

Searching for Dark Matter with SRF Cavities

Saturday 30 April 2022 10:30 (15 minutes)

Advancements in superconducting radio-frequency (SRF) cavity design have the potential to enable searches for beyond the Standard Model physics with weak coupling to photons. To motivate the use of SRF cavities as particle detectors, we will discuss the generic properties of these cavities in the context of detecting small photon couplings. Next, we will describe the application of SRF cavity searches to two dark matter models, axion-like particles (ALPs) and primordial black holes (PBHs). Examining the resonant sensitivity of a single cavity to ALP-mediated light-by-light scattering, we will show that with feasible cavity parameters, future experiments can probe previously unexplored ALP parameter space. We will then discuss the potential for indirect detection of PBHs using cavities as gravitational wave detectors. We argue that for models of PBHs which favor inspirals, PBH mergers can emit gravitational waves that are potentially detectable by future SRF cavity experiments.

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