

On the Apparent Absence of Wolf-Rayet+Neutron Star Systems: The Curious case of WR124

J.A. Toala¹, L.M. Oskinova², W.-R. Hamann², R. Ignace³, A.A.C. Sander⁴, T. Shenar², H. Todt², Y.-H. Chu⁵, M.A. Guerrero⁶, R. Hainich², and J.M. Torreon⁷

1 - Instituto de Radioastronomia y Astrofisica, UNAM Campus Morelia, Mexico

2 - Institute for Physics and Astronomy, University of Potsdam, Germany

3 - Department of Physics and Astronomy, East Tennessee State University, USA

4 - Armagh Observatory and Planetarium, UK

5 - Institute of Astronomy and Astrophysics, ASIAA, Taipei, Taiwan

6 - Instituto de Astrofisica de Andalucia, IAA-CSIC, Spain

7 - Instituto Universitario de Física Aplicada a las Ciencias y las Tecnologías, Universidad de Alicante, Spain

Among different types of massive stars in advanced evolutionary stages is the enigmatic WN8h type. There are only a few Wolf-Rayet (WR) stars with this spectral type in our Galaxy. It has long been suggested that WN8h-type stars are the products of binary evolution that may harbor neutron stars (NS). One of the most intriguing WN8h stars is the runaway WR124 surrounded by its magnificent nebula M1-67. We test the presence of an accreting NS companion in WR124 using ~100 ks long observations by the Chandra X-ray observatory. The hard X-ray emission from WR124 with a luminosity of $L_{\text{X}} \sim 10^{31} \text{ erg s}^{-1}$ is marginally detected. We use the non-LTE stellar atmosphere code PoWR to estimate the WR wind opacity to the X-rays. The wind of a WN8-type star is effectively opaque for X-rays, hence the low X-ray luminosity of WR124 does not rule out the presence of an embedded compact object. We suggest that, in general, high opacity WR winds could prevent X-ray detections of embedded NS, and be an explanation for the apparent lack of WR+NS systems.

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Comments:

Email: j.toala@irya.unam.mx