

# Searching for Millicharged Particles from the eV to GeV mass scale with Skipper-CCDs

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Millicharged particles (mCPs) appear in many extensions of the standard model. They are characterized by having a fractional electric charge and can be a compelling DM candidate to solve anomalies in both particle physics and cosmology. They could be created on Earth through meson decays in accelerator facilities or through Compton-like processes in nuclear reactors. Due to their small electric charge, their detection remains elusive. Taking advantage of the low ionization threshold, and the sub-electron noise of Skipper-CCDs, the SENSEI collaboration recently published direct detection constraints with a small gram-scale detector at the neutrino beamline at Fermilab establishing this technology as an ideal candidate to advance mCP searches with dedicated, more massive experiments. In this talk, I will present the SENSEI result, report on the mCP search by the CONNIE and ATUCHA collaborations in nuclear reactors, and present a future experiment (DarkBeaTs) that can greatly extend the sensitivity of mCPs at accelerators by tracking single electron depositions through a stack of Skipper-CCDs to reject background sources. I will also discuss other opportunities for mCP searches at accelerator facilities like the new Skipper-CCD detector installed at the CMS service cavern near the interaction point of the LHC at CERN, or the future PIP-II at Fermilab.

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