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CEvNS as a tool to investigate nuclear and electroweak properties: current status and prospects

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Coherent elastic neutrino-nucleus scattering (CEvNS) has been demonstrated to be an essential tool to investigate key electroweak physics parameters and nuclear properties since its first observation in 2017 at COHERENT.
In this presentation, we show for the first time the results obtained using the latest CsI dataset, which allows us to achieve a precise measurement of the average neutron rms radius of 133Cs and 127I. In combination with the atomic parity violation (APV) experimental result, we derive the most precise measurement of the neutron rms radii of 133Cs and 127I, disentangling the contributions of the two nuclei. By exploiting these measurements we determine the corresponding neutron skin values for 133Cs and 127I. This analysis allows us to also obtain a data-driven APV+COHERENT measurement of the low-energy weak mixing angle with a percent uncertainty, independent of the value of the average neutron rms radius of 133Cs and 127I.
In this contest, exploiting the recent detection of such a process with antineutrinos produced by the Dresden-II reactor scattering off a germanium detector, we also present the limits achieved on the weak mixing angle at the low-energy scale, highlighting the impact of the germanium quenching factor and the reactor antineutrino flux. To conclude, prospects for the future will be reviewed, with particular emphasis on the current limiting factors and a list of desiderata to improve these measurements.

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