Contribution ID: **114** Type: **Talk**

Tracking outflows evolution across spectral states of the black hole X-ray binary MAXI J1820+070

In this talk, I will present a study of the optical counterpart of the black hole X-ray binary MAXI J1820+070 during its main 2018 outburst and subsequent three reflares. The goal is to track the evolution of outflows across different spectral states and investigate the origin of minute-timescale optical variability. We collected high-cadence multi-filter optical light curves using the Las Cumbres Observatory network of telescopes and the Al Sadeem Observatory (UAE) telescope from 2018 to 2020. These were complemented by low-resolution optical spectra obtained with telescopes in Mexico and Italy, and by archival X-ray data from Swift (BAT and XRT) and MAXI. We find a positive correlation between the fractional optical rms and the X-ray spectral hardness, particularly at low frequencies. A similar correlation is observed between optical and X-ray rms variability. Optical spectra show double-peaked emission lines and evidence of cold wind outflows only during the hard state, including during reflares, constituting one of the first detections of such winds in this phase. These findings support a scenario where the optical variability is linked to jet activity, which dominates during the hard state and is quenched in the soft state. The variability may be driven by fluctuations in the inflow velocity at the jet base, consistent with internal shock models. Alternatively, the observed variability might arise from a hot magnetised accretion flow. The lack of wind features in the soft state could indicate over-ionisation of the outflow.

Affiliation

INAF-OAB, Merate

E-mail

marco.messa@inaf.it

Author: BAGLIO, Maria Cristina (Istituto Nazionale di Astrofisica (INAF))

Co-author: MESSA, Marco Maria (Istituto Nazionale di Astrofisica (INAF))

Presenter: MESSA, Marco Maria (Istituto Nazionale di Astrofisica (INAF))

Session Classification: Wind (Observation, Theory and modelling)

Track Classification: Talk