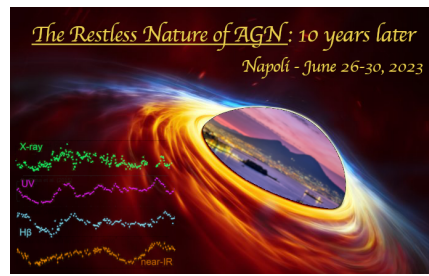


## The restless nature of AGN: 10 years later



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## Supermassive black hole binaries and quasar broad emission line variability

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Supermassive black hole binaries are thought to be an inevitable product of the prevailing galaxy evolution scenarios where most massive galaxies host a central black hole and undergo mergers over cosmic time. The early stages of this process have been observed in the form of interacting galaxy pairs and widely separated dual quasars, but the close, gravitationally bound binaries that are expected to follow have so far eluded observation. The detection of this population is important because at the smallest separations they become bright sources of low-frequency gravitational waves and are prime targets for multi-messenger detections. One approach to search systematically for close supermassive black hole binaries among quasars is based on the hypothesis that the secondary black hole in the system is feeding and the resulting emission lines will be doppler shifted due to its orbital motion. Binary candidates identified via this method are therefore selected from nearby quasars via substantial ( $>1000$  km/s) shifts of the broad H-beta lines relative to the systemic redshift. One key test of this search is an ongoing spectroscopic monitoring campaign to look for signs of bulk motion of the quasar indicative of orbital motion. I will describe the observational research program that I have been leading, including our most compelling candidates and efforts to evaluate the credentials of these candidates in the face of quasar variability.

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