.20	9.735e-10	0.00	3.717e-11	1.013	5110	60	2.169e-11	1 030	5237	₩	8.282e-12	1.021	5172	40	5185	53
5.00         0.00         5.444e10         0.00         3.687e11         1.024         [314]         30         1.244e11         1.032         3832         109         (2           4.00         0.00         5.744e10         0.00         2.687e14         1.012         6107         1.5         1.04         4.06         0.01         2.744e11         1.012         6251         7           4.00         0.00         8.201e-13         0.03         2.714e-14         1.012         677         1.2         1.00         2.601e-11         1.016         578         1.6         1.15e-12         1.017         591         6.2         1.002e-13         1.02         582         7           4.00         0.00         8.704e-13         1.000         578         1.6         1.15e-13         1.02         582         92         -1.02         582         7         4.0         1.0         582         7         4.0         1.0         582         7         4.0         1.0         582         1.0         582         1.0         582         1.0         582         1.0         582         1.0         582         1.0         582         1.0         582         1.0         582	G102-020	4.50	-1.39	2.479e-11	0.02	8.779e-13	1.009	5221	120	5.150e-13	1.029	5267	125	1.927e-13	1.020	5269	68	5254	109
4.00         0.016         9.574e-09         0.00         2.511e-14         1.012         6.377         159         —         4.00         0.016         9.574e-09         0.00         2.511e-14         1.012         6.377         1.30e-1         —         4.00         0.016         8.201e-09         0.00         1.70te-10         1.013         6.717         1.70te-1         1.016         6.72         1.017         6.72         1.00         6.830         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         6.831         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.00         8.831         1.12         1.12 <th< td=""><td>G191-031</td><td>5.00</td><td>0.00</td><td>7.424e-10</td><td>0.00</td><td>3.687e-11</td><td>1,012</td><td>[4101]</td><td>198</td><td>3.262e-11</td><td>1.054</td><td>[3619]</td><td>300</td><td>1.249e-11</td><td>1.032</td><td>3832</td><td>133</td><td>(3832)</td><td>  3</td></th<>	G191-031	5.00	0.00	7.424e-10	0.00	3.687e-11	1,012	[4101]	198	3.262e-11	1.054	[3619]	300	1.249e-11	1.032	3832	133	(3832)	3
4.50         0.00         8.201e-13         0.10         7.894         1.00         3.91         0.00         3.500e-13         1.01         0.00           4.50         0.00         8.201e-10         1.07         7.89         1.66         —         —         —         —         0.00         3.500e-13         1.020         5.29         4.350e-13         1.020         5.37         1.02         5.28         6.8         1.990e-13         1.020         5.37         1.02         5.28         6.8         1.990e-13         1.02         5.39         4.50         1.02         5.39         4.50         1.02         5.39         4.50         1.02         5.39         4.50         1.02         5.39         4.50         1.02         5.39         4.50         1.02         5.39         4.50         4.50         1.02         5.39         4.50 <td< td=""><td>HR1983</td><td>90.4</td><td>-0.16</td><td>9.574e-09</td><td>0.00</td><td>2.511e-10</td><td>1.012</td><td>6277</td><td>159</td><td>  500</td><td>  5</td><td>  6</td><td>  9</td><td>4.745e-11</td><td>1.014</td><td>6251</td><td>- 5</td><td>6250</td><td>104</td></td<>	HR1983	90.4	-0.16	9.574e-09	0.00	2.511e-10	1.012	6277	159	500	5	6	9	4.745e-11	1.014	6251	- 5	6250	104
4.50         -1.26         5.7726-11         0.00         1.9786-12         1.00         5.29         1.6         1.156-12         1.02         5.28         9.2         4.3356-13         1.020         5.37         7.2           4.50         -1.74         2.601e-11         0.00         2.934-13         1.002         5.37         1.02         5.33         68         1.9026-13         1.020         5.39         6.0           4.50         -1.32         R.456-11         0.00         2.934-12         1.002         5.25         1.02         5.336         68         1.9026-13         1.02         5.39         6.0         4.50         4.50         1.03         5.34         6.0         5.346-13         1.002         5.34         1.01         5.25         1.02         1.02         5.39         6.0         4.50         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1         1.02         5.34         6.1	H R 2085	90.4	0.00	8.201e-15	00.0	7.2346-14	2010	7083	2 9 2	*1-300c-1		7160	2	3 0036-13	1.007	8248	98	2010	113
4.50         -1.74         2.601e-11         0.05         8.658-13         1.008         53.75         1.36         5.129e-13         1.027         5336         68         1.909e-13         1.020         5359         60           4.50         1.074         2.600e-11         1.028         2.516e-13         1.028         363         1.024         384         1.12         6           4.50         1.086         2.576e-13         1.009         2.834e-13         1.009         5.576         1.656e-13         1.026         5.648-13         1.034         384         1.12         4.50	G100-054	4.50	-1.26	5.712e-11	0.00	1.978e-12	1.009	5299	176	1.155e-12	1.028	5328	32	4,333e-13	1.020	5320	22	5319	66
5.00         0.00         5.79e+10         0.00         2.95e+11         1.012         (3886)         22.         2.50e+11         1.058         [328]         3.00         9.65e+12         1.034         3814         112         (3846)         4.50         -1.32         4.69e+12         1.037         3814         112         (3886)         4.50         -1.32         4.69e+12         1.034         3814         112         (3886)         4.50         -1.32         4.69e+12         1.034         5283         16         1.57f+12         1.027         5375         74         6.148e+14         1.019         54.60         4.50	G102-047	4.50	1.74	2.601e-11	0.05	8.658c-13	1.008	5375	136	5.129e-13	1.027	5336	68	1.909e-13	1.020	5359	60	5353	77
4.50         1.32         8.468e-12         0.00         5.293e-12         1.008         5.293         162         1.656e-13         1.027         5.375         74         6.148e-14         1.019         5.490         4.5           4.50         1.02         2.934e-12         1.008         5.233         84         1.706e-13         1.027         5.236         1.935e-13         1.029         5.236         67         1.935e-13         1.010         5.238         161         5.271e-13         1.029         5.236         67         1.935e-13         1.020         5.288         161         5.271e-13         1.029         5.236         67         1.935e-13         1.010         5.288         161         5.271e-13         1.029         5.236         67         1.935e-13         1.010         5.288         161         5.271e-13         1.029         5.236         67         1.935e-13         1.014         5.83         1.247e-12         1.029         5.236         74         1.535e-13         1.029	GJ229	5.00	00.0	5.579e-10	0.00	2.958e-11	1.012	[3836]	223	2.505e-11	1.058	3626	300	9.663e-12	1.034	3814	112	(3814)	H
4.50	6-098-056	4.50	-1.32	R.469e-12	0.00	2.934e-13	1.009	5293	162	1.665e-13	1.027	5375	₹ :	6,148e-14	1.0.13	2400	un s	10 to	123
4.50         1.03         2.453e-11         0.00         6.737e-13         1.01         6.777e-13         1.01         6.777e-13         1.01         6.777e-13         1.00         6.277e-13         1.01         6.777e-13         1.00         6.73         7         4.531e-13         1.02         5.05 </td <td>G098-058</td> <td>05.4</td> <td>-1.86</td> <td>9.307e-11</td> <td>0.05</td> <td>2.939e-12</td> <td>1,008</td> <td>5523</td> <td>4 +</td> <td>1.706e-12</td> <td>1.026</td> <td>. 545 </td> <td>15 P 10 P 10 P</td> <td>6.284e-13</td> <td>1.079</td> <td>5523</td> <td>ମଧ୍ୟ କମସ</td> <td>02210</td> <td>200</td>	G098-058	05.4	-1.86	9.307e-11	0.05	2.939e-12	1,008	5523	4 +	1.706e-12	1.026	. 545 	15 P 10 P 10 P	6.284e-13	1.079	5523	ମଧ୍ୟ କମସ	02210	200
4.50         0.00         7.206-11         0.00         2.885-12         1.04         5.87         1.53         1.247-12         1.00         6739         79         4.586-13         1.01         6738         72         4.586-13         1.00         5.187         75         1.116-12         1.03         5190         72         1.586-13         1.02         5138         72           4.00         0.10         1.236-12         1.01         5187         1.51         1.116-12         1.03         5190         72         1.512-12         1.03         480         85         1.02         5138         43           4.50         0.00         1.136-11         1.002         4787         171         6.116-12         1.03         480         88         1.02         483         10         2.35-12         1.02         483         10         2.236-12         1.02         483         10         2.236-12         1.02         483         10         1.02         483         10         1.02         483         10         4.50         10         4.50         10         8.236-12         1.01         8.756         10         2.256-12         1.02         8.236-12         1.02         8.236-12	G101-035	0 P	/0.0- Ca :-	2.455e-11	0.00	6.771e 13	200	0263 1987	133	3.271E-13	1 038	520D	ŏ I	1 K21e-12	1 020	5305	0.4	5280	2.5
5.00         -1.04         1.875e-70         0.00         6.783e-12         1.010         5187         75         4.11fe-12         1.031         5190         72         1.535e-12         1.020         5198         4.3           4.00         0.00         1.38e-63         0.00         1.35e-12         1.002         8402         1.07         8.534         1.07         2.53e-12         1.020         8439         1.03         4.69         8401         1.07         2.53e-12         1.03         84847         1.04         4.69         8913         1.0         2.23e-12         1.0         4.69         1.0         1.23e-12         1.0         8.53e-12         1.0         8.54e-13         1.0         8.54e-13<	HD45281	50.50	0.00	7.206e-13	0.00	2,385e-12	1.014	5.58	133	1.247e-12	1.020	5739	7.5	4.585e-13	1.016	5733	2	5703	91
4,00         0.00         1138e-03         0.00         1.516e-11         1.002         4402         177         6.117e-12         0.997         8534         107         2.23e-12         0.965         8439         103           4,00         0.02         8.317e-11         0.00         8.23fe-12         1.0101         8774         17.1         8.23fe-12         0.986         89.3         1.021e-12         0.995         8487         10.7           4,00         0.00         8.95fe-12         1.001         8.747         17.1         3.256e-12         0.98         8913         110.21e-12         10.92         4847         40           4,00         -1.60         1.046e-11         0.00         5.95ge-12         1.001         4.747         118         2.906e-13         1.036         4841         69         1.121e-13         1.028         3.58         1.02         4.841         69         1.116e-14         1.027         4.69         1.02         4.841         69         1.116e-14         1.02         4.841         69         1.116e-14         1.02         4.841         69         1.116e-14         4.69         1.02         4.841         60         1.116e-14         4.669         8.8         4.841	HD45282	5.00	-1.04	1.875e-10	0.00	6.783e-12	1.010	5187	75	4.116e-12	1.031	5190	7.5	1.531e-12	1.020	5198	44	5193	59
4.50	HR2324	4.00	00.0	1.138e-09	00.0	1.516e-11	1.002	8402	171	6.117e-12	0.997	8534	107	2.253e-12	0.995	8439	103	8464	120
4.00 0.000 6.805e-10 0.000 8.216e-12 1.001 8774 171 8.259e-12 0.889 8813 110 1.210e-12 0.895 8786 107 5.00 1.035e-10 0.000 8.216e-12 1.001 8.75e-12 0.895 8786 107 1.210e-12 0.895 8786 107 1.000 1.035e-12 0.00 5.226e-12 0.00 5.226e-12 0.00 5.226e-12 0.00 5.289e-13 1.009 [4747] 118 2.905e-12 0.036 478 161 6.185e-14 1.027 4689 108 4.50 1.56 2.185e-12 0.03 5.289e-13 1.009 6.041 188 2.985e-13 1.018 6.093 101 1.097e-13 1.016 6.009 8.5 4.50 1.56 2.185e-12 0.00 5.75e-12 1.010 6.041 188 2.985e-13 1.018 6.03 8.5 5.75e-12 1.011 6.678 8.5 5.75e-12 1.011 6.681 8.5 5.00 1.150 5.209e-12 0.00 1.475e-12 1.010 6.000 1.475e-13 1.008 6.000 1.475e-14 1.011 6.07 8.0 5.095e-14 1.013 6.851 54 1.009	G108-053	4.50	.0.36	3.172e-11	0.00	1.323e-12	1.012	4 7 8 7 4 7 5 7 5	172	8.531e-13	1.039	4866	* in	3.212e-13	1.024	4847	40	4855	F4.
5.00 1.00 1.0856-10 0.00 5.9526-12	HR2383	9.90	0.00	6.905e-10	00.0	8.216e-12	1.001	8764	171	3.259e-12	0.99€	8913	110	1.210e-12	0.995	300	107	8825	124
4.50 1.1.59 1.1486-11 0.01 4.5556-13 1.003 [4/47] 178 2.3956-13 1.035 4778 161 6.156-14 1.027 4569 108 4.50 -3.00 5.569-12 0.03 2.3956-13 1.003 6041 188 2.9856-13 1.018 6083 101 1.0976-13 1.016 6089 85 4.50 -1.56 2.1336-11 0.00 5.7216-13 1.009 668 130 1.585-13 1.018 6083 101 1.0976-13 1.016 6089 85 5.00 -1.58 1.4376-19 0.03 3.1956-11 1.009 688 130 1.585-13 1.011 6673 88 5.7576-12 1.000 688 130 1.1756-13 1.0176-13 1.0176-13 1.0176-13 1.0176-13 1.0176-13 1.0176-13 1.018 5851 54 (4.50 -2.20 5.2306-11 0.00 1.4776-13 1.008 583 7.108 7.9726-14 1.021 5876 80 2.9936-14 1.018 5851 54	C105-049	9.00	-1.50	1.085e-10	0.00	5.952e-12	6	V3500	1 1	5.325e-12	8	V3560	{	1.972e-12	1.028	1586	142	(3586)	5
4.50 -1.56 2.133-11 0.00 5.721-12 1.009 6041 28.2 28.5-13 1.008 6093 10 1.097-13 1.016 6099 85 4.50 -1.58 1.457-19 0.03 3.196-13 1.009 6685 1.30 1.582-13 1.018 6093 10 1.097-13 1.016 6089 82 5.00 -1.58 1.457-19 0.03 3.196-13 1.019 6685 1.30 1.582-13 1.010 673 88 5.757-12 1.011 6873 82 5.00 1.593-13 1.024 4.026 81 6.00 1.477-13 1.013 5.00 1.00 1.477-13 1.013 5.00 1.00 1.477-13 1.013 5.00 1.00 1.477-13 1.005 5.00 1.00 1.477-13 1.005 5.00 1.00 1.477-13 1.005 5.00 1.005 5.00 1.005 5.00 1.005 5.00 1.005 5.00 5.00	G103-050	S 5	60.0	1.140e-11 8.458e-12	10,0	4.558e-13	1.009	4.4.7	206	2.903e-13	1.036	4541	16.9	1,1120-13	1.021	4669	10.8	4713	129
4.50 -0.88 1.457e-09 0.03 3.199e-11 1.009 6688 130 1.593e-11 1.011 6673 88 5.755e-12 1.011 6681 82 5.00 -1.50 2.908e-11 0.00 1.432e-12 1.011 [4009] 2.06 1.176e-12 1.050 [3655] 3.00 4.176e-13 1.024 40.26 81 4.50 -2.20 5.230e-12 0.00 1.477e-13 1.008 5.837 1.08 7.572e-14 1.021 5.876 80 2.993e-14 1.018 5.851 5.4	G192,043	8 8	1.56	2 1338-11	00.0	5 7916-13	1 000	1±0±1	188	2 985e-13	1018	2023	<u> </u>	1.0979.13	1 016	6609	9 mg	6085	111
5.00 -1.50 2.908e-11 0.00 1.432e-12 1.011 [4009] 206 1.176e-12 1.050 [3655] 300 4.176e-13 1.024 4026 81 (4.50 -2.20 5.230e-12 0.00 1.477e-13 1.008 5.837 108 7.972e-14 1.021 5878 80 2.993e-14 1.013 5851 54	HR2530	4,50	80.0	1.437e-09	0.03	3.196e-11	1.009	6685	130	1.593e-11	1.01	6673	80	5.757e-12	1.011	6681	82	6679	36
4.50 -2.20 5.230-12 0.00 1.477e-13 1.008 5.837 10.8 7.597e-14 1.021 5.876 80 2.993e-14 1.018 5.551 54	G110-021	5.00	-1.50	2.908e-11	0.00	1.432e-12	1.011	[4009]	206	1.176e-12	1.050	[3655]	300	4.17Ce-13	1.024	4026	81	(4026)	
	G088-010	4.50	-2.20	5.230e-12	0.00	1.477e-13	1.008	5837	108	7.972e-14	1.031	5876	80	2.993e-14	1.018	5851	55	5856	74

Table 4. continued

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.50 1.50	6.777e-11 1.932e-11 1.932e-11 1.366e-13 1.212e-09 1.212e-09 1.22e-11 1.86fe-11 1.86fe-11 1.86fe-11 1.86fe-11 1.86fe-11 1.86fe-11 1.86fe-11 1.86fe-12 2.276e-13 2.276e-13 2.276e-13 2.276e-14 2.276e-14 2.276e-14 2.276e-14 2.276e-14 2.276e-16 2.276e-17 2.276e-		3.3844-12 3.3844-12 1.1134-10 1.1136-10 3.4136-13 3.4136-13 3.437-11 3.437-13 3.437-13 3.437-13 3.437-13 3.437-13 3.437-13 3.437-13 4.831-12 4.831-	1,001 1,002 1,003		253 253 1126 1166 1166 1166 117 110 110 110 110 110 110	2.2066-12 2.806-12 2.0044-13 2.0026-13 2.0026-13 2.5336-13 1.8036-13 2.0076-12 2.0076-12 2.0076-13 2.0076-	1.063 1.020 1.020 1.022 1.017 1.019 1.019 1.027 1.027 1.031	<3500 [3661] 5881 6030 — 5770	300 34 61 118	1,245e-12 1,079e-12 1,122e-13 7,723e-14 1,969e-11	1.029 1.034 1.018 1.017 1.009	3570 2880 5895 6030 6989 5813	144 102 73 84 86 108	(3870) (3880) 5871 6015 7020 5786 6208 5928 5781	75 78
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.85	1.8226-11 1.466-12 1.466-13 1.226-03 1.1226-03 1.1226-03 1.1246-10 1.5376-10 1.5376-10 1.5376-10 1.5376-10 1.5376-10 1.5376-10 1.5376-10 2.2086-10 2.2086-10 2.2086-10 2.2086-10 2.2086-10 2.2086-10 3.216-10 2.2086-10 3.216-10 3.216-10 3.216-10		5.7846-12 1.1366-13 1.1366-13 1.1366-13 3.4576-13 3.4576-13 5.456-13 5.456-13 5.456-13 5.456-13 5.456-13 7.3426-13 7	1008 1008 1008 1008 1008 1009 1009 1009	\$40.4 \$40.4	·	2.0424-13 2.0426-13 2.0426-13 3.5346-13 1.8036-13 1.8036-13 5.2076-12 5.2076-12 2.0776-13 2.1606-09 1.7826-12 1.7826-12 3.7081-13	1,021 1,021 1,020 1,017 1,019 1,019 1,027 1,031 1,031 1,034	5881 5881 6030 	54 118 118	1.122e-13 1.122e-13 7.723e-14 1.969e-11	1.018	5895 6030 6030 5813	7.3 84 108	(5889) 5871 6015 7020 5786 5208 5928	7.5 8.7
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1.13.0 1.13.0 1.13.0 1.13.0 1.15.0 1.	1,466e.11 2,517e.09 2,517e.09 2,517e.09 3,124e.10 3,124e.10 1,057e.10 1,557e.10 1,557e.10 2,766e.11 2,766e.12 2,766e.13 2,766e.13 1,430e.10 4,745e.10 4,745e.10 4,745e.10 3,230e.11 2,203e.09 2,203e.10 3,230e.11 2,203e.10 3,230e.11 2,203e.10 3,230e		3.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3940c.13.3960c.13.3	1008 1008 1008 1008 1000 1000 1000 1000	5948 7080 6191 6191 5150 6191 5150 6184 6133 6103 6103 7748 5108 5108 5108 5108 5108 5108 5108 510	•	2.0924-13 2.0924-13 1.0024-13 1.0024-13 1.0024-13 1.0024-13 2.0776-13 2.0776-13 1.7826-12 1.7826-12 3.3706-13	1,020 1,020 1,017 1,019 1,019 1,031 1,027 1,009	8030 8030 1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	118	7.723e-14 1.969e-11	1.017	6030 6989 5813	84 86 108	6015 7020 5786 6208 5928 5781	87
1. 4. 4. 4. 4. 4. 4. 4. 4. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.	0.011 0.011 0.010	5.500-11 2.200-11 2.200-11 1.212-09 2.256-11 1.077-11 1.077-11 1.077-11 2.760-11 2.760-11 2.760-11 2.760-10 2.300-10 3.201-09 3.2		1.1139-1.	1,000 1,000	7080 5762 5176 5176 5176 5150 5003 6003 6003 7481 7481 5138 5138 5138 5138 5138 5138 5138 51	•	8.533e-13 1.846e-11 1.846e-11 5.2077e-13 2.077e-13 2.160e-09 1.782e-12 7.088e-12 3.370e-13	1,022 1,015 1,019 1,019 1,027 1,027 1,034	5770 5770	841	1,969e-11	1.009	6989 5813	86 108	7020 5786 6208 5928 5781	5
24 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5	1.1.5 1.	2.2026-11 1.2026-11 1.2026-11 1.0026-11 1.0026-11 1.0026-11 1.5676-11 1.5676-10 2.2086-10 2.2086-10 2.2086-10 2.2086-10 3.216-10 3.216-10 3.216-10 3.5339-11 2.2086-10		6.419e-13 3.451e-13 3.451e-13 3.451e-13 8.706e-12 2.812e-13 8.447e-12 8.487e-12 7.342e-12 7.342e-12 4.831e-12 4.831e-12 8.4831e-12 8.4831e-12 8.4831e-12 8.4831e-12 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13 8.4831e-13	1008 1008 1009 1009 1009 1009 1009 1009	5.762 6191 6191 6191 6191 6191 6088 6088 603 603 603 603 603 603 603 603 603 603	•	3.533e-13 1.803e-13 1.846e-11 5.207e-12 2.077e-13 2.077e-13 1.782e-12 7.083e-12 3.370e-13	1,022 1,017 1,019 1,018 1,031 1,009	5770	118	11.000	1.018	5813	108	5786 6208 5928 5781	113
2 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5	2.5.6 0.088 0.088 0.088 0.0000 0.0000 0.00	1.369e.11 1.212e.09 3.124e.09 2.226e.11 1.567e.11 1.567e.11 1.567e.11 2.209e.10 2.326e.09 1.432e.0 1.432e.0 3.230e.10 2.516e.12 2.326e.0 3.516e.10 3.533e.10 3.533e.10 3.533e.10 3.533e.10 3.533e.10 3.533e.10 3.533e.10 3.533e.10		3.4436-13 3.4576-11 3.4576-11 8.4106-13 4.4006-03 2.512-12 3.7690-12 7.3420-11 7.3420-12 7.3420-12 7.3420-12 7.3420-12 7.3420-13 7	1000 1000 1000 1000 1000 1000 1000 100	6191 5509 5509 5504 6504 6504 6504 6504 6503 6502 6503 6503 6503 6503 6503 6503 6503 6503	•	1.803-13 1.846-11 5.2076-12 4.914e-13 2.077e-13 2.160c-09 1.783e-12 7.083e-12 3.370e-13	1.017 1.019 1.019 1.027 1.009	2005		.287e-13				6208 5928 5781	132
0.24444444448000000000000000000000000000	0.09 0.08 0.08 0.08 0.08 0.00 0.00 0.00	1,212e-09 2,224e-10 2,224e-10 1,007e-11 1,567e-10 2,426e-10 2,228e-10 2,328e-10 2,328e-10 3,231e-10 4,745e-10 3,231e-10 3,539e-11 3,539e-11 3,539e-11 3,539e-11 3,539e-11 3,539e-11 3,539e-11 3,539e-10 3,539e-10 3,539e-10		3.457e.11 8.170e.12 3.643e.13 3.643e.13 3.643e.12 2.812e.12 3.426e.12 3.426e.12 4.832e.12 4.832e.12 4.832e.11 4.832e.11 1.737e.11 1.737e.11 3.857e.13 3.857e.13 3.857e.13 3.857e.13 3.857e.13 3.857e.13	1.010 1.010 1.010 1.010 1.010 1.010 1.010 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.	5909 5176 5176 5180 5349 6524 6523 6523 6523 5422 5422 5422 5422 5422 5422 5526	•	1.846e-11 5.207e-12 4.914e-13 2.077e-13 2.160c-09 7.089e-12 3.370e-13	1.019 1.019 1.031 1.027 1.009	2570	26	6.568e-14	1.016	6222	65	5928	1.8
4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 6 6 6 6	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	3.1346-10 2.2256-11 1.0576-11 7.5250-11 1.5576-10 2.7656-11 2.7656-10 2.7656-10 2.7656-10 2.7656-10 3.216-10 3.		8.706-12 8.1706-13 9.6420-13 8.4320-13 8.4370-12 6.4480-13 7.3420-13 7.3420-13 7.3420-13 7.3420-13 7.3420-13 8.6300-13 1.7700-	1.013 1.010 1.010 1.010 1.010 1.009 1.009 1.011 1.011 1.011 1.011	5776 5345 5345 5345 5365 5103 7480 7480 7480 5035 5306 5306 5306 5306 5306 5306 530		5.207e-12 4.914e-13 2.077e-13 2.160c-09 1.782e-12 7.089e-12	1.019 1.031 1.027 1.009	5937	06	6.838e-12	1.017	5929	7.5	5.78	101
4 4 4 4 5 4 5 4 5 4 4 4 4 4 4 4 6 4 6 6 6 6	0.088 0.000	2.225e.11 1.844e.07 1.555e.11 1.557e.10 2.2402e.11 2.2402e.11 2.2402e.10 2.2402e.10 2.2402e.10 2.2402e.10 2.2402e.10 3.216e.10		8.170+13 4.4003-0-13 2.4003-0-13 2.407-12 2.407-13 6.448-13 7.332-	1,010 1,009 1,009 1,010 1,009 1,009 1,011 1,009 1,00 1,00	\$150 6545 6545 6545 65103 6503 6503 6503 5738 5738 5738 5738 5738 5738 5738 573	•	4.914c-13 2.077c-13 2.160c-09 1.782c-12 7.089c-12 3.370c-13	1.031 1.027 1.009	5818	79	1.973e-12	1.016	5750	7.1	4	90
4 4 4 5 4 5 4 5 4 4 4 4 4 4 4 6 4 6 6 6 6	115 0.08 0.88 0.88 1.150 0.00	1.067e-11 1.844e-07 7.554e-07 1.567e-10 2.268e-10 2.328e-10 2.328e-10 3.231e-10 3.539e-11 3.539e-11 3.539e-11 3.539e-11 3.539e-11 3.539e-11 3.539e-11 3.539e-11		3.643-13 3.643-13 2.8120-09 8.4480-13 6.4480-12 1.620-12 7.3420-12 4.8310-12 8.630-14 1.720-11 1.720-11 1.720-11 1.720-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11 1.730-11	1,009 1,009 1,001 1,001 1,001 1,001 1,001 1,009 1,009	5349 6585 6585 6585 6633 6633 7491 7491 5738 5738 5308 5308 5503 5877 5562		2.077e-13 2.160c-09 1.782e-12 7.089e-13 3.370e-13	1.027	5192	8.1	1.828e-13	1.020	5194	72	5188	100
4 4 4 6 4 7 4 4 4 4 4 4 4 4 4 4 6 4 4 6 6 6 6	0.05 1.50 0.00	1844e-07 7.553e-11 11.567e-10 2.768e-11 2.768e-10 2.395e-09 11.495e-09 3.291e-10 4.745e-10 8.533e-10 8.533e-10 2.841e-11	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	4,400e.09 8.307e.12 8.307e.12 6,48e.13 6,48e.13 6,48e.13 1,76e.12 1,76e.11 1,77e.11 1,77e.11	1,011 1,011 1,001 1,000	6585 6503 6033 6033 6033 6033 5350 5300 530		2.160c-09 1.782e-12 7.089e-12 3.370e-13	1.009	5411	74	7.703e-14	1.019	5420	44	5400	81
4 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6	0.88 -1.50 -1.50 -1.61 -1.61 -1.82 -1.61 -0.65 -0.42 -1.64 -	7.556-11 2.402-11 2.766-11 2.766-11 2.326-09 2.546-10 2.546-10 2.546-10 3.231-10 8.539-11 8.539-11 8.539-11 8.539-11	90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2.812e-12 2.8012e-12 6.448e-13 2.659e-12 7.842e-12 7.842e-12 7.842e-13 1.720e-13 1.720e-13 1.720e-13 1.720e-13 1.730e-13 1.730e-13 1.730e-13 1.730e-13 1.730e-13 1.730e-13 1.730e-13 1.730e-13	10010 10010 10000 10000 10000 10000 10000 10000 10000	\$103 [8602] 6033 6033 5350 7491 5738 5422 5128 5118 5268 5503 5503 5555		1.782e-12 7.089e-12 3.370e-13	1.034	6579	87	7.908e-10	1.010	6576	Ξ	6579	100
r 4 v 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6	1.50 1.00 0.00 0.00 1.82 1.82 1.61 0.60 0.65 0.42 0.42 1.64 1.73	1.567e-10 2.765e-11 2.765e-10 2.325e-09 1.435e-10 2.516e-12 3.23e-10 5.375e-10 8.535e-	000 000 000 000 000 000 000 000 000 00	8.407e-12 1.6248e-13 1.6248e-13 1.7269e-12 1.3269e-12 1.7269e-11 1.7269e-11 1.7269e-11 1.7269e-11 1.726-11 1.726-11 1.726-11 1.726-11	0.001 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	[8602] 6033 6033 7480 5738 5728 5422 5306 5118 5226 5503 5503 555		7.089e-12 3.370e-13	,	5065	61	6.562e-13	1.021	5090	6	5082	72
4 x 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1.61 0.00 0.00 0.00 1.182 1.61 0.65 0.65 0.42 0.42 0.14	2.402e.11 2.086e.11 2.086e.10 2.326e.09 2.556e.12 3.291e.10 5.376e.10 5.376e.10 5.376e.10 3.559e.11 2.841e.11	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6.448+13 16.420+12 17.620+12 17.942+11 17.9420+14 17.220+14 17.220+11 17.20+11 9.987+13 6.436+13	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6033 73500 7491 7491 5306 5306 5226 5503 5877 5255		3.370e-13	.1	<3500		2.569e-12	1.026	3772	118	(3772)	13
000 4 4 4 4 4 6 4 4 6 6 6 6 6 6 6 6 6 6	0.00 0.00 0.00 1.182 1.61 0.66 0.45 0.42 1.184 1.173	2,786e-11 2,098e-10 2,325e-09 1,493e-10 2,516e-12 3,291e-10 4,745e-10 5,373e-10 2,038e-09 2,841e-11		1,620e.12 7,542e.12 7,542e.11 4,891e.12 1,229e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11 1,720e.11	1.003 1.003 1.003 1.003 1.003 1.003 1.003 1.003	A3500 7491 5491 5402 5312 5726 5877 5762			1.018	6085	**	1.252e-13	1.017	6909	99	6065	83
4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0.00 0.00 0.00 1.61 0.65 0.42 0.42 0.14 0.173	2.0986-10 2.9256-09 2.9266-10 2.5169-12 3.2916-10 4.7456-10 3.596-11 2.0386-09 2.8416-11		3.769e.12 4.891e.11 8.603e.14 1.229e.11 1.720e.11 1.720e.11 1.720e.11 9.887e.13 6.436e.11	1,0007 1,004 1,008 1,009 1,001 1,001 1,009	7491 5738 5738 5306 5206 5503 5747 5255		1.196e-12	1.067	3926	348	4.708e-13	1.034	3907	84	(3907)	1
00 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0.00 -1.82 -0.65 -0.65 -0.42 -1.84 -1.73	2.356-09 2.56-10 2.56-12 3.2316-10 4.745-10 4.745-10 3.539-11 2.036-09 2.8416-11		7.342e-11 8.801e-12 8.603e-14 1.229e-11 1.720e-11 1.797e-11 9.87e-13 9.436e-11	1.014 1.008 1.009 1.001 1.011 1.009	5738 5422 5306 5306 5506 5508 577 5762		1.764e-12	1.003	7382	96	6.477e-13	1.003	7348	91	7392	110
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1.82 1.61 1.61 0.060 0.060 1.64 1.73 1.73	1.4936-10 2.5166-12 3.2916-10 4.7456-10 5.3746-10 8.5396-11 2.0386-09 2.8416-11		4.891e.12 1.229e.11 1.720e.11 1.720e.11 2.987e.13 6.436e.11	1.008 1.009 1.011 1.011 1.011	5422 5306 5306 5326 5508 547 5762		4.001e-11	1.020	5740	78	1.492e-11	1.017	5711	70	5727	68
03.4 03.4 03.4 00.4	1,61 0.065 0.060 0.042 1,64 0.173	2,516e-12 4,745e-10 5,3745e-10 8,539e-11 2,038e-09 2,841e-11		8.603e.14 1.229e.11 1.720e.13 1.797e.11 9.987e.13 6.436e.11	1.009 1.011 1.011 1.011 1.009	5306 5118 5226 5503 5877 5762		2.771e-12	1.025	5448	50	1.049e-12	1.020	5443	69	5441	99
4.50	.0.66 .0.60 .0.42 .1.64 .1.73	3.291e-10 4.745e-10 5.373e-10 8.539e-11 2.038e-09 2.841e-11		1.229e-11 1.720e-11 1.797e-11 9.987e-10 6.436e-11 9.877e-10	1.011 1.011 1.011 1.009	5118 5226 5503 5877 5762 5255	200	4.972e-14	1.027	5341	147	1.828e-14	1.020	5385	105	5353	142
4.50 00.4	.0.60 -0.42 .1.64 0.14	4.745e-10 5.373e-10 3.539e-11 2.038e-09 2.841e-11 2.351e-09	0000000	1.720e.11 1.797e.11 9.987e.13 6.436e.11 9.877e.13	1.011	5226 5508 5877 5762 5285		7.449e-12	1.032	5161	£	2.836∈-12	1.021	5117	E	5134	r) 60
4.00	0.42 -1.64 0.14 -1.73	5.373e-10 3.539e-11 2.038e-09 2.841e-11 2.351e-09	00000	1.797e-11 9.987e-13 6.436e-11 9.877e-13	1.011 1.009 1.014	5503 5877 5762 5255	7.9	1.028e-11	1.030	5251	43	3.830e-12	1.020	5244	5	5242	80
04.7	-1.64 0.14 -1.73	3.539e-11 2.038e-09 2.841e-11 2.351e-09	00.00	9,987e-13 6,436e-11 9,877e-13	1.009	5877 5762 5255	150	1,011e-11	1.024	5547	16	3.843c-12	1.018	5485	68	5512	E~ :
1.50	0.14 -1.73 -0.50	2.038e-09 2.841e-11 2.351e-09	0.00	6.436e-11 9.877e-13	3.014	5762	170	5.195e-13	1.020	5985	112	1.905e-13	1.017	6004	102	5967	122
4.00	-1.73	2.351e-11	0.00	9.877e-13		5255	153	3.425e-11	1.019	5797	13	1.272c-11	1.016	5775	Z ;	5781	80
5.00	-0.50	2.351e-09	0.00	FF 750F 4	1.009			5.656e-13	1.027	5309	76	2.115e-13	1.020	5330	4.	5308	82
4.00			)	6.135c-11	1.011	6216		3.170e-11	1,014	6245	40° (	1.154e-11	1.014	6255	N E	6242	2.5
0.50	-0.04	4.002e-11	0.02	1.821e-12	1.013	4560		1.311e-12	3.050	4569	40.4	4.82/e-13	1.028	4587	5 1	4 C	200
9.00	.D.41	1.518e-09	0.00	3.980e-11	1.011	6246		2.00/e-11	1.014	2879	din A	(.4U/e-12	5.013	6273	- 0	9779	0.7
200	-1.13	0.130e-12	40.0	7.103-10	1.010	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )		1.07.70.13	7.0	1010	6	1.2016-14	220.0	2010	0 5	2569	102
9.00	9 6	0.1846-10	200	1.0030-12	1.001	8637		2.780e-12 6.986a-19	1.034	8883 K046	501	2 2534-12	1001	5063	72	5059	91
4.4	00.6	2.0516-11	0.00	1.000c-12	1.011	50°L		5 1896-13	1.007	6936	# <b>4</b>	1.9244-13	1.016	8209	2.2	6224	100
5.4	18.1	5.079-11	0.00	1.082-12	1.008	6791	167	5.3555.13	1.010	6771	67	1.9376-13	1.013	6776	- 67	92.29	3
4.50	-1.70	9.626e-12	0.00	3.755e-13	1.009	4883		2.319e-13	1,033	900	: [	8,715e-14	1.020	4964	84	4950	77
4.50	-0.85	1.328e-11	00.00	4.300e-13	1.010	5543		2.405e-13	1.024	5581	61	8 944c-14	1.018	5572	45	5569	61
4.50	.1.05	1.278e-09	0.00	3.950e-13	1.010	5663		2.138e-11	1.022	5735	72	7.823e-12	1.018	5763	99	5727	t- 15
4.50	-1.18	4.757e-12	0.00	1.507e-13	1.009	557I		8.246e-14	1.024	5643	106	3.076e-14	1.019	5636	F-6	5625	120
4.50	-1.47	3.932e-11	00.0	1.157e-12	1.009	5768		6.270e-13	1.022	5805	7.9	2.292e-13	1,018	5835	48	5809	99
4.50	-1.86	6.573e-12	0.00	1.792e-13	1.009	5967		9.852e-14	1.021	5926	0%	3.597e-14	1.017	5958	20	5950	72
2,00	-1.50	7.436e-11	0.00	4.360e-12	I	<3500	I	3,500e-12		<3500	I	1.364e-12	1.029	3573	144	(3573)	! ;
4.50	-1,65	3.972e-12	0.00	9.760e-14	1.009	6303	255	5.3]4e-14	1.017	6195	991	1.880e-14	1.015	6279	114	6257	160
4.50	-0.79	1.265e-11	0.00	3.643e-13	1.010	5897	143	2.012e-13	1.020	0000	69	7.388e-14	1.017	40 X 40 X	25	9980	η, Ση (
#.00 	-0.39	5.927e-10	0.00	1.659e-11	1.012	6048	157	8.517e-12	1.016	6106	82	3.149e-12	1.014	6089	a •	1809	# X
1.50	0.00	4.131e-11	0.00	1.554e-12	1,014	5180	144	9.118e-13	1.029	1070	\$ C	0.488e-1.5	1.022	2010	55	0170	o c
00.4	10.0	1.30+05.03	8 6	0.4196.11	1.012	0000	9 9	0.000e-J1	1.020	900	10 m	1.0246-11	1.0	2000	0 10	6238	4 X
00	10.0	1.0166-11	800	2.4366.13	210.1	6333	- KG	1.289e-13	1016	6283	2 00	4 5504-14	501	6371	0.00	8888	6
4.50	-1.75	5,485e-12	0.00	1.491e-13	1.009	5991	240	8.308e-14	1.021	5908	. P.	2.855e-14	1.017	6067	103	5966	(n)
4.50	- G	1.894e-11	0.00	4.671e-13	1.008	6240	108	2,377e-13	1.016	6817	5.4	8.488e-14	1.015	6371	94	6313	80
4.00	-2.66	2.444e-11	0.01	5.463e-13	1.008	6584	130	2.620e-13	1.012	6698	68	9.463e-14	1.013	6719	83	6678	46
4.50	-2.49	1,363c-10	0.00	3.253e-12	1.003	6355	144	1.719e-12	1.016	6312	88	6.226e-13	1.015	6335	68	6330	€ 80
4.50	-2.40	1.236e-11	0.00	3.247e-13	1.008	6053	157	1.733e-13	1.019	6061	(*1 (X)	6.365e-14	1.017	6070	75	6963	94
4.50	-2.97	1.271e-11	00.0	3,241c-13	1.008	6131	110	1.694e-13	1.018	6174	54	6.274e-14	1.017	6155	76	6158	74
4.50	-0.60	2.598c-10	0.00	8.779e-12	1.011	5439	8	4.933e-12	1.025	5509	76	1.873e-12	1.019	5453	<b>4</b>	5465	89
4.5	-1,38	4.747e-12	0.00	1.609e-13	1.009	534 94.0	183	9.215e-14	1.027	5395	108	3.435e-14	1.020	5403	\$ : 5 :	000	111
4.50	-1.68	9.100c-11	0.05	3.161e-12	1.009	5259	108	1.926e-12	1.023	5198	54	7,133e-13	1.020	524	4 5	5229	28
3 5	00.1	6.944e-11	00:0	4 0016 13		\2500 \2500		0.335e-11 2.45ke-13		\ 2500 \ 2500		1 22926-11	1.020	1000 1000 1000	981	(3637)	
5.00	1.00	7,859e-11	0.00	4.785e-12	1	V3500		3.777e-12	1	V3500		1.444e-12	1.031	3580	14.	(3580)	1
																J	
	च च च च च च च च च च च च च च च च च च च		0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	2.531-09 0.04 4.00221 0.04 4.00221 1.13 6.786-01 2.00 5.786-01 1.31 6.786-01 1.30 5.786-01 1.10 6.579-01 1.10 6.278-01 1.10 6.278-01 1.10 6.278-11 1.10 6.278-11 1.10 6.278-12 1.10 7.286-11 1.10 6.278-12 1.10 6.278-12 1.10 6.278-11 1.10 6.278-11 1.10 6.278-11 1.10 6.278-11 1.10 6.278-11 1.10 6.244-11 1.20 1.378-11 1.20 1.378-11 1.31 1.894-11 1.31 1.31-11 1.31 1.31-11 1.3	2.501-09 0.04 4.002e-11 0.00 0.04 4.002e-11 0.00 1.13 6.736e-11 0.00 2.00 5.736-11 0.00 1.20 7.567e-11 0.00 1.13 6.756-11 0.00 1.17 6.756-12 0.00 1.18 4.757e-12 0.00 1.18 4.757e-12 0.00 1.18 4.757e-12 0.00 1.19 7.436e-11 0.00 1.15 7.436e-11 0.00 1.17 7.416e-11 0.00 1.18 4.747e-12 0.00 2.46 1.757e-11 0.00 1.18 4.747e-11 0.00 1.18 4.747e-11 0.00 1.18 4.747e-11 0.00 1.10 1.371e-11 0.00 1.10 1.476-12 0.00 1.10 1.476-11 0.00	0.04 4.002e-11 0.05 1836-12 1.0.04 4.002e-11 0.05 1836-12 1.1.3 0.00 2.586-11 1.0.05 1.238-12 0.00 2.586-11 1.0.05 1.238-12 1.0.05 1.238-12 1.0.00 1.0.05 2.581-12 1.0.00 0.00 2.586-12 1.0.00 0.00 2.581-12 1.0.00 0.00 0.003-12 1.0.00 0.00 0.003-12 1.0.00 0.00 0.003-12 1.0.00 0.00 0.003-12 1.0.00 0.00 0.003-12 1.0.000 0.003-12 1.0.000-12 1.	0.50	0.00	0.00 2.031-09 0.00 6.1856-11 1.011 6216 86 3 0.04 1.038-09 0.05 2.986-11 1.011 6246 139 2 0.05 5.796-12 0.04 2.781-12 1.011 6246 139 2 0.06 5.796-12 0.04 7.723-12 1.001 8657 171 2 2.00 5.796-11 0.00 1.032-12 1.001 8657 171 2 1.01 5.706-11 0.00 1.032-12 1.001 8657 171 2 1.05 1.228-11 0.00 1.042-12 1.008 6.791 177 5 1.05 1.228-11 0.00 1.072-12 1.008 6.791 177 5 1.10 1.228-11 0.00 1.507-13 1.009 5.03 100 2 1.15 1.228-11 0.00 1.507-13 1.009 5.03 100 2 1.24 1.238-11 0.00 1.549-11 1.012 5.83 100 2 1.25 1.228-11 0.00 1.549-11 1.012 5.83 100 2 1.24 1.238-11 0.00 1.549-11 1.012 5.83 100 2 1.24 1.228-11 0.00 1.549-11 1.000 5.33 17 10 10 10 10 10 10 10 10 10 10 10 10 10	0.00 2.515-0.9 0.00 6.1821e-1 1.011 6.216 86 5.1776-1 1.014 1.1516-0.9 0.00 2.980e-1 1.013 6.346 159 2.007e-1 1.014 1.1516-0.9 0.00 2.980e-1 1.013 6.346 159 2.007e-1 1.013 6.746 159 2.007e-1 1.014 1.1516-0.9 0.00 2.980e-1 1.011 6.346 159 2.007e-1 1.015 6.780e-1 1.011 6.346 159 2.007e-1 1.012 6.780e-1 1.012 6.230e-1 1.013 6.230e-1 1.013 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.231 1.022 6.232 1.032 6.232 1.033 6.232 1.033 6.23	0.00 2.515-0.9 0.00 6.1821e-11 1.011 6.216 86 5.170e-11 1.014 1.015 6.216 8.0 5.170e-11 1.014 1.015 6.216 8.0 5.170e-11 1.014 1.015 6.216 8.0 5.170e-11 1.015 6.216 6.216 1.015 6.216 1.015 6.216 1.015 6.216 1.015 6.216 1.015 6.216 1.015 6.216 1.015 6.216 1.015 6.216 6.216 6.21	0.00 2.535-09 0.00 6.186-11 1.011 6216 86 5.170-11 1.014 0.00 0.00 6.186-11 1.011 6246 139 2.007-11 1.014 1.1818-09 0.05 2.896-11 1.011 6246 139 2.007-11 1.014 0.00 5.186-12 1.011 6246 139 2.007-11 1.014 1.1818-09 0.00 2.896-11 1.011 6246 139 2.007-11 1.014 1.1818-09 0.00 1.0038-12 1.011 1.011 1.014 1.012 1.000 5.786-11 0.010 1.0038-12 1.011 1.017 1.12 2.00 2.006-11 1.017 1.010 6231 1.017 1.01	0.00 0.2351-60 0.00 0.186-71 1.011 6246 159 0.1176-12 1.024 654 4.1-1.13 6.128-10 0.00 0.186-71 1.011 6246 159 2.0076-11 1.014 6229 84 1.1-1.13 6.128-10 0.00 0.289-11 1.011 6246 159 2.0076-11 1.014 6229 84 1.1-1.13 6.128-10 0.00 0.1073-12 1.011 8657 1.17 2.180-12 0.096 8863 1.09 1.1-1.3 6.128-11 0.00 0.1073-12 1.001 8657 1.17 2.180-12 0.096 8863 1.09 1.1-1.3 6.128-11 0.00 0.1073-12 1.001 8657 1.17 2.180-12 0.096 8863 1.09 1.1-1.3 6.128-11 0.00 0.1073-12 1.001 8657 1.17 2.180-12 0.096 8863 1.09 1.1-1.3 6.128-11 0.00 0.1073-12 1.001 8657 1.17 2.180-12 1.017 8.280-13 1.010 823-13 1.000	0.004         4.004         2.004         4.004         2.004         4.004         2.004 <th< td=""><td>0.04         4.235-49         0.00         4.3170-41         1.014         4.66         1.01         4.69         1.01         4.69         1.01         4.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         4.69         1.00         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69</td><td>0.56         4.355-49         0.00         4.3170-41         1.014         4.505         4.50         4.60         6.4         4.3275-43         1.014         4.50         4.60         4.60         6.4         4.3275-43         1.014         4.50         4.60         6.4         4.3275-43         1.014         4.70         4.70         1.01         4.20         4.60         4.60         6.4         4.3275-43         1.01         4.20         4.60         4.60         6.4         4.2075-43         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         4.70         1.01         4.70</td><td>  Color   Colo</td></th<>	0.04         4.235-49         0.00         4.3170-41         1.014         4.66         1.01         4.69         1.01         4.69         1.01         4.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         6.45         1.00         4.69         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         1.00         4.69         4.69         1.00         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69         4.69	0.56         4.355-49         0.00         4.3170-41         1.014         4.505         4.50         4.60         6.4         4.3275-43         1.014         4.50         4.60         4.60         6.4         4.3275-43         1.014         4.50         4.60         6.4         4.3275-43         1.014         4.70         4.70         1.01         4.20         4.60         4.60         6.4         4.3275-43         1.01         4.20         4.60         4.60         6.4         4.2075-43         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         1.01         4.70         4.70         1.01         4.70	Color   Colo

Table 4. continued

$\Delta T_{mean}$	99	83	73	80	₹ 1	6.2	3 5	;	119	64	112	131	67	I	I	I	3	n s	0 00 3 00	.	I	155	100	168	:	93	82	98	16 61	92	80	62	# C	о я О п	) m0	105	53	67	III	994	100	:	82	203	110	73	198	2 400	141	52	94	ж) б ж) б	ja D	\$
Tmean	5669	5692	6026	5325	5844	27.T2	2000 4000 4000	(3570)	38180	5413	5481	6001	4370	(3634)	(3828)	(3686)	(3783)	5192	#17.4 E206	(3806)	(3714)	6393	9595	5645	(3576)	5918	6634	5483	5342	6268	5957	6311	5566	4000	4310	7019	4442	7003	7481	00000	5960	(3565)	6208	5463	7441	6343	4644	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5299	5205	6097	3333 3333 3433 3433 3433 3433 3433 343	1980	(00.00)
$\Delta T_K$	7.0	T.	74	99	දුර .	ης) + 10 μ	5 H	144	149	10) (0)	91	113	99	136	91	128	116	4 1	28	132	126	500	22	187	144	7.5	62	67	99	18	120	2	4. 1 T) (	2 5	3 5	96	33	58	92	e e	3 5	145	t-	176	85	59	70	25	129	43	75	986	7 :	# c
$T_{K}$	5683	5769	6033	5320	5845	5683	1000	3570	5837	5405	5376	6027	4373	3634	3828	3696	3783	5203	0000	0000	3714	6416	5633	5601	3576	5938	6650	5428	5382	6290	5970	6309	5607	50.05	4380	6982	4434	7009	7481	2000	5.974	3565	6215	5526	7491	6327	4653	5289	5287	5207	6101	5313	5835	0,00
$q_K$	1.018	1.016	1.014	1.020	1.018	1.017	1.019	1.029	1.018	1.019	1.020	1.017	1.029	1.030	1.032	1.027	1.026	1,020	1.023	900	1.020	1015	1.017	1.018	1.023	1.017	1.010	1.019	1.020	1.014	1.017	1.011	1.019	200.	1.032	1.008	1.032	1.006	0.999	1.018	1 017	1.029	1.014	1.019	0.999	1.010	1.029	1 020	1.020	1.028	1.017	1.020	1.016	1.029
Жď	1.453e-12	6.904e-12	6.891e-12	1.199e-14	6.328e-14	4.725e-12	8 700e-14	2.6472-12	1.330e-13	2.222e-13	2.008e-14	T.672e-13	6.591e-13	2.267e-12	1.975e-11	5.471e-12	2.158e-12	8.027e-14	1,391e-14	A Keda 10	4.001e-10	2.5556-13	3.5136.13	2.690e-14	2.646e-12	1.558e-13	5.045e-12	5.613e-12	1.592e-11	6.613e-12	1.084c-13	4.383c-12	2.039e-13	5.U/8e-11	7.282e-12	5.309c-13	1.287e-12	2,266e-11	8.785e-13	6.195e-13	3,321E-13	1.626c-12	4.837e-12	8.907e-15	5.019c-13	3.654e-12	6.675e-13	1.2766-11 1.478e.13	2.285c-13	6.639e-13	1.975e-13	5.665e-13	3.196e-11	1.832e-12
$\Delta T_H$	48	77	1.8	73	60 60	es a	n d	n :	6	1 kg	113	117	69	I	300		300	52	36	:		55	25	132		90	81	2	!	84	50	70. 70.	1- i	20 P	9 69	95	64	62	87	n c	0 2	3	63	205	16	÷9	99	109	* <u>*</u>	6.4	쭚	4.	-	;
HL	5664	5654	6028	5297	5860	5737	0000	73800	5804	5423	5465	5963	4367	<3500	3525	V3300	3507	5174	1844	200	7,000	6380	5695	5633	<3500	5913	6633	5486	1	6268	5966	6319	5590	6115	4358	7008	4452	7009	7467	70807	0750	<3500	6209	5427	7462	6341	4636	5347	5293	5234	6092	5366	00	V3500
4P	1.023	1.022	1.016	1.028	1.021	1.021	1.020	070.1	1.022	1.027	1.026	1.020	1.057	I	1.056	!	1.055	1.028	1.039	170-1		10.1	1.020	1.023	ł	1.020	1.010	1.025	1	1.015	1.019	1.011	1.024	1.074	1.058	1.007	1.054	1.006	1,001	1.022	1 020	3	1.016	1.027	1.001	1.010	1.047	1 028	1.029	1.029	1.018	1.028	l	3
FH	3.964e-12	1.984e-11	1.87Te-11	3.233e-14	1.696e-13	1.262c-11	0.1000-10	6 060e.12	3.636e-13	5.924e-13	5,118e-14	2.132e-12	1.784e-12	6.005e-12	5.327e-11	1.440e-11	5.785e-12	2.131e-13	3.395e-14	01-9000'E	2.0506-12	7.0674-13	0.0886-13	7.182e-14	6.813e-12	4.269e-13	1,397e-11	1.485e-11	I	1.825e-11	2.938e-13	1.195e-11	5.509e-13	1.3736-10	1.976e-11	1.441e-12	3.415e-12	6.286c-11	2.451e-12	1.6736-12	1.5196-15 3 600e 13	4.310e-12	1.322e-11	2.515e-14	1.413e - 12	9.922e-12	1.811e-12	3.534e-11	6.1026-13	1.7706-12	5.381e-13	1.4896-12	;	4.8146-12
$\Delta T_J$	100	151	156	118	139	137	5 5	3	139	500	137	181	157	246	195	i	213	# 1 # 1	750	50T		806	133	202	25.7	127	120	151	146	127	109	96	136	116	227	166	223	98	168	3156	# &	<u> </u>	127	238	167	119	205	137	212	, <u>*</u>	16.7	141	156	L
$T_{J}$	5658	5602	8009	5377	5808	5714	2001	0707	7830 7810	5412	5659	6008	[181]	3582	[3544]	<3500	[3939]	5197	4691	0100	V 28 KDO	7	1,644	5711	34.56	5893	6606	5599	5256	6225	5926	6300	5556	5074	[3794]	7108	[3830]	6984	7505	5795	9966 F031	73500	9619	5420	7305	6380	[4019]	8561	3331	5156	8609	5337	5938	V3500
4.1	1.010	1.014	1.012	1.009	1.009	1.012	1.010	7.010	1 008	1.009	1.009	1.009	1.011	1.011	1.012	I	1.011	1.008	1.010	1,003	I	1 010	101	1.012	1.011	1.010	1,009	1,013	1.013	1.010	1.009	1.013	1.009	1.014	1.010	1.010	1.010	1.008	1.006	1.610	1.000	F. C.	1.010	1.009	1.009	1.015	1.011	1 013	1001	1.014	1.008	1.011	1.012	"
I.I.	7.103e-12	3.643e-11	3.596c-11	5.314e-14	3.167e-13	2.298e-11	0.4.300.0	6.165e-16	6 5928-13	1.022e-12	8.338e-14	3.911e-12	2.396e-12	6.833e-12	6.598e-11	1.752e-11	8.592e-12	3.563e-13	5.393e-14	01-1070-0	0.250e-12	1 2984-12	1 71919	1.2486.13	8 6194-12	7.948e-13	2.841e-11	2.479e-11	7.696e-11	3.576e-11	5.539e-13	2.385e-11	9.877e-13	2.696e-10	2.915e-11	2.980c-12	5.270e-12	1.326e-10	5.403e-12	3.072e-12	2. (896-13 8 7800-13	5 1417-12	2.551e-11	4.340e-14	3.325e-12	1.969e-11	2.991e-12	9.067e-11	1.011e-12	3.010e-12	1.008e-12	2.548e-12	1.550e-10	5.689e-12
E(B.V)	0.00	0.00	0.00	0.00	0.00	0.00	00.0	00.0	00.0	0.00	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	00.0	0.00	00.0	000	000	860	0.00	0.00	0.00	0.00	0.00	0.00	00.0	0.00	0.00	8 6 6	0.00	0.00	0.00	0.00	0.00	0.00	800	00.00	0.00	00.0	0.00	0.00	9.0	0.05	0.0	0.00	0.00	0.00	0.00
Feet	2.275e-10	1.108e-09	1.255e-09	1.590e-12	1.089e-11	7.305e-10	1,868e-11	1 4410.10	2 2976-11	3.0454-11	2.752e-12	1.438e-10	4.919e-11	1.275e-10	1,173e-09	3.202c-10	1.324e-10	1.020c-11	1.279e-12	0.00/e-11	5.955e-11	0.0016-11	- 6 246a-11	4.0036-12	1 4465-10	2.780e-11	1.233e-09	7.558e-10	2.099e-09	1.381e-09	1.966e-11	9.014e-10	3,136e-11	9.419e-09	5.406e-10	1.473e-10	9.870c-11	6.467e-09	3.0416-10	1.040e-10	2.420.11	X 8218-11	9.749e-10	1.300e-12	1.750e-10	7.545e-10	5.851e-11	7.021e-03	2.9496-11	7.958e-11	3.875e-11	7.260c-11	5.319e-09	1.002e-10
Fe/H	-0.78	-0.03	-0.19	-1.48	-1.39	-0.23	. 00.	-1.02	1.38	-1.04	1.64	-1.50	-0.23	-1.00	-0.20	-1.50	-1.50	-2.30	-0.89	17.1.	1.50	00.1+	0.14	# T O	00.5	-1.03	-0.61	-0.13	-0.14	-6.82	-1.17	0.12	-1.54	0.21	00.0	0.00	00.0	-0.60	0.00	.1.08	0.7	02.17	9.79	-1.13	00.0	0.38	0.00	0.11	-1.15	0.00	-1.98	0.50	0.53	-1.50
log(R)	4.50	4.00	4.50	4.50	4.50	4.00	3 5	26.2	5 7 Y	4 50	4.50	4.50	4.50	5.00	5.00	5.00	5.00	4.50	4.50	4.00	00.0	00.5	00.4	2.5	00.4	4.50	4.50	4.00	4.50	4.50	4.50	4.00	4.50	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4. 4 0. 7	200	2,4	4.50	4.00	4.00	4.00	4.00	9.4 07.4	4.00	4.50	4.00	هر . وي و	5.00
GI.	G044-006	HR4030	HR4039	G055-017	G053-041	HR4098	C+162-068	G044-030	0.110.030	G-058,023	G196-047	G058-025	G055-044	G.7410	G119-052	G176-011	G119-059	G010-004	G056-022	G119-009	G1421A	G12#51D	0.00 54.00	0197,008	G238-085	G056-036	HR4421	HD101177	HR4496	HR4501	G121-012	HR4533	G176.053	HR4540	G122-066	HD104636	HD104674	HR4623	HD105601	HD105755	GOLL*094	G197-049	HR4657	G012-023	HD106965	HR4688	HD107906	HE4689	G059-092	HD107906	G013-035	G013-043	HR4785	G012-039

Table 4. continued

ORGEOGRAPH (1)         4,50         2,34         1,256-11         0.00         1,343-12         1,008         6115           ORGEOGRAP (2)         4,50         1,24         3,598-11         0.00         1,343-12         1,009         5241           OGGOL-102         4,50         1,10         2,598-11         0.00         1,343-12         1,009         5241           OGGOL-103         4,50         1,12         2,449-11         0.00         1,242-13         1,010         564           OGGOL-104         4,50         0.29         2,449-11         0.00         2,422-13         1,010         5713           OGGOL-104         4,50         0.26         1,273-41         0.00         2,422-13         1,010         5714           OGGOL-104         4,50         0.00         1,274-11         0.00         2,422-12         1,010         5714           OGGOL-108         4,50         0.01         1,274-11         0.00         1,274-11         1,010         5714           OGGOL-108         4,50         0.01         1,278-11         0.00         1,276-11         1,010         5714           OGGOL-108         4,50         0.00         1,278-11         0.00         1,278-11	180 76 152 175	1,718e-13 7.432e-13	1.018	6117	105	6,393c-14 2,780e-13	1.017	6092 5273	117	6107	127
4.50         -1.24         3.566+11         0.00         1.246+21         1.00           4.50         -1.37         3.566+11         0.00         1.50e+12         1.010           5.00         0.10         2.59e+10         0.00         1.50e+11         1.013           4.50         -1.32         2.449e+12         0.00         1.52e+12         1.010           4.50         -0.29         2.99e+10         0.00         2.45e+12         1.013           4.50         -0.29         2.99e+10         0.00         2.57e+12         1.013           4.50         -0.29         2.99e+10         0.00         2.57e+12         1.013           4.50         -0.79         2.99e+10         0.00         2.57e+12         1.013           4.50         -0.77         2.814e+11         0.00         2.57e+12         1.013           4.50         -0.77         2.814e+12         0.00         2.81e+12         1.010           4.50         -0.77         2.814e+11         0.00         2.81e+12         1.010           4.50         -0.77         2.81e+12         0.00         1.012e+12         1.012           4.50         -0.77         2.81e+12         0.00	152 175 148	7.432e-13	-			2.780e-13	000	5273			
4.50         0.37         2.9148-11         0.00         1.0868-12         1.013           4.50         1.12         1.2759-10         0.02         2.938-12         1.003           4.50         1.12         1.2759-10         0.02         2.938-12         1.003           4.50         1.02         2.948-12         0.00         2.526-12         1.013           4.50         0.02         2.948-12         0.00         2.526-12         1.013           4.50         0.06         1.526-10         0.00         2.526-12         1.014           4.50         0.06         1.526-10         0.00         2.526-12         1.014           4.50         0.07         2.418-11         0.00         2.878-12         1.014           4.50         0.03         2.938-11         0.00         2.898-12         1.014           4.50         0.07         2.948-11         0.00         2.898-12         1.014           4.50         0.07         2.948-12         0.00         1.046-12         1.010           4.50         0.07         2.948-12         0.00         1.046-12         1.014           4.50         0.07         2.948-12         0.00         1.026-1	175 175	00000	1.029	5274	4 t	1000	1.000 t	) T	42	5275	20 00
4.00         0.10         2.598+10         0.00         1.508+11         1.008           4.50         -1.32         8.448+12         0.00         2.456+13         1.008           4.50         -1.32         2.994+10         0.00         1.526+13         1.008           4.50         -2.66         7.247+11         0.00         1.526+12         1.013           4.50         -2.62         2.844+11         0.00         1.526+12         1.013           4.50         -0.07         2.844+11         0.00         1.526+12         1.013           4.50         -0.07         2.844+11         0.00         1.266+12         1.013           4.50         -0.07         2.844+11         0.00         1.266+12         1.013           4.50         -0.34         9.037-11         0.00         1.266+12         1.013           4.50         -0.34         9.037-11         0.00         1.266+12         1.013           4.50         -0.34         9.037-11         0.00         1.266+12         1.013           4.50         -0.34         9.037-11         0.00         1.266+12         1.013           4.50         -0.34         9.037-11         0.00 <td< td=""><td>148</td><td>9.482e-13</td><td>1.023</td><td>5660</td><td></td><td>3.502e-13</td><td>1.018</td><td>1693</td><td>2 5</td><td>5647</td><td>n e</td></td<>	148	9.482e-13	1.023	5660		3.502e-13	1.018	1693	2 5	5647	n e
4.00         -1.12         1.275e-10         0.02         2.456e-12         1.008           8.4.50         -0.29         2.994e-10         0.00         2.456e-12         1.008           4.50         -0.29         2.994e-10         0.00         1.35e-11         1.013           4.50         -0.29         2.944e-11         0.00         1.35e-12         1.008           4.50         -0.34         2.97e-11         0.00         2.57e-12         1.013           4.50         -0.34         2.07e-11         0.00         2.87e-12         1.010           4.50         -0.34         2.07e-11         0.00         2.87e-12         1.010           4.50         -0.76         3.24d-11         0.00         2.87e-12         1.010           4.50         -0.77         3.24d-11         0.00         2.89e-12         1.010           4.50         -0.76         3.24d-11         0.00         1.04e-12         1.010           4.50         -0.77         3.24d-11         0.00         1.04e-12         1.010           4.50         -0.77         3.24d-11         0.00         1.04e-12         1.010           4.50         -0.77         3.24d-11         0.00	148	1,322e-11	;	V3500	! !	4.625e-12	1.035	57.48	121	(86.48)	6
4.50         1.92         2.448e+12         0.00         2.452e+3         1.013           4.50         0.00         1.520e+10         0.00         2.452e+11         1.013           4.50         0.00         1.520e+10         0.00         2.52e+11         1.013           4.50         0.01         1.52e+11         0.00         1.52e+12         1.013           4.50         0.03         4.50         0.03         2.45e+12         1.013           4.50         0.03         4.50         0.03         4.50         1.014           4.50         0.03         4.50         0.04         1.24e+12         1.012           4.50         0.04         5.24e+03         0.00         1.56e+12         1.013           4.50         0.07         5.24e+03         0.00         1.05e+12         1.012           4.50         0.07         5.24e+03         0.00         1.05e+12         1.010           4.50         0.07         5.24e+03         0.00         1.05e+12         1.010           4.50         0.07         5.24e+12         0.00         1.05e+12         1.010           4.50         0.07         5.24e+12         0.00         1.05e+12         <		Z.ZZ5e-1Z	1.024	2028	ō :	6.207e-15	1.019	0900	î î	# P P P	- 1
5.50         0.029         4.29e-10         0.00         7.52e-12         1.012           4.50         0.029         4.29e-10         0.00         7.52e-11         1.012           4.50         0.07         2.22e-10         0.00         7.52e-12         1.013           4.50         0.07         2.22e-11         0.00         2.57e-12         1.013           4.50         0.07         2.24e-01         0.00         2.57e-12         1.013           4.50         0.07         7.13e-12         0.00         0.00         2.54e-12         1.013           4.50         0.07         7.13e-12         0.00         0.00         1.02e-12         1.010           4.50         0.07         5.24e-09         0.00         1.05e-12         1.012           4.50         0.07         5.24e-09         0.00         1.05e-12         1.010           4.50         0.07         5.24e-09         0.00         1.05e-12         1.010           4.50         0.07         5.24e-09         0.00         1.04e-12         1.010           4.50         0.07         5.24e-09         0.00         1.04e-12         1.010           4.50         0.07         1.28e-12	7 .	1,337e-13	1.021	40.00	Į,	4.9336-14	200	9 0 0 0	n c	0 2 2 2	# C
4.50         0.00         1.526-10         0.00         7.536-12         1.01           4.50         0.00         7.527-12         1.01	110	6.959e-12	1.032	5136	79	Z.629e-12	1.022	2010	р , К. (	aric)	E C
4.50 0.05 7.247e-11 0.00 2.577e-12 1.014 4.50 0.07 2.814e-11 0.00 2.577e-12 1.013 4.50 0.03 1.66e-10 0.00 1.26e-12 1.010 4.50 0.04 7.138e-12 0.00 1.26e-12 1.010 4.50 0.06 7.138e-12 0.00 1.26e-12 1.010 4.50 0.07 2.244e-11 0.00 2.891e-12 1.010 4.50 0.07 2.24e-11 0.00 2.891e-12 1.010 4.50 0.07 2.24e-11 0.00 1.55e-10 1.010 4.50 0.07 2.858e-10 0.00 1.55e-10 1.010 4.50 0.07 2.868e-10 0.00 1.55e-10 1.010 4.50 0.07 2.868e-10 0.00 1.26e-12 1.010 4.50 0.07 2.868e-10 0.00 1.26e-12 1.010 4.50 0.07 2.868e-10 0.00 1.26e-12 1.010 4.50 0.08 5.08e-10 0.00 1.26e-12 1.010 4.50 0.08 5.08e-10 0.00 4.40e-14 1.009 4.50 0.08 5.08e-10 0.00 4.40e-14 1.009 4.50 0.08 5.08e-10 0.00 4.40e-14 1.009 4.50 0.08 5.08e-10 0.00 5.08e-12 1.010 4.50 0.09 1.378e-10 0.00 5.08e-12 1.010 4.50 0.09 1.378e-10 0.00 5.08e-12 1.010 4.50 0.09 1.378e-10 0.00 5.08e-12 1.010 4.50 0.00 1.378e-12 0.00 5.08e-12 1.010 4.50 0.00 1.378e-11 0.01 5.08e-12 1.010 4.50 0.00 1.378e-12 0.00 5.08e-12 1.010 4.50 0.00 1.378e-12 0.00 5.08e-12 1.010 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00 0.00 4.50 0.00 0.00 0.00 0.00	66.	6.429e-12	1.054	[8/23]	900	Z1-9616.Z	1.032	2870	104	(0,000)	
4.50	989	1,457e-12	1.025	5436	÷ 1	5.429e-13	1.013	3414 :000	200	40 0	5 6
4.50	137	5.552e-14	1.030	4941	7.1	2.063e-14	1.020	5029	4.	47.62	× 5
4.50         -1.58         1.660e-10         0.00         6.80ze-12         1.009           4.50         -1.58         1.660e-10         0.00         6.80ze-12         1.002           4.50         -0.79         3.24e-01         0.00         1.55e-10         1.012           4.50         -0.79         3.23e-12         0.00         1.55e-12         1.010           4.50         -0.79         3.23e-12         0.00         1.55e-12         1.011           4.50         -0.72         1.83e-11         0.00         5.76e-12         1.011           4.50         -0.75         3.80e-11         0.00         1.75e-12         1.010           4.50         -0.77         3.80e-11         0.00         1.76e-12         1.011           4.50         -0.77         3.75e-12         0.00         1.76e-12         1.010           4.50         -1.70         3.75e-12         0.00         4.76e-12         1.011           4.50         -1.70         3.75e-12         0.00         4.76e-12         1.010           4.50         -1.70         3.75e-12         0.00         4.76e-12         1.010           4.50         -1.50         -1.50         0.00         <	90	7.357e-13	1.024	5511	87	2.731e-13	1.018	5495	63	5500	2.9
4.50         -0.34         9.037e-11         0.00         2.89fe-12         1.012           4.50         -0.79         5.738e-10         0.00         1.054e-12         1.012           4.50         -0.79         5.244e-04         0.00         1.054e-12         1.010           4.50         -0.79         3.524e-04         0.00         1.054e-12         1.010           4.50         -0.76         3.535e-10         0.00         1.054e-12         1.010           4.50         -0.72         1.855e-11         0.00         1.10e-12         1.010           4.50         -0.72         1.855e-11         0.00         1.10e-12         1.010           4.50         -0.70         3.754e-12         0.00         1.05e-12         1.011           4.50         -0.77         3.754e-12         0.00         1.05e-12         1.014           4.50         -0.77         3.754e-12         0.00         1.05e-12         1.014           4.50         -1.76         1.25e-11         0.00         1.05e-12         1.014           4.50         -1.75         3.69e-10         0.00         1.05e-12         1.014           4.50         -1.75         3.69e-12         0.00<	124	4.874c-12	1.040	4513	63	1.850e-12	1,021	4566	56	4541	50
5.00         0.00         7.138-12         0.00         2.918-12         1.010           4.50         0.779         5.224-04         0.00         1.555-10         1.010           4.50         0.779         5.224-04         0.00         1.555-10         1.010           4.50         -0.78         5.358-10         0.00         1.555-10         1.010           4.50         -0.72         1.855-11         0.00         5.759-12         1.011           4.50         -0.72         1.855-11         0.00         8.779-12         1.010           4.50         -0.76         1.776-11         0.00         8.779-12         1.011           4.50         -0.77         3.754-12         0.00         1.056-12         1.011           4.50         -1.70         3.754-12         0.00         6.046-12         1.014           4.50         -1.70         3.754-12         0.00         6.046-12         1.014           4.50         -1.70         3.754-12         0.00         6.046-12         1.014           4.50         -1.70         3.754-12         0.00         6.046-12         1.014           4.50         -1.50         1.586-10         0.00 <td< td=""><td>179</td><td>1.647e-12</td><td>1.023</td><td>5605</td><td>Ę</td><td>6.221e-13</td><td>1.018</td><td>5558</td><td>69</td><td>5590</td><td>9.1</td></td<>	179	1.647e-12	1.023	5605	Ę	6.221e-13	1.018	5558	69	5590	9.1
4.50         0.776         3.2046-11         0.00         1.0546-12         1.010           4.50         0.776         3.2046-11         0.00         1.0546-12         1.010           4.50         0.80         3.525-09         0.00         1.556-10         1.014           4.50         0.20         1.855-11         0.00         1.766-12         1.012           4.50         0.77         3.000-11         0.00         1.766-12         1.012           4.50         0.77         3.000-11         0.00         1.766-12         1.012           4.50         0.70         1.748-12         0.00         1.252-12         1.011           4.50         0.70         1.748-12         0.00         1.256-12         1.014           4.50         0.70         1.748-12         0.00         1.760-12         1.009           4.50         0.77         9.545-11         0.00         1.760-12         1.004           4.50         0.77         9.545-11         0.00         1.760-12         1.004           4.50         0.77         9.545-11         0.00         1.766-12         1.004           4.50         0.78         1.786-12         0.00         1.766	154	3.490e-13	ı	<3500	1	1.218c-13	1.034	3900	75	(3800)	1
4.50         0.10         5.241-59         0.00         1.555-10         1.01           4.50         -0.80         3.535-10         0.00         1.555-10         1.01           4.50         -0.22         1.855-11         0.00         1.766-12         1.01           4.50         -0.22         1.855-11         0.00         1.766-12         1.01           4.50         -0.75         3.000-11         0.00         5.769-13         1.01           4.50         -0.70         1.748-10         0.00         1.016-12         1.01           4.50         0.00         1.748-12         0.00         5.769-13         1.01           4.50         0.10         1.748-10         0.00         5.769-12         1.014           4.50         0.10         1.748-10         0.00         5.769-12         1.019           4.50         0.12         2.896-11         0.00         5.769-12         1.019           4.50         0.13         1.248-11         0.00         4.786-12         1.019           4.50         0.15         5.266-12         0.00         4.786-12         1.019           4.50         0.15         1.248-11         0.00         4.786-12	244	5.980e-13	1.025	5528	148	2.231e-13	1.019	5512	129	5516	161
4.00         0.00         0.00         0.700-12         1.00           4.50         -2.06         2.838-12         0.00         0.700-12         1.01           4.50         -0.75         3.000-11         0.00         0.700-12         1.01           4.50         -0.75         3.000-11         0.00         0.700-14         1.00           4.50         -0.75         3.000-11         0.00         1.700-14         1.00           4.50         -1.70         3.754-12         0.00         1.700-14         1.00           4.50         -1.70         3.754-12         0.00         1.000-14         1.00           4.50         -1.70         3.754-12         0.00         1.000-14         1.00           4.50         -1.70         3.754-12         0.00         4.700-12         1.00           4.50         -1.76         1.500-12         0.00         4.700-12         1.00           4.50         -1.36         1.580-10         0.00         8.700-12         1.00           4.50         -1.36         1.580-10         0.00         8.700-12         1.00           4.50         -1.35         1.760-12         0.00         8.700-12         1.00	156	8 111.4.11	8101	5077	18	2 9870-11	1 014	5,962	7.4	5984	93
4.50	134	K 2464-12	1.020	4000	5.5	1 9316-12	1017	FRGT	1 10 1 10	5884	6.6
4.50	1 6	7 0000	000	1000	1 15	2 0070 14	1001	1007	8	4498	3 2
4.50         0.02         1.855e-11         0.00         8.75e-12         1.011           4.50         0.07         1.748e-10         0.00         1.748e-10         0.00         1.748e-11         0.00         1.748e-11         0.00         1.748e-12         0.00         1.748e-12         0.00         0.00         1.748e-12         0.00         0.00         1.748e-12         0.00         4.400e-14         1.004           4.50         -0.72         2.898e-10         0.00         4.400e-12         1.014           4.50         -1.16         1.351e-11         0.00         4.780e-12         1.014           5.00         -1.35         7.898e-10         0.00         4.780e-12         1.014           4.50         -0.83         5.048e-12         0.00         4.780e-12         1.014           4.50         -1.50         6.928e-11         0.00         4.780e-12         1.019           4.50         -1.57         7.656e-12         0.00         4.780e-12         1.019           4.50         -1.57         7.656e-12         0.00         4.780e-12         1.019           4.50         -1.57         7.656e-12         0.00         4.780e-12         1.019           4.50	101	1.020c-13	F.009	2777	2 :	Z.9016-13	7.007	000	5 6	0077	
4.50	9 P	6.230e-13	250-1	0004	4 1	2.053e-10	1.028	1307	- ( 9 (	70**	n d
4.50         1.7486-10         0.00         1.7486-10         0.00         1.7486-11         0.00         4.00         0.01         2.626-11         0.01         4.00         0.01         2.626-11         0.00         4.400-14         1.008           4.50         -0.07         9.546-11         0.00         4.400-12         1.012         1.008           4.50         -0.07         9.546-11         0.00         8.020-12         1.012           5.00         -1.16         1.554-12         0.00         8.000-12         1.012           4.50         -1.35         7.966-12         0.00         8.020-12         1.012           4.50         -1.36         6.926-11         0.00         8.000-12         1.013           4.50         -1.50         6.926-11         0.00         4.076-12         1.013           4.50         -1.50         6.926-11         0.00         4.076-12         1.013           4.50         -1.50         1.540-11         0.00         4.06-12         1.013           4.50         -1.52         1.478-10         0.00         5.206-12         1.013           4.50         -1.52         1.478-11         0.00         4.400-12         1.013	100	7.408e-13	1.028	5334	-1	2.725e-13	1.020	5343	20	1460	2 1
4.50         -1.70         3.754=-12         0.00         1.051e-12         1.009           4.50         -1.70         2.754e-12         0.00         4.00e-12         1.009           4.50         -1.07         2.896e-10         0.00         9.40e-12         1.012           4.50         -1.50         1.586e-10         0.00         9.40e-12         1.012           4.50         -1.50         1.586e-10         0.00         8.780e-12         1.012           4.50         -1.50         1.586e-10         0.00         8.780e-12         1.012           4.50         -1.50         1.086e-12         1.012         1.009           4.50         -1.75         1.06e-12         1.013         1.009           4.50         -1.75         1.04e-11         0.00         4.76e-12         1.013           4.50         -1.75         1.04e-11         0.00         4.30e-12         1.010           4.50         -1.50         1.470e-12         0.00         4.40e-12         1.009           4.50         -1.50         1.876e-12         0.00         4.40e-12         1.010           4.50         -1.50         1.877e-10         0.00         2.43e-12         1.011 <td>101</td> <td>3.314e-12</td> <td>1.023</td> <td>5549</td> <td>92</td> <td>1.254e-12</td> <td>1.018</td> <td>5498</td> <td>88</td> <td>5504</td> <td>73</td>	101	3.314e-12	1.023	5549	92	1.254e-12	1.018	5498	88	5504	73
4.50         -2.05         1.242e-12         0.00         4.400e-14         1.004           4.50         -0.07         9.545e-11         0.00         9.400e-12         1.004           4.50         -0.07         9.545e-11         0.00         8.029e-12         1.015           4.50         -1.08         1.586e-10         0.00         8.029e-12         1.015           4.50         -1.35         5.96e-12         0.00         8.60e-12         1.00           4.50         -1.35         5.96e-12         0.00         1.60e-12         1.00           4.50         -1.35         5.96e-12         0.00         1.55e-12         1.010           4.50         -1.47         7.66e-12         0.00         1.55e-12         1.010           4.50         -1.75         7.66e-12         0.00         4.076e-12         1.011           4.50         -1.32         1.479e-10         0.00         4.00e-12         1.009           4.50         -1.51         1.54e-12         1.011         1.009           4.50         -1.52         1.85e-11         0.00         4.00e-12         1.010           4.50         -1.52         1.85e-11         0.00         4.00e-12	149	5.489e-14	1.020	5988	30	2.042e-14	1.018	5978	63	5970	74
4.00         0.17         2.896-11         0.00         9.407-12         1.014           4.50         -0.77         1.586-11         0.00         9.407-12         1.014           4.50         -1.76         1.586-12         0.00         8.866-12         1.009           5.00         -1.56         1.586-12         0.00         4.786-12         1.009           4.50         -0.83         5.044-11         0.00         1.551-12         1.010           4.50         -1.83         5.044-11         0.00         1.551-12         1.010           4.50         -1.80         5.254-11         0.00         1.551-12         1.010           4.50         -1.52         1.047-11         0.00         1.551-12         1.010           4.50         -1.52         1.047-11         0.00         2.036-12         1.011           4.50         -1.53         1.473-10         0.00         2.406-12         1.009           4.50         -1.53         1.473-10         0.00         2.406-12         1.009           4.50         -1.54         1.224-11         0.01         2.406-12         1.009           4.50         -1.86         1.524-12         0.00 <td< td=""><td>205</td><td>2.942e-14</td><td>1.032</td><td>4928</td><td>122</td><td>1.108e-14</td><td>1.024</td><td>4961</td><td>108</td><td>4994</td><td>134</td></td<>	205	2.942e-14	1.032	4928	122	1.108e-14	1.024	4961	108	4994	134
3         4.50         -0.07         9.545e-11         5.00         5.02e-12         1.012           6.00         -1.16         1.15e-1         0.00         8.860e-12         1.009           4.50         -1.35         5.996e-12         0.00         8.860e-12         1.009           4.50         -0.83         5.044e-11         0.00         4.076e-12         1.010           4.50         -0.84         1.399e-12         0.00         4.076e-12         1.010           4.50         -1.50         6.926e-11         0.00         4.076e-12         1.011           4.50         -1.75         7.05e-12         0.00         4.076e-12         1.013           4.50         -1.75         1.046e-12         0.00         4.076e-12         1.013           4.50         -1.75         1.046e-12         0.00         4.206e-12         1.009           4.50         -1.75         1.046e-12         0.00         4.206e-12         1.009           4.50         -1.32         1.047e-11         0.00         4.206e-12         1.009           4.50         -1.32         1.047e-11         0.00         4.20e-12         1.011           5.00         -1.58         1.596e-1	103	5.128e-12	1.020	5697	52	1.904e-12	1.017	5673	7.4	5682	90
4.50         -1.16         1.351e-11         0.00         4.78e-12         1.009           5.00         -1.36         1.588e-10         0.00         8.86e-12         1.009           4.50         -0.83         5.044e-11         0.00         1.551e-12         1.010           4.50         -1.36         6.926e-11         0.00         1.551e-12         1.013           4.50         -2.41         2.726e-11         0.00         5.726e-12         1.011           4.50         -2.47         2.726e-11         0.00         5.026e-12         1.013           4.50         -1.62         1.047e-11         0.00         5.026e-12         1.019           4.50         -1.62         1.047e-11         0.00         5.026e-12         1.019           4.50         -1.63         1.894e-11         0.00         4.40e-12         1.009           4.50         -1.50         1.894e-11         0.00         5.20e-12         1.011           4.00         -1.50         1.894e-11         0.00         5.20e-12         1.013           4.50         -1.80         1.894e-11         0.00         5.20e-12         1.013           4.50         -1.80         1.32e-13         0.	223	3.834e-12	1.065	4138	100	1.419e-12	1.032	4199	47	4179	64
5.00         1.50         1.588-10         0.00         8.860e-12         1.00           4.50         0.38         5.096-12         1.000         1.009         1.009           4.50         0.38         5.046-11         0.00         1.551e-12         1.013           4.50         1.08         1.399-11         0.00         4.076e-12         1.013           4.50         2.41         2.728-11         0.00         6.721e-13         1.009           4.50         1.75         7.656-12         0.01         2.02e-13         1.009           4.50         1.32         1.477e-11         0.01         2.43e-13         1.009           4.50         1.32         1.477e-10         0.01         2.43e-13         1.009           4.50         1.32         1.477e-10         0.01         2.43e-12         1.003           4.00         0.36         1.851e-11         0.00         5.34e-12         1.012           4.00         0.36         1.851e-11         0.01         5.35e-12         1.013           5.00         1.58         1.851e-11         0.00         5.35e-12         1.013           4.00         0.36         1.851e-12         1.011         1.	129	2.913e-13	1.030	5215	43	1.104e-13	1.020	5187	54	3209	63
6.00         -3.35         7.996e-12         0.00         1.806e-13         1.009           4.50         -0.83         5.014e-11         0.00         4.50e-12         1.010           4.50         -0.83         5.014e-11         0.00         4.076e-12         1.011           4.50         -1.45         2.261         1.000         3.26e-12         1.011           4.50         -1.74         2.261         1.047e-11         0.00         2.02e-13         1.009           4.50         -2.51         1.047e-11         0.01         2.40e-12         1.013           4.50         -1.65         1.596e-11         0.01         2.03e-13         1.009           4.50         -1.65         1.92e-10         0.01         4.40e-12         1.013           4.00         -0.29         8.817e-10         0.00         5.278e-12         1.012           5.00         -1.50         1.92e-11         0.00         5.33e-12         1.012           4.00         -0.29         8.817e-10         0.00         5.33e-12         1.013           5.00         -1.98         5.62re-11         0.00         2.33e-12         1.010           4.50         -1.98         5.62re-13 <td>1</td> <td>7 576e-12</td> <td></td> <td>/3500</td> <td>1</td> <td>2.7689-12</td> <td>1 028</td> <td>3658</td> <td>133</td> <td>(3658)</td> <td>: .</td>	1	7 576e-12		/3500	1	2.7689-12	1 028	3658	133	(3658)	: .
4.50	193	0 500-14	1 015	6418	2.2	2.4014.14	1 014	6490	47	6463	×
4.50		2 C C C C C C C C C C C C C C C C C C C	000	3023	- Z	2 1 40 4 13	1015	1073	. u	5705	
5.00 1.50 6.9256-11 0.00 3.5656-12 1.013 4.50 2.41 2.7256-11 0.00 5.5656-12 1.013 4.50 1.52 1.4756-12 0.00 6.7216-13 1.009 4.50 1.52 1.4756-10 0.00 2.0056-12 1.013 4.50 1.52 1.4756-11 0.01 2.4136-13 1.009 4.50 1.55 1.924-10 0.00 5.4056-12 1.009 4.50 1.55 1.924-10 0.00 5.4056-12 1.009 4.00 0.29 8.155-11 0.00 5.435-12 1.013 4.00 0.29 8.155-11 0.00 5.435-12 1.011 4.50 1.50 1.926-11 0.00 6.485-12 1.011 4.50 1.50 1.926-11 0.00 6.385-14 1.012 4.50 0.00 1.736-12 0.00 6.385-14 1.013 4.50 0.00 0.236 2.236-11 1.011 6.50 0.00 0.00 0.00 0.00 6.856-12 1.011 6.50 0.00 0.00 0.00 0.00 6.856-12 1.011 6.50 0.00 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 0.00 6.856-12 1.010 6.50 0.00 0.00 0.00 6.856-12 1.010 6.956-12 1		01.000.0	790.1	200	9 0	0 2300 13	210.1	100	3 9	8085	2
4.50	+00	7.7227.7	1.010	0000	00	07-020-0	900	1000	3 5	(0000)	•
4.50	197	3.1356-12	;	0000	!	1.0106-12	1.023	0 100	3 6	(90.0)	[
4.50	10 e	3.500e-13	1,010	6273	20	1.256e-13	1.015	9779	200	7970	7 6
4.50         1.2.51         1.047c-11         0.01         2.43c-13         1.009           4.50         -1.65         1.59c-11         0.00         2.43c-13         1.009           4.50         -1.65         1.59c-11         0.00         5.20c-13         1.009           4.50         -1.65         1.82c-10         0.00         5.36c-12         1.011           4.00         0.29         8.67c-10         0.00         5.36c-12         1.012           5.00         -1.50         0.06         1.77c-11         1.012           6.00         -1.50         0.06         1.77c-12         1.012           7.00         -1.50         0.06         1.77c-12         1.012           4.50         -1.98         5.2c-11         0.00         4.865-12         1.013           4.50         -1.98         5.2c-11         0.00         2.3g-12         1.013           4.50         -0.51         4.32e-03         0.00         2.3g-14         1.012           4.50         -0.52         8.73e-12         0.00         2.77c-12         1.008           4.50         -0.53         2.08e-12         0.00         2.77c-12         1.008           4.50	20	T.SUIG-13	1.0.42	4067	70	D.9006-14	1.020	4999	8 8	- i	9 6
1.50	113	1.250e-13	1,013	50 to 10 to	90	4.634e-14	1.015	5-FC-6	3 ;	7050	2 6
4.50         -1.65         1.5390+11         0.00         5.2076+13         1.009           4.00         -1.65         1.8510+11         0.00         5.2076+13         1.012           4.00         -1.50         0.03         5.146+12         1.012           5.00         -1.50         0.02         5.136+12         1.012           5.00         -1.50         0.09         5.136+12         1.012           6.00         -1.50         0.09         1.766+12         1.011           7         4.50         -1.98         5.627+11         0.00         5.836+14         1.012           4.00         -0.51         4.238+03         0.00         0.076+14         1.012           4.00         -0.51         4.238+03         0.00         0.036+14         1.013           4.50         -0.61         1.378+12         0.00         0.036+14         1.010           4.50         -0.54         2.7370+12         0.00         0.776+14         1.011           4.50         -0.68         2.7370+12         0.00         1.766+13         1.008           4.50         -1.50         1.032+11         0.00         1.756+13         1.008           4.50	153	2.429e-12	1.022	5754	<b>\$</b> !	8.87.78-13	1.018	27.86	Τ.	60 to 1	06
5.00 -1.50   1.924=10   0.00   9.546=-12   1.011   4.00 -0.29   8.15=-11   0.00   2.75e=-12   1.012   5.00 -1.50   0.09e=-11   0.00   2.75e=-13   1.012   5.00 -1.50   0.09e=-11   0.00   2.75e=-12   1.012   5.00 -1.50   0.09e=-11   0.00   2.75e=-12   1.012   5.00 -1.50   0.09e=-11   0.00   2.75e=-12   1.013   5.00 -1.98   5.62e=-13   0.00   1.75e=-12   1.003   5.00 -1.98   5.62e=-12   0.00   1.75e=-12   1.003   5.00 -1.00   0.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00 -1.00   0.00   0.00   5.00   0.00	7.2	2.937e-13	1.028	5479	94	1.117e-13	1.019	5452	<del>*</del>	5457	200
2         4.00         -0.36         1.851e-11         0.00         5.918e-13         1.012           7         5.00         -0.36         1.851e-11         0.00         5.918e-13         1.012           81         5.00         -1.50         9.892e-11         0.00         5.433e-12         1.012           81         5.00         -1.50         9.692e-11         0.00         5.433e-12         1.011           81         4.50         -1.98         5.625e-11         0.00         4.865e-12         1.001           6(3)         4.50         -0.51         4.278e-12         0.00         6.389e-14         1.012           5         4.50         -0.51         4.738e-12         0.00         2.235e-13         1.008           5         4.50         -0.26         4.730e-12         0.00         2.25e-13         1.008           5         4.50         -0.28         6.736e-13         0.00         2.736e-13         1.001           5         4.50         -0.68         6.484e-11         0.00         6.746e-12         1.010           5         4.50         -0.68         6.484e-11         0.00         4.684e-12         1.010           5         <	210	8.064e-12	1.052	[3582]	300	2.837e-12	1.024	3972	89	(3972)	I
7         4.00         -0.29         8 f817~-10         0.00         2.76e-11         1.012           8         5.00         -1.50         9.692e-11         0.00         4.865e-12         1.011           81         4.50         -1.50         9.049e-11         0.00         4.865e-12         1.001           9(3)         4.50         -1.98         5.62ae-11         0.00         1.776e-12         1.008           10(3)         4.50         -0.00         1.378e-02         0.00         1.776e-12         1.008           4.50         -0.51         4.328e-03         0.00         9.644e-11         1.009           5         4.50         -0.28         8.73e-12         0.00         9.644e-11         1.009           8         4.50         -0.35         2.088e-12         0.00         9.676e-13         1.008           8         4.50         -0.35         2.088e-12         0.00         9.676e-13         1.008           5         4.50         -0.68         4.84e-11         0.00         9.676e-13         1.008           5         4.50         -0.68         8.032e-12         0.00         7.752e-13         1.008           5         4.50	91	3.322e-13	1.023	5635	ec ec	1.262e-13	1.018	5575	45	5608	29
7         5.00         -1.50         9.692e-11         0.00         5.435e-12         —           81         4.50         -1.28         5.623e-11         0.00         4.756e-12         1.011           0(3)         4.50         -1.28         5.623e-11         0.00         1.776e-12         1.001           4.50         -0.21         4.378e-12         0.00         2.38e-14         1.001           5         4.50         -0.24         4.378e-12         0.00         2.252e-11         1.009           8         4.50         -0.26         8.736e-10         0.00         2.732e-11         1.001           8         4.50         -0.26         2.739e-12         0.00         2.732e-11         1.001           8         4.50         -0.26         2.739e-12         0.00         2.732e-11         1.011           8         4.50         -0.88         6.48e-11         0.05         1.735e-12         1.010           8         4.50         -0.89         6.48e-11         0.00         4.68e-12         1.008           8         4.50         -0.80         0.302e-10         0.00         4.735e-12         1.010           9         4.50         -1.	124	1.537e-13	1.022	5663	52	5.725e-12	1.017	5634	53	5646	839
8 5.00 -1.50 5.049e-11 0.00 4.855e-12 1.011 81 4.50 -1.98 5.23e-11 0.00 6.38e-12 1.008 0(3) 4.50 -0.01 1.378e-12 0.00 6.38e-12 1.008 4.00 -0.51 4.328e-09 0.00 6.38e-11 1.009 6.4.50 -0.02 7.28e-12 0.00 5.232e-11 1.001 8.4.50 -0.35 2.088e-12 0.00 1.756e-12 1.008 8.4.50 -0.35 2.088e-12 0.00 1.756e-12 1.008 8.4.50 -0.38 2.088e-12 0.00 1.756e-12 1.008 8.4.50 -0.08 6.89e-11 0.00 7.168e-12 1.008 8.4.50 -0.00 0.00 2.62e-12 1.008 8.4.50 -0.00 0.00 2.62e-12 1.008 8.4.50 -0.00 0.00 2.62e-12 1.008 8.4.50 -0.00 0.00 3.478e-12 1.008 8.4.50 -0.00 0.00 3.478e-11 1.008 8.4.50 -0.00 0.00 3.478e-11 1.008 8.4.50 -0.00 0.00 0.347e-11 1.009 8.4.50 -0.00 0.00 0.347e-11 1.002 8.4.50 -0.00 0.00 0.347e-11 1.002 8.4.50 -0.00 0.00 0.347e-11 1.012	I	4.690e-12	1	<3500	l	1.766e-12	1.028	3583	143	(8583)	1
81 4.50 -1.98 5.62a-11 0.00 1.776e-12 1.008 0(3) 4.50 -0.00 1.378e-12 0.00 6.38p-14 1.012 4.00 -0.29 8.726e-10 0.00 5.44e-11 1.009 8 4.50 -0.28 7.26e-10 0.00 2.25e-11 1.010 5.9 4.50 -0.38 2.088e-12 0.00 6.706e-13 1.008 5.3 4.00 -0.08 6.48e-11 0.05 1.887e-12 1.011 5.9 4.50 -0.08 6.48e-11 0.05 1.887e-12 1.011 5.9 4.50 -0.08 8.032e-10 0.00 4.684e-12 1.008 5.3 4.00 -0.00 8.032e-10 0.00 7.752e-13 1.010 5.4 5.0 -1.00 6.89e-11 0.00 2.526-12 1.012 5.4 5.0 -1.20 6.89e-11 0.00 3.47e-13 1.008 5.4 5.0 -1.20 6.89e-11 0.00 3.47e-13 1.008 5.4 5.0 -1.50 1.07f-11 0.01 3.47e-13 1.008 5.4 5.0 0.28 1.204e-11 0.00 3.47e-13 1.008 5.4 5.0 0.28 1.204e-11 0.01 0.347e-11 1.012 5.4 5.0 0.28 2.28 2.26e-11 0.01 0.347e-11 1.012 5.4 5.0 0.28 2.28 2.26e-11 0.00 1.666-12 1.002 5.4 5.0 0.28 2.26e-10 0.00 8.456e-12 1.012	252	4.382e-12		<3500		1.595e-12	1.028	8638	136	(3639)	
0(3) 4.50 0.00 1.378-12 0.00 6.389-14 1.012 4.00 0.28 6.728-01 0.00 2.232-11 1.009 4.50 0.26 7.376-12 0.00 2.232-11 1.001 5. 4.50 0.28 6.736-10 0.00 2.232-11 1.001 5. 4.50 0.28 6.484-11 0.05 1.765-12 1.001 5. 4.50 0.08 0.08 6.484-11 0.05 1.887-12 1.011 5. 4.50 0.08 0.082-10 0.00 7.756-12 1.010 5. 4.50 0.09 0.09 0.09 7.756-12 1.010 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.09 0.09 0.09 5. 4.50 0.09 0.09 0.00 0.09 5. 4.50 0.09 0.00 0.00 0.00 5. 7.526-11 0.01 0.01 0.01 0.01 5. 7.686-12 1.002 5. 4.50 0.09 0.00 0.00 0.00 0.00 5. 7.506-12 1.002 5. 4.50 0.00 0.00 0.00 0.00 0.00 0.00 5. 7.506-12 1.002 5. 7.506-12 1.002	102	9.980e-13	1.025	5546	51	3.738e-13	1.019	5547	46	5541	83
4.00         -0.51         4.328-09         0.00         9.644e-11         1.009           4.00         -0.28         7.726-0         0.00         2.536-1         1.001           8         4.50         -0.35         2.088e-12         0.00         1.756-13         1.001           59         4.50         -0.35         2.088e-12         0.00         9.670-14         1.011           50         4.50         -0.38         2.088e-12         0.00         7.756-13         1.008           53         4.50         -0.68         2.684e-11         0.00         7.756-12         1.010           53         4.50         -0.64         3.072e-12         0.00         7.756e-12         1.00           5         4.50         -0.00         3.032e-13         0.00         7.756e-12         1.00           5         4.50         -1.00         6.89e-11         0.00         2.65e-12         1.01           6         4.50         -1.50         1.071-11         0.01         2.768e-13         1.008           6         4.50         -1.50         1.071-11         0.01         2.768e-13         1.002           7         4.50         -0.50         4.609e-	168	3.612e-14	1.037	4931	8	1.510e-14	1.027	4730	74	4825	-4
4.00         -0.28         8.726e-10         0.00         2.252e-11         1.011           8         4.50         -0.28         8.726e-10         0.00         2.252e-11         1.0108           59         4.50         -0.38         6.48e-11         0.05         1.88e-12         1.010           1         4.50         -0.68         6.48e-11         0.05         1.88f-12         1.011           2         4.50         -0.69         2.03e-10         0.00         4.68e-12         1.010           2         4.50         -0.11         2.04e-11         0.00         4.68e-12         1.008           5         4.50         -1.00         6.89e-11         0.00         7.752e-13         1.010           6         4.50         -1.50         1.07fe-11         0.01         9.94fe-13         1.008           6         4.50         -1.50         1.07fe-11         0.01         2.768e-13         1.002           6         4.50         -1.50         1.07fe-11         0.01         2.768e-13         1.002           7         4.50         0.50         1.07fe-11         0.01         2.768e-13         1.002           8         9         0.00	163	4.824e-11	1.010	6679	90 90	1.722e-11	1.009	6722	83	5707	102
E         4.50         -2.64         7.370e-12         0.00         1.763e-13         1.008           89         4.50         -0.38         5.088e-11         0.00         e.770a-13         1.001           1         4.50         -0.88         6.484e-11         0.05         e.770a-14         1.011           5.3         4.00         -0.00         7.75e-12         0.00         7.75e-13         1.008           2.3         4.00         -0.01         7.75e-12         1.00         4.68e-12         1.00           2.0         -1.10         -0.322e-10         0.00         7.75e-12         1.003           5.0         -1.00         6.899e-11         0.00         3.562e-12         1.010           6.0         -1.20         -1.20         0.77e-11         0.01         9.4te-13         1.003           4.50         -1.50         -1.50         1.07f-11         0.01         2.768e-12         1.002           4.50         0.50         4.609e-11         0.00         3.478e-11         1.012           2         -1.50         0.55         2.352e-10         0.00         8.950e-12         1.012	144	1,129e-11	1.013	6351	90 90	4.088e-12	1.012	6369	83	6349	66
4.50         -0.35         2.0886-12         0.00         8.670e-14         1.011           4.50         -0.84         6.484e-11         0.00         1.887e-12         1.000           4.00         0.00         8.032e-10         0.00         4.68e-12         1.003           4.00         -1.11         2.00         4.68e-12         1.003           5.00         -1.10         2.689e-11         0.00         2.56e-12         1.010           4.50         -1.50         1.077e-11         0.01         2.768e-13         1.008           4.50         -1.50         1.077e-11         0.01         2.768e-13         1.008           4.00         0.50         1.204e-09         0.00         3.478e-11         1.014           4.50         -0.50         2.352e-10         0.00         8.469e-11         1.012           4.50         -0.50         2.352e-10         0.00         8.469e-12         1.012	102	9.249e-14	1.016	6320	97	3.387e-14	3.016	6319	144	6328	111
4.50	142	6.473e-14	1.048	4617	67	2.352e-14	1.026	4666	73	4639	5
4.50         -2.64         2.579e-12         0.00         7.169e-14         1.008           4.00         0.00         3.032e-10         0.00         4.68e-12         1.003           4.00         -1.10         6.899e-11         0.00         2.562e-12         1.010           4.50         -2.33         3.726e-11         0.01         9.94te-3         1.008           4.50         -1.50         1.071e-17         0.01         2.768e-13         1.009           4.50         0.20         1.204e-09         0.00         3.478e-11         1.019           4.50         0.25         2.352e-10         0.00         8.469e-12         1.012           4.50         -0.55         2.352e-10         0.00         8.956e-12         1.012	411	1.076e-12	1.022	5762	46	4.028e-13	1.018	5737	122	5763	141
4.00 0.00 3.032e-10 0.00 4.684e-12 1.003 . 4.50 - 1.11 2.044e-11 0.00 7.752e-13 1.010 5.00 - 1.00 0.892e-11 0.00 2.562e-13 1.010 4.50 - 2.33 3.756e-11 0.01 9.94te-13 1.008 4.50 0.2.65 1.20 1.077e-11 0.01 2.768e-13 1.009 4.00 0.20 1.204e-09 0.00 3.475e-11 1.014 4.50 0.55 4.698e-11 0.00 8.456e-12 1.012 4.50 0.55 2.352e-10 0.00 8.950e-12 1.012	ž	3.905e-14	1.032	5884	45	1.508e-14	1.018	5799	107	0380	75
4.50 -1.11 2.044e-11 0.00 7.752e-13 1.010 5.00 -1.00 6.899e-11 0.00 2.565e-12 1.012 4.50 -1.50 1.07fe-11 0.01 2.768e-13 1.008 4.00 0.20 1.204e-09 0.00 3.479e-11 1.019 4.50 0.55 4.609e-11 0.00 1.655e-12 1.012 4.50 0.55 2.352e-10 0.00 8.950e-12 1.012	170	1.987e-12	0.998	7993	102	7.1354-13	986.0	2979	60	7977	116
6.00 -1.00 6.899-11 0.00 3.8626-12 1.012 4.50 -2.33 8.728e-11 0.01 9.941e-13 1.008 4.50 -1.50 1.071e-11 0.01 2.768e-13 1.008 4.00 0.20 1.204e-09 0.00 3.479e-11 1.014 4.50 0.55 2.352e-10 0.00 8.950e-12 1.012	135	4 646e-13	1 032	5113	110	1.790e-13	1.021	5065	7.8	5071	102
4.50         -2.33         3.720e-11         0.01         9.941e-13         1.008           4.50         -1.50         1.077e-11         0.01         2.768e-13         1.008           4.00         0.20         1.204e-09         0.00         3.478e-11         1.014           4.50         -0.50         4.609e-11         0.00         8.950e-12         1.012           4.50         -0.55         2.352e-10         0.00         8.950e-12         1.012	226	3.086c-12	ţ	<3500		1.071e-12	1.027	3888	101	(3888)	
4.50 -1.50 1.071a-11 0.01 2.768e-13 1.009 4.00 0.20 1.204e-09 0.00 3.479e-11 1.014 4.50 -0.50 4.609e-11 0.00 1.665e-12 1.012 4.50 -0.55 2.352e-10 0.00 8.950e-12 1.012	106	5.293e-13	1.019	6034	25.55	1.931e-13	1.017	6058	75	6037	7.8
4.00 0.20 1.204e-09 0.00 3.479e-11 1.0114 4.50 0.50 4.609e-11 0.00 1.656e-12 1.012 4.50 0.55 2.352e-10 0.00 8.950e-12 1.012	142	I.396e-13	1.016	6261	126	5.238e-14	1.016	6212	1.2	6211	107
4.00 0.20 1.204-09 0.00 3.478-11 1.014 4.50 0.50 4.609-11 0.00 1.656-12 1.012 4.50 0.55 2.352e-10 0.00 8.950e-12 1.012	!										
4.50 .0.50 4.609e.11 0.00 1.665e.12 1.012 4.50 .0.55 2.352e.10 0.00 8.950e.12 1.012	83	1.826e-11	1.015	6025	69	6.790e-12	1.013	5995	63	6019	71
4.50 -0.55 2.352e-10 0.00 8.950e-12 1.012	219	9.312e-13	1.027	5388	111	3.657e-13	1.020	5280	æ	5311	114
100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	107	5.441e-12	1.033	5127	1.1	2.061e-12	1.022	2603	4-1	5098	67
4,50 0.01 1,970e-09 0.00 8,942e-11 1,013	63	6.089e-11	1.047	4640	67	2.354e-11	1.027	4577	38	4605	43
4.00 -1.53 1.190e-10 0.03 3.393e-12 1.009	127	1.934e-12	1.023	5767	99	7.136e-13	1.018	5773	4	5738	85 85
G167.011(4) 4.50 .0.14 5.024c-13 0.00 1.826c.14 1.013 (5277)	į	1.626e-14	1,050	4561	63	5.568e-15	3.026	4707	5.8	4637	60

Table 4. continued

4.00 0.05 4.00 -1.15 4.50 -1.52 4.50 -1.57 4.50 -1.88	00 1926						14.	Į.	H	1				1	+11+00+14	Treat.
	60-accure	3,5	6.61Te-11	1.012	6584	130	3.26Te-11	1.009	6570	9.7	1.191e-11	1.008	6565	81	6571	35
	2.380e-10	0.0	6.771e-12	1.010	5896	81	3.735e-12	1.022	5855	81	1,383e-12	1.018	5856	92	5870	84
	7.493e-11	00.0	2.894e-12	1.009	[4932]	80 80	1.786e-12	1,033	4984	99	6.823e-13	1.020	4967	41	4974	48
	5.860e-11	00.00	2.313e-12	1.009	4749	102	1.515e-12	1.038	4758	42	5.871e-13	1.021	4732	. 20	4746	46
	4.471e-12	0.07	1.533e-13	1.008	5279	108	9.339e-14	1.028	5206	111	3.481e-14	1.020	5245	93	5244	10
	8.181e-12	00.0	2.520e-13	1.008	5594	121	1.410e-13	1.024	5614	77	5.087e-14	1.019	5687	70	5639	84
	1.278e-11	0.00	4.607e-13	1.009	5152	112	2.756e-13	1.030	5184	48	1.040e-13	1.020	5176	65	5175	67
	7 7802 13	000	0 4 1 2 2 1 2	000	2004	801	1 280 1 13	200	9 1 2 2	2	E 041 e 14	010	5,616	r C	56.14	CM
100	01-00-1	200	1 3474 13	010	0100	132	6 3664 10	100		9 0	2 2276.12	900	6829	1 4	6831	8
	0.000	9 6	11-11-11	10.0	0.00	50	7 000 14	200	200	2 6	41-01000	000	1 0		1000	9
	4.00 fe-12	00.0	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.014	7000	) H	ET-2076'	1.001	9404	3 5	4.300c-14	0.00	9 4 5	7 4	10±0	9 3
	60-a).67:T	0.01	Z.5.15e-11	1.010	2020	0 !	1.3886-11	1.00.1	0 10 10 10 10 10 10 10 10 10 10 10 10 10	101	5.110e-12	1.000	0070	9 1	7070	000
4.00 -2.37	3.859e-10	0.00	1.141e-11	1,008	5639	146	6.454e-12	1.025	5676	စ္	2.379c-12	1.018	5639	47	2691	e e
	4.514e-09	0.00	1.346e - 10	1.014	5913	155	ţ	I			2.657e-11	1,013	5889	2	5897	86
,	2.880e-11	0.00	9.573e-13	1.010	5451	119	5.331e-13	1.025	5530	87	1.981e-13	1.019	5526	94	5507	98
	4 061e-09	0.00	1.7046-10	1.014	[4810]	118	1.115e-10	1.040	4842	88	4.287e-11	1.028	4785	62	4811	63
	0000000	900	1 1070 10	6101	1000	114	F 530e 11	0.00	0623	9	2 4204 11	101	K781	2.6	4777	68
	5.800e-03	00'0	1.19/e-10	710.7	0000	* C	11-2010-1	1.020	0	0	11-1100#19	7.0	1000	- 1		700
	7.590e-09	0.00	2,013e-10	1.012	6221	651	;   ;	;	;	;	3.767e-11	1.014	6223	- (	55.23	104
-2.73	1.540e-12	0.03	5.052e-14	1.00%	5364	177	. 2.666e-14	1.025	5579	5	1.051e-14	1.020	5479	2	2002	OB :
	3.597e-10	00.0	1.155e-11	1.010	5576	151	6.616e-12	1.034	5560	-16	2.470e-12	1.018	5541	89	5555	87
	1.871e-09	0.00	5.752e-11	1.013	5794	117	3.150e-11	1.020	5793	7.1	1.177e-11	1.016	5753	40	5777	7.8
	4 3976-11	0.03	1.565e-12	1.008	5124	15 15 15	8.747e-13	1.037	5274	6	3.405e-13	1.020	5229	53	5235	94
	A 407 00	0 0	1 6000 10	¥10.+	0010	1 0	0 1870 11	510	0.00	1 0	3 4434 13	100	6106	F 2	24.50	59
	07-07-0	9 6	1.00001	# 100 m	0010	707	0.101011	010.1	9070	9 :	11.00000	0000	277	5 9	0712	3 6
	4.580e-12	90.0	1.0306-10	1.003	0140	210	9.1/2e-14	1.000	\$0T0	7 !	3.020c	T.040	1112	3 ;	0770	6 C
4.50 -1.67	3.248e-11	0.00	8.690e-13	1.009	6038	160	4.597e-13	1.019	6062	113	1.689e-13	1.017	6072	114	6009	55
	1.645c-10	00.0	6.502e-12	1.011	4940	128	4.275e-12	1.038	4910	88	1.672e-12	1.022	4828	g G	4867	64
0 -1.50	2.405e-10	0.00	1.390e-11	1	<3500		1.175e-11	1	<3500		4.396e-12	1.029	3578	143	(3578)	1
	7 0024-12	100	2 0866-13	1 000	KOTE	187	1 7826-13	1 039	5000	9	6 8854.14	1.000	5050	4.5	680%	105
•	2000	5 5	000000	000	2 2 2	0 0	1001	1	0000	3	FT-00000	1 -	0000	- 2	(0000)	,
3.00	3.9236-09	0.00	Z.10Ze-10	1.012	3804	183	1.821e-10	l	Vasuu V	l	C - 3067	1.034	2002	102	(7000)	:
	9.375e-12	0.00	3.307e-13	1.008	5162	on On	1.938e-13	1.028	5197	79	7.547e-14	1.020	5153	*	5168	69
5.00 -0.75	3.387e-10	0.00	1.001e-11	1.010	5834	රිහි	5.405e-12	1.020	5855	00	1.990c-12	1.017	5857	47	5831	62
	Z.566e-11	00'0	8.438e-13	1,008	5408	149	4.961e-13	1.026	5365	74	1.893e-13	1.020	5344	99	5364	38
	4.5610-11	000	1 784r-12	1 009	[4904]	98	1 096e-12	1 034	4979	67	4 199e-13	1.021	4955	4.3	4966	46
400	7 04 70 40	900	2 1600 11		9000		11000		200	1.6	4 2600 12	9.0	8008	i g	8003	200
	01-01-01-01-01-01-01-01-01-01-01-01-01-0	2	11-000	11011		9	11-20211	10.1	200	-		24.4		3 :		3 !
4.50 0.00	4.097e-09	0.00	1.681e-10	1.014	(4879)	101	1,400e-10	1.054	4476	83	5.697c-11	1.031	4323	533	4394	57
PC 6. US	1 2764-19	00.0	5 95720.14	1 010	(4901)	200	3.697A.14	1.036	4440	x o	1.283e-14	1.020	4721	60	4614	74
4 50	K 6180-11	2.0	2 0076-12	000	K182	001	1 1130-13	1 002	0000	0 0	4 173-13	020	0.00	1 10	0.00	. K
	0.0106-11	0.10	1 10000	000	0010	3 4	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	100.1	9 7 9	1 2	2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	020	9 8 8 8	9 00	6693	
	11-901616	1000	11.000.1	1.003	0000	000	9,700-10	17071	#100	-	01-200000	1.010	0 10	9 6	(4114)	5
	1.440e-10	0.00	7.500e-12	1.011	3731	233	6.439e-12	1	V3200		Z.434e-12	1.027	3717	125	(3/17)	:
	3.867e-10	0.00	1.886e-11	1.0.1	4217	102	1.434e-11	1,059	4327	61	5.442e-12	1.031	4304	<b>4</b>	4314	52
•	1.267p-09	0.00	6.158e-11	1.011	4187	172	4.539e-11	1.057	4343	42	1.709e-11	1.029	4347	36	4345	o (1)
4.00 0.00	1,240e-09	0.00	4.167e-11	1.014	5543	150	2.324e-11	1.023	5562	76	8.834e-12	1.019	5508	68	5535	t- oc
•	4.420p.10	0.00	1.4170.11	1.011	5,593	68	7.670-12	1.022	56.85	7.8	2.832e-12	1.018	5684	47	5662	65
	7 6004 12	000	1 2690 13	010	5070	00.5	7 6044 14	0.00	5267	63	0 877* 14	1 020	8005	E S	8363	1.7
	1 756.0 10	900	6 5084 10		1004	30	2 0784 13	1.00.1	5103	1 1-	1 5134 10	1 032	5143	8	84.75	90
	01-00-1	900	0.1000.11	200	[accord	2 .	2 50Ec 11	2001	100	10	21 -227 0	1000	0000		40.85	23
	CF *650 0		41-00410	100		9 0	4 -000	000	2 6	1	0 200 0	000	0007		4077	1.
70.T- 00.T	0.070-12	70.0	2.010e-13	1,008	000	001	1.012e-10	T.030	5T00	- 1	0.550e-14	1.020	n I			2 %
	C. SOLE-II	10.0	21-9116-12	1.0.1	2070	120	8.047c-13	1.028	9000	25	2.398e-13	1.940	000	de i	900	3 6
4.50 -0.68	1.115e-10	0.00	3,3326-12	1.011	5801	178	1.818e-12	1.021	5810	en On	6.808e-13	1.017	5781	29	50/0	90
	6.433e-10	0.00	2.017c-11	1.013	5761	153	1.081e-11	1.019	5788	73	4.036c-12	1.016	5758	Ţ	5770	06
	1.615e-10	0.00	8.852e-12	1.012	[3702]	235	7.662e-12	I	<3500		2.891e-12	1.033	3708	127	(3708)	I
	1.588e-10	00.0	5.539e-12	1.011	5340	8	3.1146-12	1.026	5444	10	1.150e-12	1.019	5446	45	5418	62
4.00 0.00	3,710e-08	00.0	5.736e-10	1.001	7958	197	2.499c-10	0.993	7941	132	9.079e-11	0.993	7900	110	7923	138
	3.493e-11	00.0	9.733e-13	1.009	5948	81	5.250e-13	1.020	5949	52	1.931e-13	1.017	5960	89	5952	65
	3.126e-11	0.01	8.6986-13	1.008	5866	83	4.7146-13	1.021	5886	89	1.722e-13	1.018	5920	75	5891	7.5
	1.246e-10	00.0	2.8156-12	1.011	5732	153	2.0642-12	1 02:1	5777	80	7.5835-13	71011	5785	7	5771	94
	2 319e-11	0 0	4 0 0 0 0	0.00	0 10 10 10 10 10 10 10 10 10 10 10 10 10	96.	0 0 0 0 0 0	100	1683	, m	1 4070 13	610	E717	44	5683	
	11-000-1	200	-1-0000-1- -1-0000-1-	0000	000	130	5.552e-15	1.024	100	5	21-5704.1	1.016	1007	* *	7000	3 6
£.50 -2.29	4.835e-1	000	1.769e-12	1.008	5803 6018	500	1.034e-12	1.028	5146	240	3.870e-13	1.020	0 TO	4 5	0.00	9.
	2.300e-10	0.00	3.394e-12	1.006	1080	169	1.823e-12	1.000	212	26	6.597e-13	n n n	156	י פי מ	1251	111
0.00	2.521e-10	00.0	3.780e-12	1.003	8033	170	1.690e-12	0.998	7932	101	6.019e - 13	0.996	7941	86	7953	115
4.00 0.00	2.988e-09	0.00	3.780e-11	0.897	8588	137	1.4430.31	0.989	8845	103	5.161e-12	0.987	8828	107	8794	118

Table 4. continued

G183-011 G154-034 C184-034	. 50		r Bo	(A-Q)q	F. 7	"		-	H.H	3	,	1	1			1	10000	
# 3	2 1	-2.05	3.701e-11	0.00	8.345e-13	1.009	6546	6	4.439e-13	1.014	6438	8 1	1.667e-13	1.015	6370	G .	6441	78
	5.50	0.00	9.956c-12	0.45,	3.406e-13	1.014	5486	701	1.938e-13	1.024	1055	5 5	7.342e-14	1.018	2447	4 6	0 to	60 -
9.	0.50	05.1.	4.119e-11	0.02	1,3716-12	T.009	2885	157	7.548e-13	1.025	2505	POT 5	Z.7/16-13	20.1	25-62	er' r	9 0 8 0 8 0	11
H.K6752	4.50	0.17	7.908e-03	0,00	3.144e-10	1.013	14990	on in	1.980e-10	1.036	5023	?∶	7.623e-11	1.023	4901	41	0 0	70
G020-024	4.50	-0.91	1.387e-11	0.12	2.289e-13	1.010	6486	113	1.726e-13	1.014	6398	84	5.971e-14	1.012	6523	70	6464	
HR6806	4.50	-0.25	8.975e-10	0.00	3.677e-11	1.013	4866	108	2.312e-11	1.037	4964	90 -4	8.719e-12	1.022	4931	70	4947	74
G140-046	4.50	-1.44	2.171e-11	00.0	8.540e-13	1.009	4876	79	5.225e-13	1.034	4972	5.4	1.964e - 13	1.021	4986	42	4980	48
G021-606(T)	4.50	00.00	4.098e-12	0.00	2.020-13	1.011	(4161)	154	1.196e-13	1.043	4749	67	4.507e-14	1.027	4723	50	4735	62
HE.6844	4.00	0.17	5.657e-10	0.00	1.177e-11	1.009	7056	133	5.562e-12	1.004	7027	69	2.003e-12	1.003	7039	65	703R	80
	5 00		8 105e-11	5 5	4 241e-12	1 012	[3882]	318	3 7MDe. 12	10.55	[3500]	300	1.8316.12	1.032	3886	102	(3886)	ı
F 10 2 G 1	9 6	9 6	11-001-0	8 6	21-01-01		2002	7 7	1 200-11	200	2000	2 6	21-020-1	200	1000	1	E781	Ü
;	00.4	0.00	0.240e-10	0.00	Z.5338-11	0101	2000	#c1	1.0000.1	0.01	101	" i	2.1006-12	1.010	1000	- 6	1000	0 6
G184-004	4.50	·0.40	T.5656-12	0.10	6.586e-14	1.012	[4755]	40	3.6736-14	1.033	2110		1.38%e-14	1.022	2000	9	oone	- !
G141-019	4.50	2.39	2.174e-11	0.05	7.795e-13	1,008	5107	110	4.617c-13	1.028	5130	71	1.738e-13	1.020	5164	64	5138	7.7
HD171620	4.50	-0.65	2.563e-10	0.00	6.960e-12	1.011	6097	126	3.629e-12	1.016	6113	82	1.33Ce-12	1.015	6111	68	6109	86
G206-034	5.00	-3.10	8.165e-12	0.04	2.137e-13	1.013	6305	223	1.163e-13	1.014	6143	82	4.158e-14	1.012	6619	83	6191	109
G227.037	4.00	127	1.576-10	0.00	4.8024-12	1.015	2882	124	2.6044-12	7.017	5842	54	9.702e.13	1.015	5809	8	28.35	65
DID 120 2078	00.7		2 04 00 a 1	000	0100010		2003	, r	CT 2000 C	500	1 1	u t	2 6604 12	1 018	: Kor	0	58.31	D.
0700	9.5	0.00	0.2216-11	0.0	77-anci-1	1.011	2000	neT	07-age-70	1.064	0 1	- 1	01-00000	0707	000	\$ 6	7 00 1	5 6
GUZ1-022	4.50	-T.63	I.419e-11	00.5	3.965e-13	1.009	9069	180	Z.Z11e-13	1.021	2847	6.9	8.0926-14	1.018	25/0	9	0000	70
G184-020	4.50	-2.11	3.593e-12	0.10	1.108e-13	1.008	5577	124	6.262e-14	1.024	55.83	105	2.294c-14	1.019	5625	134	5593	120
G021-024	5.00	-1,50	1.602e-10	0.00	8.238e-12	1.011	3793	227	6.958e-12	1.035	[3518]	300	2.427e-12	1.025	3915	97	(3915)	I
020 781	00	, i	01-000-1	000	0 4105.10	10.1	1080	0 11 0	F F192 13		/2K00		1 067-10	1 028	2760	130	(3760)	I
9	00.0	OC.T.	or-anerit	0.0	0.4196-14	1.011	H 000	207	7T-20TO-0	;	0000	1	1.30105.12	1.020	5 6 5 5	7	(0.5)	;
G022-009	4.50	-0.48	2.615e-11	0.00	9.025e-13	1.012	5386	80	5.024e-13	1.025	5497	76	1.847e-13	1,019	5503	68	5465	4
HR.7236	4.00	0.00	8.96%e-09	0.00	1.0836-10	1.00.1	8715	171	4.141e-11	0.996	8981	110	1.496c-11	0.995	8927	108	8910	124
HR7260	4.00	0.00	1.031e-09	0.00	3.406e-11	1.014	5591	142	1.875e-11	1.022	5629	29	7.066e-12	1.018	5553	67	5603	18
G022-020	4 50		5 032a.11	90.0	1 0000-10	1 000	£498	103	1.045a-12	1 024	5608	22	3.805-13	1 019	5651	73	5593	7.0
24	9 S	100	11,000,000	000	71-0070-1	000	0000	4 t	41.0000 T	# 400 F	0000	•	2000		1 2	- u	000	
TOTAL TOTAL	4.50	17.7	11-977n.c	0.00	Z.u.oc.0.Z	T.OUN	Tout.	121	1.37.36.1.6	550.	2000	5	5.25Ue-10	17071	1070	5	7007	8 :
G125-004	4.50	-0.42	9.168e-11	0.00	3.623e-12	1.012	4965	276	2.230e-12	1.035	5045	131	8.634e-13	1.023	4975	148	5004	138
G022-024	4.50	-0.47	2.074e-11	0.00	9.407e-13	1.011	1460	4	6.184e-13	1.045	4675	99	2.265e-13	1.025	47.15	33	4700	6
HR7373	4.00	0.41	2.368e-09	0.00	8.384c-11	1.017	5459	81	4.552e-11	1.023	5552	51	1.698e-11	1.017	5523	88	5518	64
H 17386	4 00	200	8 7444 10	000	2 5440 11	710	6030	125	1 206. 11	7101	6600	7	4 7410-12	10.13	6074	9	8082	26
	8 5	17.0	0.1410-10	000	TT-051000	1.011	0000	21	11-2067.1	FT0.1	200	# 0 0	77.211.1.1	5 6 6 6	, 000	9 9	900	- u
6125-016	4.50	-0.87	Z.304e-11	0.00	C.5758-13	1.010	5283	0.1	5.579e-1.5	1.020	1050	22	1.321e-13	1,017	TORC	0	0000	501
200-7600	20.00	06.1-	4.47.36-11	0.00	Z.553e-1Z	I	<.030U	l	Z.14 (e-12	l	<.0000	l	6.011e-13	1.020	0000	T :	(600)	:
HD338529	4.50	2.58	5.255e-11	0.00	1.258e-12	1.008	6341	160	g.ggse-13	1.016	6298	7.4	2.427e-13	1.016	6308	80	6310	XO.
G208-029	4.00	0.00	1.021e-10	0.00	2.445e-12	1.012	6582	292	1.214e-12	1.009	6550	174	4.433e.13	1.010	6553	182	6559	205
HD184499	4.00	-0.69	6.206e-10	0.00	1.891e-11	1.011	5748	116	1.036e-11	1.022	5759	59	3.855e-12	1.018	5745	44	5750	62
G023-005	5.00	1.50	1.1216.10	0.00	6.130s.12	ı	<3500	١	5.321e-12	I	<3500	I	1.914e-12	1.027	2692	128	(3697)	!
HR7462	9 20	50.0	4.0124-09	000	1.4376-10	1 013	\$303	147		١	;	١	3 383e. 11	1 022	2177	6.4	5227	88
	000	9 7	00 LO 14 T	3	01-04-0	3 .	000		1000		4	, i	11.000.00			5 í	100	8 8
DE 1909	4.30	0.14 0.14	1.115e-09	0.00	5.400e-11	1.014	0000	# O F	1.0000-11	1.018	2012	c (	7.1445-12	1.015	000	7 1	0 0	66
H.R.7504	4.50	0.08	8.950e-10	000	2.766e-11	1.014	4I%	154	1.522c-11	1.019	5780	20.7	5.714e-12	1.016	9	1	9/9/	25
G125-031	5.00	-1.00	1.455e-10	0.00	7.431e-12	1.011	3846	223	6.471e-12	I	000°V	l	2.415e-12	1.028	37.66	113	(33.66)	ı
HD188262	4.50	0.00	3.125e-10	0.00	1.281e-11	1.014	4882	143	8,299e-12	1.038	4906	70	3.277e-12	1.026	4802	61	4850	65
HD188510	4.00	-1.80	8.512e-11	0.0	2.627e-12	1.008	5595	166	1.526e-12	1.026	5544	(a) 1	5.604e-13	1.019	5575	169	5564	121
G023-020	4.50	-1.83	7.187e-12	0.00	2.488e-13	1.008	5260	205	1.470e-13	1.028	5257	112	5.416e-14	1.020	5306	100	5278	126
HD189558	4.00	-1.30	2.306e-10	0.00	6.878e-12	1,009	5744	147	3.993e-12	1.024	5639	92	1.480e-12	1.019	5645	n)	5683	91
G082-049	5.00	0.00	5.322e-12	0.00	2.815e-13	1.011	3854	177	1.717e-13	1.050	4570	191	6.777e-14	1.030	4477	103	4511	139
HR7670	4.00	0.26	1.431e-09	0.00	4.758e-11	1.035	5621	121	2,705e-11	1.022	5.579	92 t-	1.013e-11	1.017	5539	68	5572	83
G186-011	4 50	91.0	9 9009-10		1 6106.11	810	KORE	90	0.0086-13	920 F	400%	0	2 7374-19	1 024	4970	9	5001	7.5
G024-003	4 50	47.	1 9014 11	000	51	1 008	0282	1 to	0.0204.12	1 001	. n	1 (1	1 0886.12	1 018	5863	7.4	9,000	5
HD227618	000		11-21201	800	0.0000-10	000.	2000	5.5	2 2004 12	4001	000	2 0	0 7000 13	1000	4944	, n	4084	9 00
	000	200	11-2027-6	3 6	01-0110-0	1.010	3000	7 7 7	0.00%	9 1 7	Token	H 0	07400000	1000	100	0 0	(0000)	2
HDAARGET	0.00	7.00	T.47 - 64.10	00.0	21-9000-170 0 0 0 0 0	1000	5005	707	0.0006.12	1.000	0705	000	2.2336-12	0.020	0 0 0	n c	(2000)	4
-	000	7 7	0.040-01-01-01-01-01-01-01-01-01-01-01-01-01	3 8	21-2002-7	1.003	0000	č	21-3770	1.022	1 0	9	4.301E-10	5 0 0 0	0000	4 4	(0000)	3
2000	0.00	00.1.	01-ac-c-+	00.0	11-90/07	:	0000V	;	2.1936-11	}	0000	:	21-9004-0	070.7	7 6	7	(0000)	1 6
HD100001	4.50	-1.10	2.5.496-11	00.0	6.133e-13	1.009	5553	077	4.551e-13	3.020	7700	3 6	1.100e-13	1.018	0 0 0	2 [	0000	- 6
	00.4	-1.13	3.743e-11	0.00	7.00 V 2.0	0.01	27.30	40	7. avi 4.	1.022	0 + C	<b>10</b> 1	5.035e-13	1.018	0000	- 1	0010	2 2
0100-026	4.50	3.40	1,401e-11	0.01	3.352e-13	1.008	6327	128	1.638e-13	1.014	6487	×	6.092e-14	1.015	8543	6.	8759	S (
D UZ23Z74	4.50	2.46	7.29Ze-11	0.00	2.288e-12	1.008	5510	420	1.384e-12	1.026	5378	193	5.162e-13	1.020	5404	210	5414	243
1	5.00	-1.50	1,732c-10	00.0	9.278e-12	1.011	[3540]	250	7.923e-12	I :	V3500	3	2.816e-12	1.026	3786	116	(3786)	2
DD +4 4551	4.50	-1.80	4.1446-11	0.00	1.178c-12	1.008	5842	154	6.473e-13	1.021	5858	6.	2.4456-13	1,018	2 (88	Si i	50.00	5
Cr0.29-0.15	4.00	-1.37	1.294e-10	0.00	3.511e-12	500.1	6023	125	1,886e-12	1.019	2109	92	6.945e-13	1.017	6018	<b>7</b>	-109	9
HR7914	4.00	0.00	7.128e-10	0.00	2.215e-11	1.013	5781	154	1.211e-11	1.020	5768	æ L	4.504e-12	1.017	5745	11	5761	90

Table 4. continued

2	Jog(g)	[Fe/H]	FBol	E(B-V)	F.3	4.7	$T_J$	$\Delta T_J$	$F_H$	$_{Hb}$	$T_H$	$\Delta T_H$	$F_{K}$	4K	$T_K$	ATK.	Tracan	ATmean.
G231-019	5.00	-1.50	3.455e-10	0.00	1.867e-11	I	<3200	ı	1.636e-11	ı	<3500	1.	6.120e-12	1.028	3630	137	(3630)	1:
(7209-041	5.00	0.00	6.271e-11	00.0	3.292e-12	1.011	[3885]	126	2.588e-12	1.066	4080	2 1	1.029e-12	1.033	4005	4 0	4043	. Q
HR7994	4.00	0.00	7.678e-10	0.00	2.413e-11	1.013	5749	22.5	1.347e-11	1.021	2000		5.081e-12	1.018	2047	2 5	0 to 00 to 0	7) C
0 #5-0175	4.50	0.0 0.0	6.305e-10	200	1.8478-11	1.014	700	200	1.021c-1)	1.016	0 T	d c	3.0106-12	0.10	0000	5 1	2010	0 t
HR8d85	4 4 50 50 70	9 0	3.2706-10	00.0	3.653e-12 1.740e-10	1 013	[4472]	707	1 3354-10	1.041	4319	o w	5.0426-12	10.1	4327	) 4 ) 10	4323	- E
HR.8086	200.3	0.18	2.220-09	0.00	1.173e-10	1.012	[3810]	180	1.037e-10		<3500	3	3.630e-11	1.032	3865	24	(3865)	1
G067-037	5.00	-1.50	4.091e-10	0.00	2.066e-11	1.011	[3876]	219	1.799é-11	1	<3500	1	6.763e-12	1.026	.3759	120	(3759)	1
GJ820B	5.00	-1.50	2.241e-09	0.00	1.168c - 10	1.011	[3726]	233	1.015e-10	I	<3500	I	3.645e-11	1.026	3786	116	(3786)	į
HD201891	4.50	-1.22	3.162e-10	00.00	8.942e-12	1.009	5905	127	4.845e-12	1.020	5905	68	1.786e-12	1.017	5914	49	5909	. 10 10
HD201889	4.00	-1.10	1.727e-10	0.00	5.300e-12	1.010	5670	137	3.001e-12	1.024	5643	Ι.	1.133e-12	1.019	5609	69	5635	84
G3825	00.9	-1.50	1.422e-09	0.00	8.148e-11	I	V3200	H	7.108c-11	} }	V3500	Li	2.576e-11	1.028	3592	142	(3592)	] {
BD +04 4674	5.50	-0.90	1.118e-10	00.00	3.271e-12	1.010	5842	4 t	1.857e-12	1.021	5762	30 cc	6.926e-13	1.018	574.7	C 1	5777	0.00
G025-029	4.50	-0.90	1,118e-10	0.00	3.271e-12	1.010	2842	124	1.857e-12	1.021	57.62	£ (	6.9266-13	1.018	2.47.0	7.1	11.0	26.5
G026-009	9.50	-1.27	4.845e-11	00.0	2.339e-12	1.010	4095	143 5 t	1.740e-12	1.051	4078	× 4	6.389e-13	1.024	4288	9 1	4235	7.5
210-0205	# <b>*</b>	40.7	4.490e-12	# CO	1.5076-13	1.00%	0245	79.	6,101e-14	610.1	0	7 6	2.1.1e-14	010.	60204	: [	50100	ř ot
0214-001	2 4	20.00	4 8540-13	0.00	1.0015-12	1000	0000	107	7.0205-12	1.025	- 1014	, 6	0.000 C	1.041	5754	7.7	5702	1 90
G188-001		-2.05	2,003e-12 6.413e-11	±0.0	1.500c=15	1.000	6160	127	0.05Re-13	1.022	5160	2 0	3 3246-13	1.018	5 5 5	- 60 - 120	6159	ő
G215-020	00.6	08.	4.6958.11	0.00	2.624e.12	1	<3500 <3500	3	2.241e-12		<3500	3	8.294e-13	1.028	3635	136	(3635)	1 0
G188-030	4.50	-1.99	1.266e-11	0.01	4.340e-13	1.008	5273	135	2.542e-13	1.027	5276	55	9.793e-14	1,020	5251	49	5264	65
G018-016	5.00	-1.50	1.605e-10	0.00	9.017e-12	I	<3500	I	7.809e-12	I	<3500	I	2.931e-12	1.029	3580	143	(3580)	ŧ
G018-028	4.50	-0.84	4.469e-11	00.00	1.491c-12	1.010	5448	119	8.820c-13	1.027	5410	74	3.301e-13	1.019	5391	67	5411	81
HR8455	4.50	-0.53	9.753e-10	0.00	3.390e-11	1.011	5337	118	2.160e-11	1.031	5213	89	7.4146-12	1.020	5356	5.9	5304	io l⊢ e
G126-062	4.50	1.80	4.695e-11	00.0	1.277e-12	1.009	5979	125	7.017e-13	1.020	5930	100	2.612e-13	1.018	5923	97	5941	105
G126-063(°)	4.50	-1.49	4.005c-12	0.00	1.519e-13	. 1.009	(5003)	104	6.626e-14	1.023	5725	6. 1	2,457e-14	1.018	5733	Ę.;	5730	n) t 00 (
HD211476	5.50	0.03	4.137e-10	0.00	1.234e-11	1.014	5912	₹ 6 20 6	6.729e-12	1.018	5,464	o t	2.508e-12	1.015	0000	on t	5862	67
HR8541	0.4	0.00	3.7516-09	0.00	5.658e-11	1.000	8033	3:	2.352e.11	0.992	8120	- C	8.460e-12	0.989	2608	ò	5005	60
201010101010101010101010101010101010101	а 4 О п	40.4	2.000e-11	00.0	0.000e-10	800.1	0000	100	2.37.16-10	1.020	0.00	2 5	1.105e-13	10.1	0000 H	3.5	537.0 57.00	4 9
G027-036	00.5	02.1	7.2874-11	00.0	4 280e-12	001	00000	<u> </u>	3.4426-12	740.1	V3500	2	1.339e-12	1.029	3570	144	(3570)	3
HR8585	4.00	00.0	7.9448-09	0.00	9.3124-11	1.001	8811	171	3.655e-11	0.996	8994	110	1.348e-11	0.995	90 10 90 10	108	8906	124
C067-608	4.50	-0.09	4.598e-11	00.0	1.665e-12	1.014	5293	117	9.947e-13	1.029	5288	73	3.762e-13	1.021	5248	65	5273	980
G027-044	4.50	-0.90	3.063e-10	00.0	9.503e-12	1.010	5664	152	5.116e-12	1.022	5746	121	1.889e-12	1.018	5752	73	5730	105
G156-065	4.30	-0.42	1.753e-10	0.00	5.668c-12	1.012	5595	145	3.197c-12	1.023	5599	65	1.186e-12	1.018	5583	es i	5532	76
G-1884	2.00	-1.50	4.283e-10	0.00	2.830e-11	8	V3500	9	2,001e-11	1 5	V3500	1 8	7.142e-12	1.027	94.0	121	3746	121
G028-040	9.54	0.1.0	0.04440.0	00.0	1.255e-12	1.008	0100	041	5f-ac16.7	1.001	3010	9	2.6466-16	1.020	2007	- c	300F	0
G190.015	90.4	00.0	1.040-11	3.5	4 4819-11	1.016	[\$100] \$074	3 1 1	2 803e.12	2	1 2	5	1.0070-11	1.020	4100	h sá	5113	200
G273-001	5.00	-1.63	1.537e-10	0.00	4.299c-12	1.003	5907	13.5	2.176e-12	1.019	6063	80	8.277e-13	1.017	6003	74	6012	68
G216-037	5.00	0.00	3.632e-11	00.0	, 2.002e-12	1.012	[3693]	116	1.799e-12	ı	<2500	I	6.534e-13	1.032	3775	92	(3775)	I
G029-023	4.50	-2.02	2.387e-11	0.00	6.158e-13	1,009	6126	126	3.265e-13	1.018	6129	82	1.241e-13	1.017	6062	35	0102	06
G217-007	5.00	0.00	1.061e-10	0.00	5.513e-12	1.01	2830	248	4.814e-12	1.063	3681	300	1.807e-12	1.034	3907	130	3980	130
HI18905	₹.00	-0.12	4.612e-09	00.00	1.335c-10	1.013	5982	156	1	ł		I	2.637e-11	1.016		2	5904	n n
G217-008(3)	4.50	-1.91	1.817e-11	0.01	3.994e-13	1.008	(6645)	130	2.432e-13	1.018	6183	83	9.323c-14	1,017	1609	F- 1	6134	20 20
G273-068	5.00	0.00	1.867e-10	00.0	9.914e-12	1.012	3824	224	7.452e-12	1.057	3940	300	2.799e-12	1.030	4101	73	4101	8
C#029-043	8 5	00.0	4,608e-11	00.0	2.497e-12	1.012	[3762]	# t	1.888e-12	1.068	4096	113	7,5270-13	500.0	2104	o u	40.43	Ď.
G029,047	20.20	0.00	9.4686-11	00.0	5.1460-12	1.013	[3754]	183	4.540-12	, ()	73500	7	1.698e-12	1.035	3781	9 55	(3781)	:
HD221950	4 6	20.0	1 4266.09	00.0	2 5076 11	010.1	6370	140	1 8640 11	1014	4003	8.4	8.827e-12	1 014	6296	3	6311	66
HD222589	90,4	200	9.688e-11	00.0	2.5.80e-12	1010	5248	148	2.233e-12	1 032	5181	5 6	8 440e-13	1 021	3135	- 45 C	5174	82
G157-093	4.50	-0.90	2,612e-11	0.00	8.739e-13	1.010	5443	119	5.026e-13	1.026	5459	: 12	1.899e-13	1.019	5422	67	5440	83
G158-020	4.50	-0.59	1.201e-10	00.00	3.463e-12	1.011	5919	127	1.926e-12	1.020	5849	67	7.139e-13	1.017	5837	7.5	5859	82
LTT6059	4.00	0.00	7.738e-12	00.0	2.407e-13	1.014	5779	123	1.4746-13	1.023	5541	¥;-	5.630e-14	1.019	5470	89	5566	83
BD -16 418	£.50	0.00	1.429e-11	0.00	5.774e-13	1.014	(4935)	128	3.688e-13	1.037	4975	69	1.445e-13	1.024	4867	G (	4917	5
G251-054	4.50	-1.73	2.841E-11	0.00	9.877E-13	1.008	5255	146	5.657E-13	1.027	5309	7.3	2.115E-13	1.020	5330	üę	5308	45

NOTES TO TABLE 4: (1)SB501: Wrong  $F_J$ . (J=11.22). (2)G036-005: The error in  $F_J$  is greater than 10 %, hence no  $T_J$  is provided. (3)G178-030: Very faint star, J=11.63, H=11.31 and K=11.127. (4)G167-011: The error in  $F_J$  is greater than 20 %. The faintest star of the sample (J=12.99). (5)HR6228: Wrong  $F_J$ . (5)G017-037: Very faint star, J=11.706, H=11.300 and K=11.297. (7)G021-006: Wrong  $F_J$ . (J=10.38). (8)G126-068: Faint star, J=10.69, H=10.64 and K=10.59.