The *CHANDRA* HETGS X-ray Grating Spectrum of η Carinae

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[Contributed talk, 15min.]

Abstract

η Carinae may be the most massive and luminous star in the Galaxy and is suspected to be a massive, colliding wind binary system. The *CHANDRA* X-ray observatory has obtained a calibrated, high-resolution X-ray spectrum of the star uncontaminated by the nearby extended soft X-ray emisssion. Our 89 ksec *CHANDRA* observation with the High Energy Transmission Grating Spectrometer (HETGS) shows that the hot gas near the star is non-isothermal. The temperature distribution may represent the emission on either side of the colliding wind bow shock, effectively "resolving" the shock. If so, the pre-shock wind velocities are $\sim$ 700 and $\sim$ 1800 km s^{-1} in our analysis, and these velocities may be interpreted as the terminal velocities of the winds from η Carinae and from the hidden companion star. The forbidden-to-intercombination (f/i) line ratios for the He-like ions of S, Si and Fe are large, indicating that the line forming region lies far from the stellar photosphere. The iron fluorescent line at 1.93Å, first detected by *ASCA*, is clearly resolved from the thermal iron line in the *CHANDRA* grating spectrum. The Fe fluorescent line is weaker in our *CHANDRA* observation than in any of the *ASCA* spectra. The *CHANDRA* observation also provides the first high-time resolution lightcurve of the uncontaminated stellar X-ray emission from η Carinae and shows that there is no significant, coherent variability during the *CHANDRA* observation. The η Carinae *CHANDRA* grating spectrum is unlike recently published X-ray grating spectra of single massive stars in significant ways and is generally consistent with colliding wind emission in a massive binary.

CATEGORY: NORMAL STARS AND WHITE DWARFS