

# Suzaku Monitoring of Hard X-ray Emission from Eta Carinae over a Single Binary Orbital Cycle

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The Suzaku X-ray observatory monitored the supermassive binary system Eta Carinae 10 times during the whole 5.5 year orbital cycle between 2005-2011. This series of observations presents the first long-term monitoring of this enigmatic system in the extremely hard X-ray band between 15-40 keV. During most of the orbit, the 15-25 keV emission varied similarly to the 2-10 keV emission, indicating an origin in the hard energy tail of the  $kT \sim 4$  keV wind-wind collision (WWC) plasma. However, the 15-25 keV emission declined only by a factor of 3 around periastron when the 2-10 keV emission dropped by two orders of magnitude due probably to an eclipse of the WWC plasma. The observed minimum in the 15-25 keV emission occurred after the 2-10 keV flux had already recovered by a factor of  $\sim 3$ . This may mean that the WWC activity was strong, but hidden behind the thick primary stellar wind during the eclipse. The 25-40 keV flux was rather constant through the orbital cycle, at the level measured with INTEGRAL in 2004. This result may suggest a connection of this flux component to the gamma-ray source detected in this field. The Helium-like Fe K $\alpha$  line complex at  $\sim 6.7$  keV became strongly distorted toward periastron as seen in the previous cycle. The 5-9 keV spectra can be reproduced well with a two-component spectral model, which includes plasma in collision equilibrium (CE) and a plasma in non-equilibrium ionization (NEI) with  $\tau \sim 1e11$  cm $^{-3}$  s $^{-1}$ . The NEI plasma increases in importance toward periastron.

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