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Indium-115 based crystals for β-decay spectral shape measurement

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Neutrinoless double beta decay (0νββ) is a rare nuclear transition. If it is observed, it would answer open questions about neutrino masse and nature. To convert the 0νββ half-life into the neutrino Majorana mass a precise knowledge of the Nuclear Matrix Elements (NMEs) is required, but their current evaluation is strongly model-dependent. The measurement of highly suppressed β-decay spectral shape is a benchmark to test and stress nuclear models, shading light on the gA quenching and possibly identifying its origin. A quenched value of gA produces a spectral distortion in highly-suppressed single β-decay spectra. These decays have a higher transferred momentum, more similar to 0νββ, and offer a unique probe of the gA quenching as they are not masked by any lower-order β-decays. In the list of interesting isotopes to be measured, Indium-115 is one of the most suitable due to the relatively high Q-value (497.954 keV) and half-life (4.41×10^{14} yr). In the framework of the ACCESS (Array of Cryogenic Calorimeter to Evaluate Spectral Shapes) project, we evaluated the performances of two ^{115}In-based crystals operated as cryogenic calorimeters at the underground laboratory of Gran Sasso. In this talk, we present the results obtained from the test of indium oxide and indium iodine crystals to study the spectral shape of ^{115}In.

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