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Modeling Multiwavelength Emission of Super-Eddington accreting Black Hole ULXs

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“Ultra-luminous X-ray Sources (ULXs) are point like off-nuclear X-ray sources whose bolometric luminosity exceeds the Eddington limit for a 10 solar masses Black Hole (BH) (Fabbiano, 1989).

Their observational properties, as the X-ray luminosity, the variability and the spectral changes, suggest that ULXs are compact object accreting via a disc (Makashima et al. 2000, Feng & Soria 2001).

In this work (Ambrosi et al. in prep.) we compute optical through X-ray emission of ULXs. We first calculate an extended grid of binaries which evolve through Roche Lobe Overflow (RLOF) considering case A mass transfer from massive donors (up to 25 solar masses) onto massive BHs (up to 100 solar masses). We calculate their optical emission with our model of super-Eddington accretion (Ambrosi & Zampieri 2018). Moreover, we compute their optical-through-X-ray Spectral Energy Distribution (SED) considering the effect of a Comptonizing corona which surrounds the innermost regions of the disc. We show that the evolutionary tracks occupy specific position on the color-magnitude diagram depending on the evolutionary stage of the donor and on the BH mass. We finally apply our model to well-known persistent ULXs.”