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Modelling the jet of the Neutron Star LMXB 4U 0614+091 with internal shocks

Jets have been extensively observed in X-ray Binaries with Black Holes (BHs) or Neutron Stars (NSs), but jet properties in the two classes have several peculiar differences. In the last few years, the flat radio-to-mid-IR spectra of BH X-ray binaries was described using the internal shocks model, which assumes fluctuations in the velocity of the ejected shells along the jet driven by the fluctuations in the accretion flow. The success of this model confirms the strong interconnection between accretion and ejection in BH systems. I will present the first attempt to apply the internal shocks model to a NS Low Mass X-ray Binary, i.e. 4U 0614+091, a system persistently in hard state and with a known radio emission ascribed to the jet. We used the multi-wavelength study carried out by Migliari+2010, with a data coverage ranging from Radio to X-rays, and the quasi-simultaneous RXTE Power Spectral Density. The method used takes advantage of the code ISHEM which simulates a "synthetic"Spectral Energy Distribution (SED). The code uses as an input a set of physical parameters related to the global properties of the source. In addition the PSD of the jet Lorentz fluctuations was assumed to be identical to that of the observed X-ray light curve that we use as a tracer of the accretion flow variability. The synthetic SED and the data are then compared by means of Xspec. Our results point out that a standard conical compact jet model is not compatible with the data. In order to improve the fit we changed some of the input parameters. A good fit is finally obtained when we allow for a different jet geometry, more "parabolic"than "conical", which means the jet is allowed to be more collimated. In the other BH systems for which ISHEM was applied, such switch in the jet geometry was not necessary. These results shed light over the possibility that jets in BHs and NSs may work somewhat differently, pointing out that more investigations about jets in NSs are necessary in the near future for a real understanding of the accretion/ejection coupling in X-ray binaries.

Author: MARINO, Alessio (National Institute for Astrophysics - INAF)

Co-authors: Dr MALZAC, Julien (IRAP); Dr MIGLIARI, Simone (ESA); Dr DEL SANTO, Melania (IASF Palermo); Dr DI SALVO, Tiziana (University of Palermo)

Presenter: MARINO, Alessio (National Institute for Astrophysics - INAF)

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