

Phenomenology 2020 Symposium



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The relation between Migdal effect and dark matter-electron scatterings in atoms and semiconductors

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A key strategy for the direct detection of sub-GeV dark matter is to search for small ionization signals. These can arise from dark matter-electron scattering or when the dark matter-nucleus scattering process is accompanied by a 'Migdal' electron. In this talk, I will discuss the parametric relationship between dark matter-electron scattering and the 'Migdal' ionization for noble-liquid targets and, for the first time, provide an estimate of the 'Migdal' ionization rate in semiconductors that is based on evaluating a crystal form factor that accounts for the semiconductor band structure. I will also present new dark-matter-nucleus scattering limits down to dark matter masses of 500 KeV using published data from XENON10, XENON100, and a SENSEI prototype Skipper-CCD and also show projections for proposed experiments with xenon and silicon targets.

Summary

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