

Spinning the search for sub-GeV dark matter at direct detection

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The direct detection of sub-GeV dark matter (DM) remains a significant challenge due to the low recoil energies involved. In this talk, we focus on the scattering rate of sub-GeV DM particles interacting via spin-dependent couplings with nucleons, in solid-state targets. For DM masses below 100 MeV, the dominant scattering process involves incoherent multiphonon production, which offers a promising avenue to extend sensitivity to this low-mass regime. We evaluate the potential of upcoming experiments to detect such interactions and compare their sensitivity to existing constraints, including those from stellar cooling limits, beam dump experiments, and meson factory searches that probe the mediating particle. Incorporating these bounds, we estimate that future detectors could observe a few scattering events per kilogram per year of exposure.

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