Contribution ID: **7** Type: **Contribution talk**

Probing orbits of stellar mass objects deep in galactic nuclei with quasi-periodic eruption

Tuesday, 15 October 2024 17:10 (15 minutes)

Quasi-periodic eruptions (QPEs) are intense repeating soft X-ray bursts with recurrence times about a few hours to a few weeks from galactic nuclei. Though the origin of QPEs is still an open question, more and more analyses favor the interpretation that QPEs are the result of collisions between a stellar mass object (SMO, a stellar mass black hole or a main sequence star) and an accretion disk around a supermassive black hole (SMBH) in galactic nuclei. If this interpretation is correct, QPEs will be invaluable in probing the orbits of stellar mass objects in the vicinity of SMBHs, and further inferring the formation of extreme mass ratio inspirals (EMRIs). In the previous two papers \cite{Zhou2024a,Zhou2024b}, we adopted assumptions that SMO moves along a geodesic and the accretion disk lies on the equator, and noticed that these assumptions might be violated in the long run. In this paper, we extend the previous works by including secular effects, e.g., the disk alignment of an initially misaligned disk and the SMO orbital decay due to collisions with the disk. We find clear Bayes evidences for these secular effects in several QPE sources, and the detection of these secular effects provides informative clues about the SMO nature, the SMBH spin, the disk structure and evolution.

Primary authors: ZHOU, Cong (University of Science and Technology of China); Mr ZENG, Yuhe (TDLI); PAN, Zhen (TDLI)

Presenter: ZHOU, Cong (University of Science and Technology of China)

Session Classification: Session