

Candidate X-ray-Emitting OB Stars in the Carina Nebula Identified Via Infrared Spectral Energy Distributions

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We report the results of a new survey of massive, OB stars throughout the Carina Nebula using the X-ray point source catalog provided by the Chandra Carina Complex Project (CCCP) in conjunction with infrared (IR) photometry from the Two Micron All-Sky Survey and the Spitzer Space Telescope Vela-Carina survey. Mid-IR photometry is relatively unaffected by extinction, hence it provides strong constraints on the luminosities of OB stars, assuming that their association with the Carina Nebula, and hence their distance, is confirmed. We fit model stellar atmospheres to the optical (UBV) and IR spectral energy distributions (SEDs) of 182 OB stars with known spectral types and measure the bolometric luminosity and extinction for each star. We find that the extinction law measured toward the OB stars has two components: $A_V=1-1.5$ mag produced by foreground dust with a ratio of total-to-selective absorption $R_V=3.1$ plus a contribution from local dust with $R_V>4.0$ in the Carina molecular clouds that increases as A_V increases. Using X-ray emission as a strong indicator of association with Carina, we identify 94 candidate OB stars with $L_{bol} \geq 10^4 L_{sun}$ by fitting their IR SEDs. If the candidate OB stars are eventually confirmed by follow-up spectroscopic observations, the number of cataloged OB stars in the Carina Nebula will increase by ~50%. Correcting for incompleteness due to OB stars falling below the L_{bol} cutoff or the CCCP detection limit, these results potentially double the size of the young massive stellar population.

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