

W25a X-ray state evolution of EXO 1846–031 during its 2019 outburst with NICER observations

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EXO 1846–031 is a Galactic black hole candidate discovered in 1985, whose black hole mass is still unknown. After a long quiescent period, the source exhibited a new outburst in 2019. We analyzed the X-ray properties of EXO 1846–031 and attempted to constrain its black hole mass using the MAXI/GSC and NICER/XTI data obtained during its 2019 outburst. The X-ray state transition from the low/hard state to the high/soft state was observed and a reverse transition was also seen. The X-ray spectra were characterized with a multi-color disk blackbody component predominantly seen at low energies and a power-law shaped component at high energies; the former component dominated in the high/soft and the later in the low/hard state. The inner disk radius remained almost constant at $\sim 40(D/10 \text{ kpc})(\cos i / \cos(40^\circ))^{-1/2}$ km during the high/soft state, where D and i are the distance to the source and the inclination of the disk, respectively. The black hole mass was estimated to be $\sim 4.5(D/10 \text{ kpc})(\cos i / \cos(40^\circ))^{-1/2}M_\odot$, assuming that the black hole is not spinning and that the constant inner radius in the high/soft state corresponds to its innermost stable circular orbit. Detailed mass and spin constraints using a relativistic accretion disk emission model will also be discussed in the presentation.