

A Spectroscopic Survey of WNL Stars in the LMC: General Properties and Binary Status

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We report the results of an intense, spectroscopic survey of all 41 late-type, nitrogen-rich Wolf-Rayet (WR) stars in the Large Magellanic Cloud (LMC) observable with ground-based telescopes. This survey concludes the decade-long effort of the Montréal Massive Star Group to monitor every known WR star in the Magellanic Clouds except for the 6 crowded WNL stars in R136, which will be discussed elsewhere. The focus of our survey was to monitor the so-called WNL stars for radial-velocity (RV) variability in order to identify the short- to intermediate-period (10 to 200 days) binaries among them. Our results are in line with results of previous studies of other WR subtypes, and show that the binary frequency among LMC WNL stars is statistically consistent with that of WNL stars in the Milky Way. We have identified four previously unknown binaries, bringing the total number of known WNL binaries in the LMC to nine. Since it is very likely that none but one of the binaries are classical, helium-burning WNL stars, but rather superluminous, hence extremely massive, hydrogen-burning objects, our study has dramatically increased the number of known binaries harbouring such objects, and thus paved the way to determine their masses through model-independent, Keplerian orbits. It is expected that some of the stars in our binaries will be among the most massive known. With the binary status of each WR star now known, we also studied the photometric and X-ray properties of our program stars using archival MACHO photometry as well as Chandra and ROSAT data. We find that one of our presumably single WNL stars is among the X-ray brightest WR sources known. We also identify a binary candidate from its RV variability and X-ray luminosity which harbours the most luminous WR star known in the Local Group.

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Comments:

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