Contribution ID: **102** Type: **Talk**

Aql X-1 "from dawn 'til dusk": observing an entire outburst from early rise to quiescence with Einstein Probe

Monday 15 September 2025 10:45 (15 minutes)

Outbursts from transient Low-Mass X-ray Binaries (LMXBs) have been historically caught by All-Sky X-ray monitors at relatively high X-ray luminosities, i.e. above ~1e36 erg/s; observations of these sources during the early rise of the outbursts, the stage where the X-ray luminosity increases by three or more orders of magnitude with respect to the quiescence regime, have been so far very limited. However, the launch of the Einstein Probe (EP) has significantly improved our ability to detect fainter X-ray activity, unlocking access to the outburst early rise. In September 2024, EP detected the early onset of a new outburst from the archetypal neutron star LMXB Aql X-1, catching the source at a luminosity below 1e35 erg/s. I will present results from a comprehensive, multi-wavelength campaign following this event, combining data from EP, NICER, and NuSTAR, covering the full outburst from its early rise through its return to quiescence. By comparing X-ray and optical light curves during the initial rise, we show that the outburst proceeds on similar timescales at different wavelengths. Time-resolved X-ray spectroscopy allows us to track how the geometry and the physical properties of the accretion flow evolve during the outburst and across the canonical spectral states - hard, intermediate and soft. In particular, our data show that in the rise, the thermal emission comes from an extended boundary layer between the disk and the neutron star, while during the decay it likely originates from a small hot spot on the neutron star surface.

Affiliation

Institute of Space Sciences

Author: MARINO, Alessio (Insitute of Space Sciences (ICE-CSIC))

Presenter: MARINO, Alessio (Insitute of Space Sciences (ICE-CSIC))

Session Classification: Broadband Spectroscopy (modelling and observation)

Track Classification: Talk