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Cyclotron radiation emission spectroscopy for neutrino mass measurement and exotic interaction searches

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Cyclotron radiation emission spectroscopy (CRES) is a new avenue towards high-precision measurements of nuclear -decay spectra. High energy resolution and intrinsic low background have been demonstrated for CRES. As frequency-based technology CRES has an independent set of systematic uncertainty contributions in comparison to most classical electron spectroscopy techniques. Combined with an ultra cold atomic tritium source, CRES promises a technology to surpass the intrinsic neutrino mass sensitivity limit related to the molecular final state population in state-of-the-art experiments. We will report on the first CRES-based tritium endpoint spectrum measurement and the extracted neutrino mass limit. Applied to MeV-scale electron spectra emitted from 6He and 19Ne, searches for chirality-flipping exotic interactions are currently prepared. First CRES signals form MeV electrons and positrons will be presented. This work is supported by the Cluster of Excellence "Precision Physics, Fundamental Interactions, and Structure of Matter"
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