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Exploring the Migdal Effect in CEvNS searches at low energies

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The search for coherent elastic neutrino-nucleus scattering (CEvNS) from reactor antineutrinos, represents a formidable experimental challenge that has pushed toward a global effort to develop innovative technologies capable of spotting the extremely tiny nuclear recoils produced as a single outcome of this interaction.
Due to the small energies of neutrinos produced at reactors, that extend up to a few MeVs, the CEvNS signal lies in an unexplored low-energy regime where a deep understanding of backgrounds and other compelling signals is crucial. Among them, I will focus on the Migdal effect, which is a yet-to-observed quantum mechanical phenomenon where additional ionization can be emitted after a nuclear recoil.

In this presentation, I will discuss the most recent result from the NCC-1701 germanium detector located about 10 meters away from the Dresden-II reactor site, which stands as the only experiment that has been able to find an excess compatible with CEvNS from reactor antineutrinos.
The Dresden-II observation relies on an enhancement of the measured quenching factor at low energies with respect to the theoretical prediction and the Migdal effect has been considered as a possible explanation for this unexpected behaviour. In this presentation, I will present the impact of the Migdal contribution on top of the standard CEvNS signal and I will compare it with the experimental data [1].

[1] ArXiv: 2307.12911

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