The Quintuplet cluster II. Analysis of the WN stars

A. Liermann^{1,2}, W.-R. Hamann^1, L.M. Oskinova^1, H. Todt^1, and K. Butler^3

1 - Universit"at Potsdam, Institut f"ur Physik und Astronomie, 14476 Potsdam, Germany;

2 - now MPIfR Bonn, 53121 Bonn, Germany;

3 - Universit"ats-Sternwarte M"unchen, 81679 M"unchen, Germany

Based on K-band integral-field spectroscopy, we analyze four Wolf-Rayet stars of the nitrogen sequence (WN) found in the inner part of the Quintuplet cluster. All WN stars (WR102d, WR102i, WR102hb, and WR102ea) are of spectral subtype WN9h. One further star, LHO110, is included in the analysis which has been classified as Of/WN? previously but turns out to be most likely a WN9h star as well.
The Potsdam Wolf-Rayet (PoWR) models for expanding atmospheres are used to derive the fundamental stellar and wind parameters.

The stars turn out to be very luminous, $log{(L/L_odot)} > 6.0$, with relatively low stellar temperatures, $T_* approx$ 25--35,kK. Their stellar winds contain a significant fraction of hydrogen, up to $X_mathrm{H} sim 0.45$ (by mass). We discuss the position of the Galactic center WN stars in the Hertzsprung-Russell diagram and find that they form a distinct group. In this respect, the Quintuplet WN stars are similar to late-type WN stars found in the Arches cluster and elsewhere in the Galaxy.

Comparison with stellar evolutionary models reveals that the Quintuplet WN stars should have been initially more massive than 60,M_odot. They are about 2.1 to 3.6,Million years old, and might still be central hydrogen burning objects. The analysis of the spectral energy distributions of the program stars results in a mean extinction of $A_K = 3.1 pm 0.5$,mag ($A_V = 27 pm 4$,mag) towards the Quintuplet cluster.

Reference: published in Astronomy & Astrophysics 2010, Vol. 524, A82
Status: Other

Weblink:

Comments: DOI: 10.1051/0004-6361/200912612

Email: liermann@mpifr-bonn.mpg.de