N18a X-ray Spectral Structure around the Fe XXV lines of Eta Carinae observed with the X-Ray Imaging and Spectroscopy Mission (*XRISM*)

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Eta Carinae is a binary system, consisting of two massive stars, orbiting in an eccentric orbit. The primary star, a luminous blue variable (LBV), has an estimated mass of $\sim 120-170$ $M_\odot$ (Hillier et al. 2001; Davidson & Humphreys 2012; Kashi & Soker 2010, 2016), a mass-loss rate of $\sim 3-10^{-4}\dot{M}_\odot$ yr^{-1} (Davidson & Humohreys 2012; Clementel et al. 2014; Kashi 2017, 2019), and a wind velocity of ~ 420 km s^{-1} (Groh et al. 2012b). The fast companion wind at ~ 3000 km s^{-1} forms a shock by collision with the primary wind, emitting hot thermal (kT $\sim$4 keV) X-rays (Pittard & Corcoran 2002). The shock has a cone shape toward the companion star, and hard X-rays should originate near apex. *XRISM* observed Eta Carinae for ~ 44 ksec during the commissioning phase in November 2023, at an orbital phase of $\sim$0.7. The Resolve spectrum clearly shows multiple emission lines from He-like and H-like iron ions possibly located near the wind apex and quasi-neutral iron. It also shows a broad structure around 6.5 keV, possibly originating from Compton down scattering of the He-like iron line complex in the thick primary wind. Resolve spectrum helps constrain wind-driven mass loss.