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Quasi-Periodicities and Jet Precession in AGN Perturbed by Black Hole Companions

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Detecting and interpreting electromagnetic counterparts to binary black hole mergers will require a detailed understanding of the complex plasma dynamics governing the surrounding accretion flow, particularly for binaries including at least one supermassive black hole. Quasi-periodicities observed in active galactic nuclei (AGN) may already provide a clue as to how a secondary black hole in such a system may appear observationally. In this talk I will present an exciting and computationally efficient new way to simulate binary black hole accretion in gravitational wave-emitting systems relevant for LISA and pulsar timing arrays. Specifically, I will summarize the results of simulating a smaller mass companion black hole colliding with an established AGN accretion disk. We find that quasi-periodicities appear in both the unbound outflow rate (which could correspond to small “flares” in the light curve) and in the precession of the primary black hole disk/jet caused by spin-orbit coupling. Our results are relevant for the prospect of confirming the existence of secondary black holes in AGN systems and for studying systems like OJ 287 where there is already a strong case for a secondary companion.

Primary author: RESSLER, Sean (Canadian Institute for Theoretical Astrophysics)

Co-authors: RIPPERDA, Bart (Princeton University/Flatiron Institute); Dr YANG, Huan (Perimeter Institute/University of Guelph); Dr COMBI, Luciano (Perimeter Institute); Dr LI, Xinyu (Tsinghua University)

Presenter: RESSLER, Sean (Canadian Institute for Theoretical Astrophysics)

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