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Millicharged Dark Sectors at FerMINI, Neutrino Experiments, and Neutrino Observatories

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Millicharged particles (MCPs) are linked to the fundamental questions like charge quantization, and can make up a fraction of the DM abundance. The recent surge of interest of MCPs is linked to the EDGES anomaly, the excesses seen in direct-detection experiments, and the study of strongly interacting dark matter (SIDM).

In this talk, I will present the searches of MCP and millicharged SIDM in fixed target facilities and neutrino observatories.

MCPs can be produced from intense proton beams hitting the target, or from cosmic-ray hitting the earth's upper atmosphere. The MCPs produced can be detected by the detectors downstream of the fixed-target facility or by large neutrino observatories located underground. I will discuss the constraints and sensitivity reaches of these probes. Finally, I will introduce a specialized fixed-target scintillation experiment, FerMINI, that could provide the best sensitivity reach of MCP and millicharged SIDM in the MeV to GeV regime.

This talk is mainly based on

- <https://arxiv.org/abs/1812.03998>
 - <https://arxiv.org/abs/1806.03310>
 - <https://arxiv.org/abs/2002.11732>
- (see https://arxiv.org/a/tsai_y_1.html for more refs.)

Summary

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