

## The restless nature of AGN: 10 years later



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# Multi-messenger observations of supermassive black hole binaries

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Supermassive black hole binaries are a natural end product of galaxy mergers and should be common in galactic nuclei. They produce bright electromagnetic emission and can be identified as quasars with periodic variability in time-domain surveys. They are also promising sources of low-frequency GWs soon to be detected by pulsar timing arrays (PTAs) with PTAs and time-domain surveys probing the same population of binaries. I will discuss the combination of time-domain observations with PTA data in a multi-messenger stream, the parameter space of binaries for which this combination is possible and the advantages of multi-messenger observations (e.g., improved parameter estimation).

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