

W24a X-raying the Birth of Binary Neutron Stars and Neutron Star-Black Hole Binaries

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We consider fallback accretion after an ultra-stripped supernova (USSN) that accompanies formation of a binary neutron star (BNS) or a neutron star-black hole binary (NS-BH). The fallback matter initially accretes directly to the nascent NS, while it starts to accrete to the circumbinary disk, typically 0.1-1 day after the onset of the USSN explosion. The circumbinary disk mass further accretes, forming mini disks around each compact object, with a super-Eddington rate up to a few years. We show that such a system constitutes a binary ultraluminous X-ray source (ULX), and a fraction of the X rays can emerge through the USSN ejecta. We encourage follow-up observations of USSNe within $\lesssim 100$ Mpc and ~ 100 -1,000 day after the explosion using *Chandra*, *XMM Newton* and *NuSTAR*, which could detect the X-ray counterpart with time variations representing the properties of the nascent compact binary, e.g., the orbital motion of the binary, the spin of the NS, and/or the quasiperiodic oscillation of the mini disks.