

Precise Predictions and New Insights for the Migdal Effect

Wednesday 1 May 2024 12:20 (20 minutes)

The scattering of neutral particles by an atomic nucleus can lead to electronic ionisation and excitation through a process known as the Migdal effect. I will describe the necessity of revisiting previous calculations to provide more accurate predictions which allow for large nuclear recoil velocities and incorporate the effects of multiple ionisation. These results are relevant for dark matter direct detection searches, as well as ongoing experiments involving neutron sources. I will also discuss the sensitivity of the HydroX proposal to dope the LZ experiment with hydrogen using the Migdal effect. HydroX could have sensitivity to dark matter masses as low as 5 MeV for both spin-independent and spin-dependent scattering, with XLZD extending that reach to lower cross sections. This technique would substantially enhance the sensitivity of direct detection to spin-dependent proton scattering, well beyond the reach of any current experiments.

Presenter: Prof. DOLAN, Matthew (University of Melbourne)

Session Classification: Talks