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Doublet Type-I X-ray Bursts from EXO 0748−676 Observed with SVOM/ECLAIRs and MXT: Comparison with 2024 AstroSat and NuSTAR Observations

Neutron star X-ray binaries often exhibit Type-I X-ray bursts, during which the X-ray luminosity can rise up to 100 times the persistent flux. These bursts are triggered by unstable thermonuclear burning of accreted hydrogen and/or helium on the neutron star's surface. In certain instances, two bursts are observed in close succession, typically separated by an interval of 10–20 minutes. The second burst is generally attributed to the ignition of residual fuel not consumed during the initial burst. Such events are referred to as doublet bursts. Consequently, the luminosity and spectral features of these bursts are often correlated, offering insights into the complex nuclear processes occurring on the neutron star surface. EXO 078−676 is a known X-ray burster and was observed to exhibit a Type-I burst with SVOM-ECLAIRs on 1 February 2025 in the 5–20 keV band. This was followed by a second burst approximately 17 minutes later, detected with SVOM/MXT. The integrated 4–20 keV flux decreased from $(7.4\pm0.6)\times10^{-9}$ erg s^{-1} cm^{-2} to $(4.5\pm0.1)\times10^{-9}$ erg s^{-1} cm^{-2} between the first and second bursts. We compare the profiles of these two bursts and perform time-resolved spectral analysis during both the persistent and burst phases to investigate the underlying mechanism. Additionally, we compare the SVOM observations with Type-I bursts detected for the source by AstroSat and NuSTAR in July 2024, with a particular focus on a detailed study of the photospheric radius expansion (PRE) phase

Affiliation

Observatoire astronomique de Strasbourg, France

E-mail

rawat@unistra.fr

Author: Dr RAWAT, Divya (Observatoire astronomique de Strasbourg,)

Co-authors: Prof. COLEIRO, Alexis (Astroparticule et Cosmologie - Université Paris Cité); Prof. TAO, Lian (Institute of High Energy Physics, Chinese Academy of Sciences); Prof. JIANG, Ning (University of Science and Technology of China); Prof. MAGGI, Pierre (Observatoire astronomique de Strasbourg,); OBS-SWG, SVOM; Prof. GUILLOT, Sebastien (Institut de Recherche en Astrophysique et Planétologie, Toulouse, France)

Presenter: Dr RAWAT, Divya (Observatoire astronomique de Strasbourg,)

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