

Towards multi-messenger observations of supermassive black hole binaries

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Supermassive black hole binaries (SMBHBs) are exceptional multi-messenger sources, since they emit bright electromagnetic (EM) radiation and low-frequency gravitational waves (GWs). On the EM side, SMBHB can be detected as quasars with periodic variability in time-domain surveys. Several promising candidates have already been identified and many more discoveries are expected with the Rubin Observatory, which will begin operations in the next months. On the GW side, binaries can be detected by pulsar timing arrays (PTAs). Recently, all major PTA collaborations have found evidence for the GW background, which likely consists of many unresolved binaries. The detection of individually resolved binaries on top of this background is expected soon. In this talk, I will discuss the status of observational searches of binaries and expectations for the Rubin era, the recent discovery of the GW background and its astrophysical interpretation. Finally, I will present prospects for detecting individual sources and combining PTA data with EM data to bring the first multi-messenger detection of a SMBHB within reach.

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