

The Exceptional X-ray Evolution of SN1996cr in High Resolution

We present X-ray spectra spanning 18 years of evolution for SN1996cr, one of the five nearest (~ 4 Mpc) SNe detected in the modern era. HETG observations allow us to resolve spectrally the velocity profiles of Ne, Mg, Si, S, and Fe emission lines and monitor their evolution as tracers of the ejecta-circumstellar medium (CSM) interaction. To explain the diversity of X-ray line profiles, we explore several possible geometrical models. Based on the highest S/N 2009 epoch, we find that a polar geometry with two distinct opening angle configurations and internal obscuration can successfully reproduce all of the observed line profiles. We extend this model to seven further epochs with a lower S/N ratio and/or lower spectral-resolution between 2000-2018, yielding several interesting evolutionary trends.

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