

**NINTH CAMBRIDGE WORKSHOP ON
COOL STARS, STELLAR SYSTEMS AND THE SUN**

NASA Grant NAGW-4739

Final Report

7N-90-CR
0017
065-11

For the period 01 June 1995 through 30 November 1997

p. 12

Principal Investigator

Dr. Andrea K. Dupree

January 1998

Prepared for

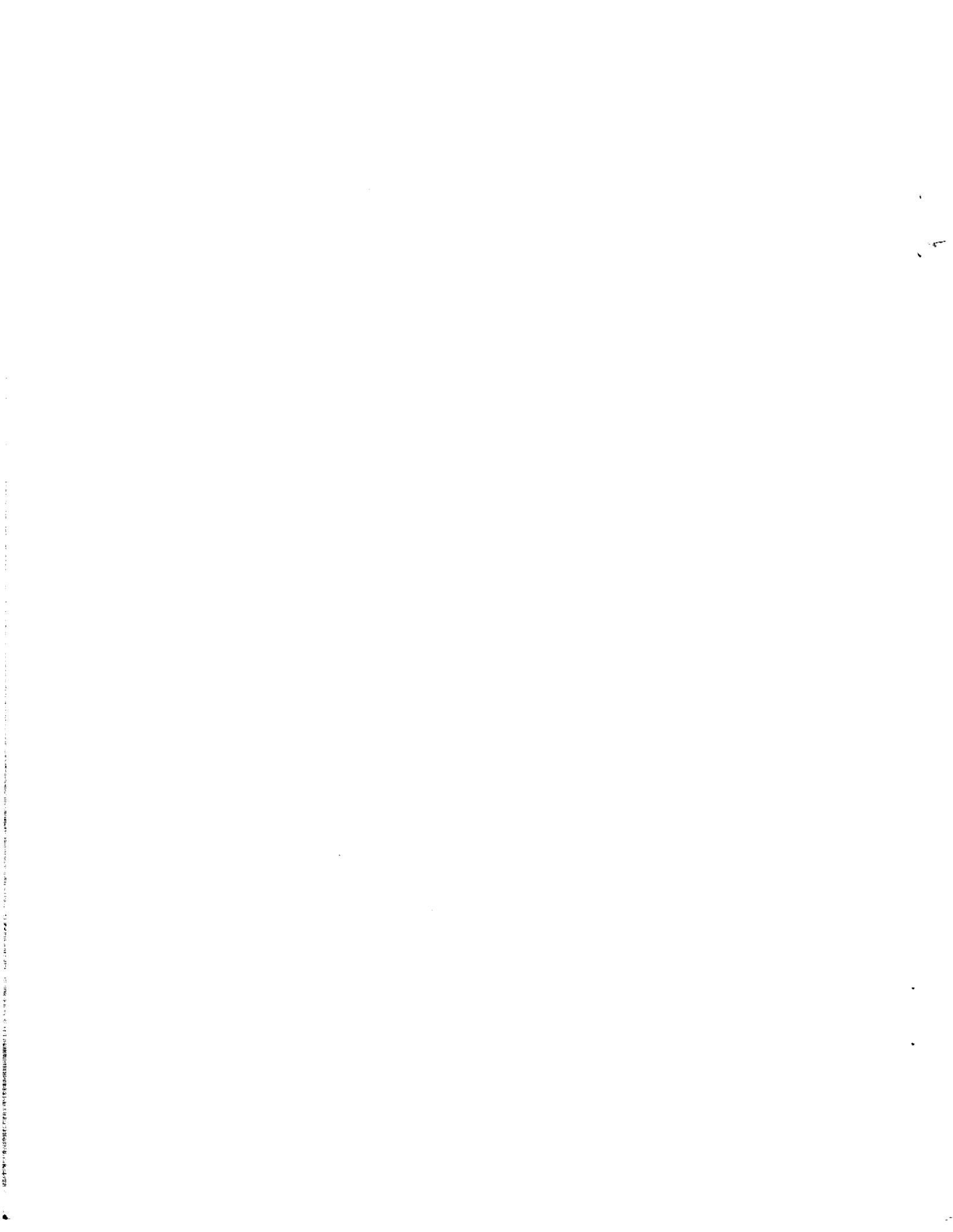
National Aeronautics and Space Administration

Washington, D.C. 20546

Smithsonian Institution
Astrophysical Observatory
Cambridge, Massachusetts 02138

**The Smithsonian Astrophysical Observatory
is a member of the
Harvard-Smithsonian Center for Astrophysics**

The NASA Technical Officer for this Grant is Dr. L. J. Caroff, Code SZF, NASA Headquarters, Washington, DC 20546.



**Ninth Cambridge Workshop on
Cool Stars, Stellar Systems, and the Sun**

This Grant was used to publish the Proceedings from the Ninth Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun held in Florence, Italy from 3 to 6 October 1995.

The Proceedings were published by the Astronomical Society of the Pacific in their Conference Series, Volume 109 in 1996. This volume was edited by Roberto Pallavicini and Andrea K. Dupree.

A copy of the title page and the Table of Contents of the volume is appended.

Preface xviii

List of Workshop Participants xxix

I – INTRODUCTORY SESSION

Olin C. Wilson and the solar-stellar connection (Invited Review)
R. W. Noyes 3

Advances in solar-stellar physics: optical and infrared studies
(Invited Review)
M.S. Giampapa 11

Radio emission from cool stars (Invited Review)
S.M. White 21

Advances in solar and stellar physics: space studies (Invited Review)
B.H. Foing 31

A search for substellar companions to solar-type stars via precise
Doppler measurements: a first Jupiter mass companion detected
(Invited Contribution)
M. Mayor, D. Queloz 35

The impact of Hipparcos on cool star research (Invited Review)
M. Grenon 39

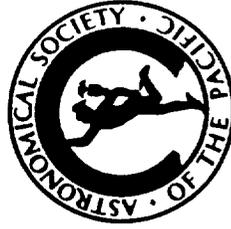
Volume 109

COOL STARS, STELLAR SYSTEMS, AND THE SUN
Ninth Cambridge Workshop

Dedicated to the memory of Olin C. Wilson

Proceedings of a Workshop held
3-6 October 1995 in Florence Italy

Edited by
Roberto Pallavicini and Andrea K. Dupree



II – NEW DEVELOPMENTS IN SOLAR PHYSICS

In memoriam of C.-C. Cheng
R. Pallavicini 43

Comparison of Yohkoh X-ray and other solar activity parameters for
November 1991 to November 1995 (Invited Review)
L. Acton 45

Solar flare mechanisms deduced from Yohkoh hard X-ray studies
(Invited Review)
T. Kosugi 55

Solar and stellar dynamos (Invited Review)
P. Hoyng 59

Chromosphere and coronal heating mechanisms (Invited Review)
P. Ulmschneider 71

Interaction of magnetic fields and convective flows in the solar atmosphere (Invited Contribution)
 A. Title 79

Progress in helio- and astero-seismology (Invited Contribution)
 P. Demarque, D.B. Guenther 87

Structure and stability of EUV loops originating from sunspots (Invited Contribution)
 G. Peres, S. Orlando 93

Proton temperatures, electron temperatures and outflows in the extended solar corona (Invited Contribution)
 J.L. Kohl, L.D. Gardner, L. Strachan, C.M.S. Cohen, A.B. Galvin, G. Gloecker, M. Guhathakurta, R.R. Fisher, Y-K Ko, J. Geiss, R. von Steiger 99

Modeling of temporal variations in the solar chromosphere
 E.H. Avrett, P. Höflich, H. Uitenbroek, P. Ulmschneider 105

Yohkoh observations of solar limb flares
 R.D. Bentley, J.T. Mariska, T. Sakao 107

A search for optical proxies for high energy emissions from solar flares
 K.A. Blais, B.J. LaBonte 109

The UV "sun as a star" flare spectrum observed with SOLSTICE
 P. Brekke, G. J. Rottman, J. Fontenla, P. G. Judge 111

PRD vs. CRD CaII K Stokes profiles from solar plage
 J.H.M.J. Bruls, S.K. Solanki, H. Uitenbroek 113

Connection between the C IV resonance lines and the quiet sun photospheric magnetic field
 N. Brynildsen, O. Kjeldseth-Moe, P. Maltby 115

Nonlocal heat transport in the solar wind
 M.V. Canullo, A. Costa, C. Ferro Fontán 117

Solar chromospheric dynamics - Results from numerical simulations
 M. Carlsson, R.F. Stein 119

Asymmetries in solar active regions and flux emergence models
 G. Caussi, F. Moreno-Insercia, L. van Driel-Gestelyi 121

On 3-min waves in the solar chromosphere
 Q.-Q. Cheng, Z. Yi 123

On the stark broadening of Mg I spectral lines important for solar and stellar spectra investigations
 M.S. Dimitrijević, S. Sahal-Bréchet 125

Gnevyshev's dual-peak in solar activity cycles
 F. Feminella, M. Storini 127

Temporal behavior of low ℓ solar p -modes from the IPHIR experiment
 V.G. Gavryusev, E.A. Gavryuseva 129

Study of electron beam generated plasma turbulence and its associated second harmonic emission during solar flares
 D. Gómez, A. Vázquez 131

Investigating the non-thermal velocity of small GOES class flares observed by Yohkoh
 L.K. Harra-Murnion, K. Akita, T. Watanabe 133

Longitudinal distribution of major solar flares
 L. Jetsu, S. Pohjolainen, J. Pelt, I. Tuominen 135

Wave heating in the solar chromosphere
 W. Kalkofen 137

Test particle acceleration in 2D dynamic coronal current sheets
 B. Kliem, J. Schumacher 139

Van der Waals damping of neutral iron lines in the solar photosphere
 C. Klumper 141

Evidence of shear flows in the solar granulation
 A. Nesia, R. Hammer, H. Schleicher 143

Nonthermal velocities in the solar transition and coronal region observed with the high-resolution telescope and spectrograph
 E. O'Shea, J.G. Doyle, K.P. Dere, F.P. Keenan 145

Coronal mass ejections and particle acceleration in the high-latitude solar wind
 S.P. Plunkett, G.M. Simnett 147

Radiatively cooling downdrafts as the origin of redshifts in transition region lines
 F. Reale, G. Peres, S. Serio 149

Amplitude and phase stratification of the solar 8-minute temperature and velocity oscillations through the photosphere
 I. Rodríguez Hidalgo, B. Ruiz Cobo, M. Collados 151

Solar irradiance at ultraviolet wavelengths, 120 to 420 nm G.J. Rottman	153
Empirical model of an average solar granule B. Ruiz Cobo, J.C. del Toro Iniesta, I. Rodríguez Hidalgo, M. Collados, J. Sánchez Almeida	155
Rotation of the solar green corona - Tracer results and their reliability J. Rybák	157
Tomography of the solar atmosphere L.M. Sarro, B. Montesinos, C. Jordan	159
On the possibility of detection of p -modes with $l > 3$ in the sun-like stars J. Staude, Y.D. Zhugshda	161
Wave trapping in intergranular lanes M. Stix, Y.D. Zhugshda	163
The Gnevyshev-Ohi rule in green corona data M. Storini, J. Sýkora	165
Dynamical study of mesogranular phenomena in the solar photosphere Th. Straus	167
New acoustic wave energy computations for late-type stars J. Theurer, P. Ulmschneider, Z. Musielak	169
VLA observations of interconnected noise storm sources on the sun R.F. Wilson	171
Oscillations in quiescent filaments from observations in H α Z. Yi, O. Engvold	173
Dynamics of thin force-free flux tubes and heating of star atmospheres Y.D. Zhugshda	175
III - X-RAY, EUV AND UV CORONAL SPECTROSCOPY	
In memoriam of B.C. Monsignori Fossi M. Landini	179
Solar spectroscopy with the BCS on Yohkoh (Invited Review) J.L. Culhane	181
Stellar X-ray spectroscopy with ASCA (Invited Review) N.E. White	193

Stellar spectroscopy with the Extreme Ultraviolet Explorer (Invited Review) J.J. Drake	203
Stellar spectroscopy with HST (Invited Review) T.R. Ayres	215
Plasma diagnostics from XUV lines (Invited Contribution) B.C. Monsignori Fossi	225
EUV spectroscopy and coronal loop models (Invited Contribution) G.H.J. van den Oord, C.J. Schrijver, R. Mewe, J.S. Kasstra	231
EUVE spectroscopy of active binaries (Invited Contribution) A.K. Dupree	237
Empirical constraints on wind flows and turbulence from HST observations of cool giants and supergiants (Invited Contribution) K.G. Carpenter	243
Examining the coronal heating on the RS CVn binary HR 1099 V. Airapetian, R.D. Robinson, S. P. Maran, K.G. Carpenter	249
New atomic data for the FeXII coronal ion A.M. Binello, H.E. Mason, P.J. Storey, J. Kohl	251
The EUV transition region lines of Capella N.S. Brickhouse, A.K. Dupree, J.C. Raymond	253
A comparative analysis of simultaneous ASCA and EUVE spectroscopy of the RS CVn Binary HR 1099 A. Brown, S.L. Skinner	255
Detailed fitting of coronal X-ray spectra with loop models: model characteristics and simulations A. Ciaravella, A. Maggio, G. Peres, S. Serio	257
Comparison of temperature and density diagnostics in the coronae of α Centauri and the sun G. Del Zanna, M. Landini, E. Landi, B.C. Monsignori Fossi	259
The EUV spectrum of AU Microscopii in a quiescent phase G. Del Zanna, M. Landini, S. Migliorini, B.C. Monsignori Fossi	261
An analysis of the ASCA spectra of the active giants β Cet and Capella using the new MEKAL coronal plasma code S.A. Drake, K.P. Singh, N.E. White, R. Mewe, J.S. Kasstra	263

ASCA and IUE Time-Resolved Spectroscopy of FK Comae D.P. Huenemoerder	265
The use of ADAS for XUV / EUV spectroscopy A.C. Lansafame, H.P. Summers, D.H. Brooks	267
Loop modeling of ROSAT/PSPC spectra of Hyades and field F-type stars A. Maggio, G. Peres, J.P. Pye, S.T. Hodgkin, J.E. Morley	269
Identification and analysis of UV emission lines observed near 1550 Å in the spectrum of α Tau obtained with the GHRS A.D. McMurry, C. Jordan, A.K. Rowe, K.G. Carpenter, R.D. Robinson	271
The corona of AB Dor: temperatures and abundances determined with ASCA and EUVE R. Mewe, J.S. Kaastra, S.M. White, R. Pallavicini	273
EM distribution and radiative losses of II Peg and λ And C.K. Mitron, J.G. Doyle, M. Mathioudakis, E. Antonopoulou	275
A ROSAT and ASCA view of VW-Cep J.E. Morley, J.P. Pye, P.A. McGale, S.T. Hodgkin, M.A. Barstow K. Makishima	277
X-ray spectroscopy of RS CVn binaries: the EXOSAT and SSS spectra revisited A. Ortolani, R. Pallavicini, G. Tagliaferri	279
ROSAT observation of a giant X-ray flare on Algol R. Öttmann, J.H.M.M. Schmitt	281
ROSAT and ASCA spectral surveys of W UMa-type contact binaries J.P. Pye, P.A. McGale, J.E. Morley, S.T. Hodgkin, K. Makishima	283
Rapid UV spectroscopy of flares on YZ CMi R.D. Robinson, B.E. Woodgate, K.G. Carpenter	285
ORFEUS FUV spectra of late-type stars J.H.M.M. Schmitt, J. Krautter, I. Appenseller, H. Mandel, J. Barnstedt, M. Göls, M. Grewing, W. Gringel, C. Haas, W. Hopfensits, N. Kappelmann, G. Krämer, R. Wichmann	287
Is the optical depth of stellar coronae really negligible? C.J. Schrijver, R. Mewe, J.S. Kaastra, G.H.J. van den Oord, J.H.M.J. Bruls ..	289
ASCA X-ray spectra of late-type giants and supergiants: the active G star β Draconis (G2Ib - II) S.L. Skinner, A. Brown	291

The flare and quiescent states of M-dwarf coronae G.S. Stringfellow	293
An ASCA observation of HD 35850 G. Tagliaferri, S. Covino, F. Haardt, T.A. Fleming, R. Pallavicini	295
CIV 1550 transition line observations of AB Doradus with the Hubble Space Telescope O. Vilhu, P. Muhl, J. Huovelin, S. Rucinski, A. Collier Cameron, B. Slec, E. Budding, T. Banks, B. Fong, T. Tsuru	297
The X-ray spectra of flares from AB Doradus S.M. White, R. Pallavicini, J. Lim	299
EUV density diagnostics in solar and stellar spectra P.R. Young, H.E. Mason	301
IV - COOL STARS IN CLUSTERS	
Open cluster membership, photometry and rotation (Invited Review) J.R. Stauffer	305
Lithium, rotation and activity in young clusters (Invited Review) D.R. Soderblom	315
ROSAT observations of stellar clusters (Invited Review) J.-P. Caillaud	325
Light element spectroscopy of cool stars in clusters (Invited Contribution) R.J. Garcia Lopez	335
Lithium in old clusters (Invited Contribution) L. Pasquini	341
X-ray observations of open clusters (Invited Contribution) G. Micela	347
How slow are slow rotators in young open clusters? S. Allain, J. Bouvier, M. Mayor, D. Quelos, J.C. Mermillod, M. Fernandes, E.L. Martín	353
ROSAT PSPC/HRI Observations of the Young Open Cluster NGC 2422 M. Barbers, F. Bocchino, F. Damiani, G. Micela, S. Sciortino, F. Favata, F.R.Jr. Harnden	355
VRI photometry of the young open cluster IC 2602 D.C. Foster, P.B. Byrne, W.R.J. Rolleston, S.L. Hawley	357

Extinction study for the young open cluster M 20 J.-J. Wang, J.-Y. Hu	391
V - PMS STARS AND STAR FORMING REGIONS	
The impact of ROSAT observations on our understanding of star forming regions (Invited Review) J. Krautter	395
X-rays from young stellar objects: from T Tauri stars to protostars (Invited Review) T. Montmerle	405
A ROSAT pointed observation in Chamaeleon II J.M. Alcalá, M. Stersik, R. Neuhauser, H. Zinnecker	417
C IV in classical T Tauri stars N. Calvet, L. Hartmann, R. Hewett, J.A. Valenti, G. Basri, F. Walter	419
Rotation and lithium of weak-line T Tauri stars in the Chamaeleon star forming region E. Covino, L. Terraneira, A. Magazzù, J.M. Alcalá, S. Allain, J. Bouvier, J. Krautter, R. Wichmann	421
X-Ray variability of T Tauri stars in the ρ Ophi region F. Damiani, G. Micela, S. Sciortino	423
Pre-main-sequence spectroscopic binaries: models versus observations J. Figueiredo	425
Magnetic fields of T Tauri stars E.W. Guenther, J.P. Emerson	427
Eruptive activity of cool young binary stars in Taurus A.S. Hojaev	429
Spectroscopic variability of the T Tauri star DF Tau C.M. Johns-Krull, G. Basri	431
Are there run-away T Tauri stars in Taurus? R. Neuhauser, A. Magazzù, M.F. Stersik, J.M. Alcalá, G. Torres, E. L. Martín	433
Young clusters in Cepheus IV F. Plassy, F. Ménard, C. Dougados	435
Infall in Herbig Ae/Be stars: what Na D lines tell us C. Sorelli, V.P. Grinin, A. Natta	437

ROSAT HRI survey of the Pleiades F.R. Jr. Harnden, J.-P. Caillault, F. Damiani, V. Kashyap, G. Micela, C. Prosser, R. Rosner, S. Sciortino, J. Stauffer	359
Infrared photometry of Praesepe cluster members S.T. Hodgkin, R.F. Jameson, D.J. Pinfield, I.A. Steele	361
An I, K survey of the Pleiades R.F. Jameson, S.T. Hodgkin, D.J. Pinfield	363
Constraining the low-mass stellar mass-function V. Kashyap, R. Rosner, F.R. Jr. Harnden, G. Micela, S. Sciortino	365
Angular momentum evolution in low-mass stars in open clusters A. Krishnamurthi, M. H. Pinsonneault, D. M. Terndrup, S. Barnes	367
Radio emission from solar-type stars in the Pleiades J. Lim, S.M. White	369
A 20 cm radio image of the young open cluster IC 2391 J. Lim, O.B. Slee, J.R. Stauffer	371
Orbital circularisation in open cluster red giant binaries J.-C. Mermilliod, M. Mayor	373
A deep R and I survey of the Praesepe open cluster D.J. Pinfield, S.T. Hodgkin, R.F. Jameson	375
ROSAT X-ray observations of the young cluster IC 348 T. Preibisch, H. Zinnecker, G. H. Herbig	377
Lithium abundance in the open cluster IC 2602 S. Randich, N. Aharpour, R. Pallavicini, C.F. Prosser, J.R. Stauffer, J.H.M.M. Schmitt	379
ROSAT observations of open clusters: recent results S. Randich, J.H.M.M. Schmitt, C.F. Prosser, J.R. Stauffer	381
Low-mass stars in old open clusters I.N. Reid, S.L. Hawley	383
UBVRI polarimetry of galactic globular clusters F. Scaltriti, L. Origlia, E. Anderlucci	385
Rotation, activity, and binary influence in the Hyades R.A. Stern, J.R. Stauffer	387
X-Ray emission from the young open cluster NGC 2516 M.R. Thurston, R.D. Jeffries, J.P. Pye	389

The large scale spatial distribution of X-Ray selected WTTS in Taurus	439
M.F. Sterzik, R. Neuhauser, R. Wichmann	
Rotation-mass-activity and flux-flux relations among low mass pre-main sequence stars	441
F.M. Walker	
Pointed ROSAT observations in the Lupus dark clouds	443
R. Wichmann, J. Krautter, J.M. Alcalá, J.H.M.M. Schmitt, R. Neuhauser, E. Covino, L. Terranegra	
X-Ray sources and other PMS stars near σ Orionis	445
S.J. Wolk, F.M. Walter, M. Freyberg	
Discussion session	447
T. Montmerle (<i>Chair</i>)	
VI – MASS LOSS, WINDS, EVOLVED STARS	
MHD waves and turbulence in the polar regions of the heliosphere (Invited Review)	451
M. Velli	
Mass loss from active dwarf stars (Invited Review)	461
D.J. Mullan	
Winds of T Tauri stars (Invited Review)	471
A. Natta	
Mass loss and winds from cool giants (Invited Review)	481
G. Harper	
Solar wind abundances from Ulysses (Invited Contribution)	491
R. von Steiger	
GHRs studies of stellar chromospheres, transition regions, and coronae (Invited Contribution)	497
J.J. Linckey, B.E. Wood	
Chromospheres and winds of ζ Aurigae binaries (Invited Contribution)	503
J.A. Eaton	
Mass loss and pressure inversion in F and G supergiants	511
L. Achmad, H.J.G.L.M. Lamers	
The UV binary technique: probing the outer atmospheres of cool stars. I. The method	513
R. Baade, T. Kirsch, F. Toussaint	

The UV binary technique: probing the outer atmospheres of cool stars. II. Application to HST observations of ζ Aurigae	515
T. Kirsch, R. Baade, F. Toussaint	
The silicate-like mid-infrared spectrum of the C-rich star R Sculptoris	517
S. Bagnulo, J.G. Doyle, M.J. Barlow, C.J. Skinner	
Outer atmospheric structures of high-luminosity G/K stars	519
B.D. Deeney, A. Brown, T.R. Ayres	
A catalogue of rotational and radial velocities for evolved stars: a quick look	521
J.R. De Medeiros, M. Mayor	
The effect of mass loss intensity on the characteristics of chemically peculiar cool stars	523
Ju.L. Frantsman	
Effects of thermal conduction on the energy balance of open coronal regions	525
R. Hammer, A. Nesis, R.L. Moore, S.T. Suess, Z.M. Musielak	
Short-period radial velocity variations of K giants	527
A.P. Hatzes, W. D. Cochran	
Can PAHs support grain-formation in carbon-stars?	529
C. Helling, U.G. Jørgensen, B. Ples, H.R. Johnson	
ROSAT observations of a complete volume-limited sample of late-type giants	531
M. Hünsch, D. Reimers, J.H.M.M. Schmitt, K.-P. Schröder	
Conditions for the occurrence of water masers in circumstellar shells	533
I.R. Little-Maregin, P.J. Benson	
Fluorescent clues for the atmospheres of AGB stars	535
D.G. Luttermoser	
ROSAT observations of hybrid stars	537
D. Reimers, M. Hünsch, F. Toussaint, J.H.M.M. Schmitt	
H- α imaging, polarimetry and mass-loss for a sample of AGB and post-AGB stars	539
E. Roseo, G. Silvestro, M. Marengo, M. Busso, L. Origlia, F. Scaltriti	
Opportunities for stellar surface imaging via gravitational microlensing	541
D.D. Sasselov	

The chromosphere and evolution of HR 6902 K.-P. Schröder	543
The influence of dust condensation on the chemical composition of the AGB star circumstellar envelope I. Shmied	545
Vilnius photometry of the red horizontal branch stars G. Tautvaišienė	547
Magnetic field measurements in the circumstellar envelope of VX Sgr C. Triglio, G. Umana, R.J. Cohen	549
Investigating fluorescence mechanisms in the atmosphere of the cool, supergiant star α Ori G.M. Wahlgren, S. Johansson	551
Accretion flows in ζ Aurigae R. Walder, G. Harper	553
VII - MODEL ATMOSPHERES, RADIATIVE TRANSFER, CONVECTION	
On radial velocity measurements in Cepheids M.D. Albrow, P.L. Cottrell	557
On the diagnostic contents of Na I lines in M dwarfs V. Andretta, P.B. Byrne, J.G. Doyle	559
Convection under the influence of rotation K. L. Chan	561
Non-LTE effects in models of long period variables P. de Laverny, C. Magnan	563
The mixing length parameter, α , for low-mass stars J. Fernandes, Y. Lebreton, A. Baglin	565
Lithium in brown dwarf atmospheres: EOS, NLTE, spectra Ya.V. Pavlenko	567
Departure from LTE in stellar atmospheres. Li I lines in spectra of K-M-C giants Ya.V. Pavlenko	569
Pressure broadening in M dwarfs and VB 10 A. Schweitzer, P. H. Hauschildt, F. Allard	571

Spectrum synthesis in polarised light: new light on broadband circular polarisation M.J. Stift	573
The Na I resonance lines as a spectroscopic test of cool stars atmospheres A. Tripicchio, E. Covino, M.T. Gomes, G. Severino, L. Terranegra	575
Modeling resonance lines in winds from cool stars J.A. Valenti, G.M. Harper, P.D. Bennett, J.J. Linsky	577
Hot water in cool stars: the computation of the water linelist S. Viti, J. Tennyson, O.L. Polyansky, S. Miller	579
VIII - STELLAR ACTIVITY	
Models of spottedness of red dwarf stars: large but not numerous high-latitude spots or wide heterogeneous equatorial bands? I.Yu. Alekseev, R.E. Gershberg	583
Flaring activity of newly discovered dMe stars B. Ball, G.E. Bromage	585
Rotation and activity in the coolest stars G. Basri, G. Marcy, B. Oppenheimer, S.R. Kulkarni, T. Nakajima	587
Surface inhomogeneities on YY Geminorum C.J. Butler, J.G. Doyle, E. Budding	589
The chromospheric limit at late-A stars S. Catalano, R. Freire Ferrero, E. Marilli, P. Gouttebrose, A. Talavera, F. Bruhweiler	591
EUVE right angle program observations of cool stars D.J. Christian, J.J. Drake, M. Mathioudakis	593
Observation of the rotational modulation effect on flare stars M.E. Contadakis	595
Optical counterparts of common and rare EUVE detections N. Craig	597
Estimating rotation periods using pooled variance R.A. Donahue, A.K. Dobson	599
Accumulative coronal, chromospheric and transition region radiative power output from late-type stars J.G. Doyle	601

Atmospheric models of dM stars	
A. Falchi, R. Pallavicini, P.J.D. Mauas, L. Pasquini	603
A critical analysis of the Wilson-Bappu relationship	
R. Freire Ferrero, E. Lastennet	605
The sun in time: coronal structuring and evolution	
M. Güdel, E. F. Guinan, S. L. Skinner	607
Detection of strong magnetic fields on M dwarfs	
C.M. Johns-Krull, J.A. Valenti	609
The EUV coronal emission of flare stars	
B.J. Kellelt, V. Tsikoudi	611
Ten years of EV Lac flare monitoring: evidence of a Longitude modulation of flare activity	
G. Leto, C. Buemi, M. Rodonò, I. Pagano	613
Rotation periods in very cool dwarfs	
E.L. Martín, M.R. Zapatero Osorio, R. Rebolo	615
Atmospheric models of flare stars: the flaring state of AD Leonis	
P.J.D. Mauas, A. Falchi	617
Nature of late-type stars in the ROSAT all-sky survey	
A.D.F. Metanomski, J. Krautter, L. Pasquini	619
Measurement of starspot area and temperature on five active, evolved stars	
D. O'Neal, J.E. Neff, S.H. Saar	621
A study of a sample of cool stars X-ray selected with EXOSAT using ROSAT data	
A. Panarella, G. Tagliaferri, R. Pallavicini	623
Chromospheric activity, stellar rotation and evolution: new results from field and cluster giants	
L. Pasquini, L. Achmad	625
New measurements of surface magnetic fields with a cross-correlation technique	
D. Queloz, J. Babel, M. Mayor	627
Stark-effect in stellar flares	
V.V. Sobolev, V.P. Grinin	629
Chromospheres and Doppler imaging: a look at the CaI λ 8439 absorption line	
N.M. Stout-Batalha, C.C. Batalha	631
IX - ACTIVE BINARIES	
Photometric variability of three noneclipsing active binaries: II Peg, UX Ari and V 1762 Cyg	
H. Ak, F. Ekmekçi, B. Albayrak, F.F. Öseren, O. Demircan	635
A study of the active binary RT And from infrared observations	
M.J. Arévalo, C. Lásaro, A. Claret	637
VLBA imaging of RS CVn systems: UX Ari	
A.J. Beasley, T.S. Bastian	639
Spectral imaging of the HR 1099 chromosphere in December 1992	
I. Busà, I. Pagano, M. Rodonò, J.E. Neff	641
A new radial velocity curve for σ Geminorum	
R. Duemmler	643
Interpretation of the October 1992 radio light curve of UX Ari	
E. Franciosini	645
Coronal and transition region structure in RS CVn binaries	
N.W. Griffiths, C. Jordan	647
Environments of active binaries	
A.G. Gunn, J.G. Doyle	649
Time resolved H α , H β and Ca II (8492 Å and 8542 Å) spectroscopy of short period RS CVn binaries	
C. Lásaro, M.J. Arévalo	651
Activity in binaries with very hot companions	
E. Marilli, A. Frasca, S. Catalano, M. Bellina-Terra	653
Infrared light curves of the Algol system UX Her	
I.G. Martínez-Pais, M.J. Arévalo, C. Lásaro, E. Antonopoulou, E. Ferentinos	655
Flux-flux relations between excess H α , Ca II H & K and He emissions and other activity indicators in chromospherically active binaries	
D. Montes, M.J. Fernández-Figueroa, M. Cornide, E. De Castro	657
Snapshot VLBA maps of Algol at 8.4 GHz	
R.L. Mutel, B.R. Scharringhausen	659
Flashes from WZ Cygni	
P. Rovithis, H. Rovithis-Livanou	661

X-ray emission of RS CVn's versus Algol-type binaries K.P. Singh, S.A. Drake, N.E. White	683
RS Oph: a recurrent nova explosion inside the outers layers of a cool giant S. Starrfield, S.N. Shore, S.J. Kenyon, G. Sonneborn	685
Formation of blue stragglers and FK Com-type stars K. Stępień	687
The radio spectrum of Algol-type system RZ Cas G. Umans, P. Leto, C. Triglio, R.M. Hjellming, S. Catalano	689
Discussion session M. Rodonó (<i>Chair</i>)	671
X - STELLAR ABUNDANCES	
Lithium depletion in dwarf and subgiant components of chromospherically active binaries D. Barrado y Navascués, M.J. Fernandes-Figueroa, B. Montesinos, E. De Castro, M. Cornide	675
Non-standard mixing on the red giant branch: influence on chemical anomalies - special look to $^{12}\text{C}/^{13}\text{C}$ and ^3He C. Charbonnel	677
New observations of Beryllium in the galactic halo C.P. Deliyannis, A.M. Boesgaard, J.R. King, D.K. Duncan	679
Boron in the Hyades giants D.K. Duncan, J.A. Thorburn, R.C. Peterson, M.H. Pinsonneault, C.P. Deliyannis	681
Spectroscopy of metal poor M-dwarfs J.E. Gisis	683
Helium peculiarities as a possible manifestation of the diamagnetic effect U. Goldstein, R. Steinits	685
Lithium abundances in a solar analog pair J.R. King, D.D. Hiltgen, C.P. Deliyannis, A.M. Boesgaard	689
The evolution of abundances in the atmospheres of cool giant stars N.S. Komarov, T.V. Shevchuk	691
On the relation between rotation and lithium abundance on the Sub-giant Branch A. Lebre, C. Charbonnel, J. De Medeiros	693
Chemical composition of solar-type stars C. Neuforge, P. Magain	695
Theoretical models of lithium depletion in open cluster stars M.H. Pinsonneault, V.K. Narayanan	697
Be abundances in the Alpha Centauri system F. Primas, D.K. Duncan, R.C. Peterson, J.A. Thorburn	699
New solar models including element segregation and rotation-induced mixing O. Richard, S. Vauclair, C. Charbonnel	701
The analysis of the cool star molecular spectra A.V. Shavrina	703
Lithium abundance spread in population II dwarfs F. Spite	705
Lithium abundance in K and M dwarfs M. Zboril, P.B. Byrne, W.R.J. Rolleston, J.J.L. Douglas	707
XI - IR SPECTROSCOPY	
The first stellar abundances in the Galactic Center: The M Supergiant IRS 7 J.S. Carr, K. Selgren, S.C. Balachandran	711
Rotational velocity measurements in young stars using the CO V=0-2 bandhead M. Casali, C. Eiroa	713
Hydrogen line emissions from cool young stars: results of a near-IR spectroscopic survey T.P. Greene, C.J. Lada	715
Water and titanium oxide in late-type M dwarfs H.R.A. Jones, S. Viti, S. Miller, J. Tennyson, F. Allard, P. Hauschildt	717
High resolution optical and infrared spectroscopy of RV Tauri stars K.R. Pollard, K.H. Hinkle, W.A. Lawson, P.L. Cottrell, G.M. Wahlgren	719
Cool stars and NICMOS on HST R.I. Thompson	721

Infrared Mg I lines in cool giant and supergiant stars	
H. Uitenbroek, R. W. Noyes	723
Discussion session	
J. Carr (<i>Chair</i>)	725
XII - LOW-MASS STARS AND BROWN DWARFS	
Late M-dwarfs in front of dark nebulae, Barnard 1 East	
L. Festin	729
Deep R_c I CCD photometry in the Pleiades: Teide 1 and new brown dwarf candidates	
M.R. Zapatero-Osorio, R. Rebolo, E.L. Martín	731
Cool stars in TOPP	
R.L. Smart, B. Bucciarelli, R. Casalegno, G. Chiumiento, F. Morale, M.G. Lattanzi, L. Lanteri, G. Massone, R. Morbidelli, F. Porcu, F. Racioppi	733
Discussion session	
J. Liebert (<i>Chair</i>)	735
CLOSING SESSION	
Summary of Cool Stars 9	
J.J. Linsky	739
Author Index	749
Object Index	757

