

Phenomenology 2019 Symposium



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Paleo-detectors for Dark Matter I: Backgrounds and mineral optimization

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Recently, we proposed paleo-detectors as a method for the direct detection of Weakly Interacting Massive Particle (WIMP) dark matter. In paleo-detectors, one would search for the persistent traces left by dark matter-nucleon interactions in ancient minerals. For sufficiently radiopure target materials obtained from boreholes deep enough to avoid cosmogenic backgrounds, we identify (broadly speaking) two different background regimes. For low-mass WIMPs with masses $m_\chi < 10$ GeV, the largest contribution to the background budget comes from nuclear recoils induced by coherent scattering of solar neutrinos. For heavier WIMPs, the largest background source is nuclear recoils induced by fast neutrons arising from trace amounts of radioactivity. In this talk, we discuss the background budget for paleo-detectors and how backgrounds inform which minerals are suitable as targets materials.

Summary

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