

Probing and Knocking with Muons for Dark Matter and others

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We propose here a set of new methods to directly detect light mass dark matter through its scattering with abundant atmospheric muons or accelerator beams. Firstly, we plan to use the free cosmic-ray muons interacting with dark matter in a volume surrounded by tracking detectors, to trace possible interaction between dark matter and muons. Secondly, we will interface our device with domestic or international muon beams. Due to much larger muon intensity and focused beam, we anticipate the detector can be made further compact and the resulting sensitivity on dark matter searches will be improved. Furthermore, we will measure precisely directional distributions of cosmic-ray muons, either at mountain or sea level, and the differences may reveal possible information of dark matter distributed near the earth. Specifically, our methods can have advantages over 'exotic' dark matters which are either muon-philic or slowed down due to some mechanism, and sensitivity on dark matter and muon scattering cross section can reach as low as microbarn level.

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Primary authors: ZHOU, Chen (Peking University); LI, Qiang (Peking University); LI, Qite (Peking University)

Presenter: LI, Qite (Peking University)

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