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Investigating Gravitational Wave Multi-Messenger Sources for Pulsar Timing Arrays JOSEPH SIMON, Jet Propulsion Laboratory, California Institute of Technology, SARAH BURKE-SPOLAOR, West Virginia University — Pulsar Timing Arrays (PTAs) are galactic-scale low-frequency (nHz - μHz) gravitational wave (GW) observatories, which aim to directly detect GWs from binary supermassive black holes (SMBHs) ($> 10^7$ $M_\odot$). Binary SMBHs are predicted products of galaxy mergers, and are a crucial step in galaxy formation theories. The inspiral of binary SMBHs creates extended interaction between the black holes and their host galaxy, and there is the potential for many electromagnetic tracers to accompany the binary's evolution. This talk will highlight work incorporating models of electromagnetic radiation from binary SMBHs emitting GWs in the PTA frequency range to investigate the potential for jointly detecting a binary's electromagnetic and gravitational radiation. The detection of a single 'multi-messenger' source would provide a unique window into a pivotal stage of galaxy evolution, and would revolutionize the understanding of late-stage galaxy evolution.

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