Contribution ID: **95** Type: **not specified**

Direct deflection of Millicharged radiation

Tuesday 19 August 2025 17:50 (20 minutes)

Millicharged particles are generic in theories of dark sectors. A cosmic or local abundance of them may be produced by the early universe, stellar environments, or the decay or annihilation of dark matter/dark energy. Furthermore, if such particles are light, these production channels result in a background of millicharged radiation. We show that light-shining-through-wall experiments employing superconducting RF cavities can also be used as "direct deflection" experiments to search for this relativistic background. The millicharged plasma is first subjected to an oscillating electromagnetic field of a driven cavity, which causes charge separation in the form of charge and current perturbations. In turn, these perturbations can propagate outwards and resonantly excite electromagnetic fields in a well-shielded cavity placed nearby, enabling detection. We estimate that future versions of the existing Dark SRF experiment can probe orders of magnitude of currently unexplored parameter space, including millicharges produced from the Sun, the cosmic neutrino background, or other mechanisms that generate a thermal abundance with energy density as small as 10^{-4} that of the cosmic microwave background.

Authors: BERLIN, Asher (Fermilab); TANIN, Erwin (Stanford); RAMANI, Harikrishnan (Delaware); RAJENDRAN, Surjeet (Johns Hopkins)

Presenter: TANIN, Erwin (Stanford)

Session Classification: Non-SUSY extensions of the Standard Model

Track Classification: Non-SUSY extensions of the Standard Model