

# Waves in a Box: Resonant Cavities for Axion and GW Detection

*Tuesday, September 19, 2023 2:30 PM (30 minutes)*

I will discuss electromagnetic signals generated by gravitational waves (GWs) and light axion dark matter in microwave cavity experiments. In our proposed setup we generate and detect a heterodyne signal. This idea has the potential to cover a factor of 100 in mass on the QCD line and an extra 15 orders of magnitude of unexplored ALPs parameter space. Two prototypes are currently being designed at SLAC and at Fermilab. The same logic can be applied to gravitational waves giving potentially one of the best detectors at high frequencies (MHz to GHz). I will also show that, contrary to the standard lore, existing axion dark matter cavity experiments are already sensitive to high-frequency GWs with strains as small as  $h \sim 10^{-22} - 10^{-21}$ .

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