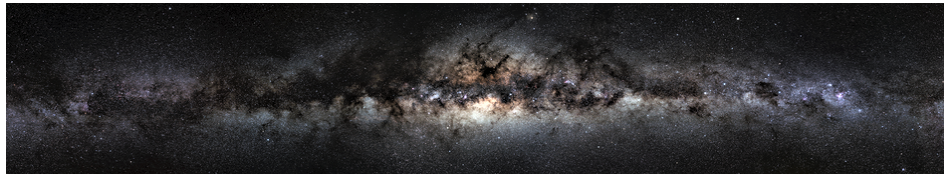


# Dark Sectors of Astroparticle Physics (AstroDark-2021): Axions, Neutrinos, Black Holes and Gravitational Waves



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## Searching for New Compact Objects with Gravitational Waves

*Thursday, 9 December 2021 12:50 (18 minutes)*

To date, the only direct evidence of gravitational waves (GWs) comes from the detection of merging black holes and neutron stars by the LIGO and Virgo detectors. Observations of these mergers have provided a wealth of astrophysical information as well as constraining theories of modified gravity. However, no convincing signs of new physics have yet been found in GW data. In this talk I will describe my work on enabling searches for compact objects (COs) other than black holes and neutron stars. In particular, I will focus on COs with enhanced spin-induced quadrupoles such as boson stars or black holes with superradiant clouds. First, I will show how signals from these objects can easily be missed in current search pipelines. Second, I will describe our work on finding effective approximations to these high dimensional waveforms in order to make searching for these COs computationally feasible. Third, I will briefly describe how a modern computational method called automatic differentiation can be used to efficiently generate template banks. Finally, I will report on our initial search results for these novel COs in O3a data.

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