

CSU Department of Physics Seminar:

Using gravitational-wave detectors to probe the existence of dark matter

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Wednesday, March 23, 10:30-11:30am Location: WH118

Gravitational-wave interferometers could both directly and indirectly find evidence for dark matter. Different types of dark matter, such as primordial black holes, ultralight boson clouds around spinning black holes, axions and dark photons, could leave distinct imprints on gravitational-wave detectors, some via their gravitational-wave emission, and others via their interactions with standard-model particles in the interferometers. While arising from physically different sources, such signals share common traits, such as their quasi-sinusoidal natures, and can be searched for with similar methods. In this talk, I will explain how persistent, quasi-monochromatic signals in ground-based detectors could arise from each of the aforementioned dark matter candidates. I will also describe search methods and summarize search results from the most recent observing runs of Advanced LIGO, Virgo, and KAGRA for each of these sources