X-RAY ASTRONOMY 2019
Current Challenges and New Frontiers in the Next Decade
8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: **42** Type: **Poster**

Understanding super-Eddington accretion through winds in ultraluminous X-ray sources

Friday, September 13, 2019 3:44 PM (1 minute)

Among the most important and debatable problems in astrophysics and cosmology is the formation of supermassive black holes. The detection of fully-grown supermassive black holes in active galactic nuclei at high redshift, when the Universe was young, challenges the theories of black holes growth, requiring long periods of high accretion, most likely above the Eddington limit. This is a focus of the next generation large missions, such as JWST and ATHENA, but the most distant supermassive black holes will be difficult to probe even with these advanced observatories. Ultraluminous X-ray sources (ULXs) are bright objects with X-ray luminosities between 10^{39-41} erg/s and can be found in nearby galaxies. Today we know that the vast majority of this complex class consists of stellar-mass black holes or neutron stars accreting at or above the Eddington limit. This was made possible by the discovery of coherent pulsations and cyclotron lines in some ULXs, indicating that at least a fraction of them hosts neutron stars as compact objects and, finally, the discovery of powerful winds as predicted by theoretical models of super-Eddington accreting black holes and neutron stars. In particular, the presence of both pulsations and winds in a pulsating ULX supports the existence of hybrid configurations where thick disks and radiatively-driven winds survive despite the opponent strong magnetic pressure. ULX winds carry a huge amount of power owing to their mildly relativistic speeds (~0.2c) and are able to significantly affect the surrounding medium such as regulating the ionization state and brightness of ULX super bubbles. The winds substantially limit the amount of matter that can reach the central accretor, which slows down its growth and extends its lifetime - in the case of an accreting neutron star. The study of ULX winds is therefore quintessential to understand 1) how much and how fast can matter be accreted by black holes and 2) how strong is their feedback onto the surrounding medium in the regime of high accretion rate such as for quasars and supermassive black holes at their peak of growth. In this talk I will provide an overview on this vast phenomenology and its state-of-art, focusing on recent discoveries of outflows in ULXs and their characteristics.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

Affiliation

European Space Agency

Author: Dr PINTO, Ciro (European Space Agency)

Co-authors: Mr KOSEC, Peter (University of Cambridge); Dr WALTON, Dom (University of Cambridge); Dr MIDDLETON, Matthew (University of Southampton); Dr SORIA, Roberto (University of the Chinese Academy of Sciences); Prof. ROBERTS, Tim (University of Durham); Prof. FABIAN, Andy (University of Cambridge); Dr GUAINAZZI, Matteo (European Space Agency); Dr MEHDIPOUR, Missagh (Netherlands Institute for Space Research); Dr NESS, Jan-Uwe (European Space Agency)

Presenter: Dr PINTO, Ciro (European Space Agency)

Session Classification: POSTER SESSION