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A scintillating bolometer array for double beta decay studies: the LUCIFER experiment

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The main goal of the LUCIFER experiment is to study the neutrinoless double beta decay, a rare process allowed if neutrinos are Majorana particles. Although aiming at a discovery, in the case of insufficient sensitivity the LUCIFER technique will be the demonstrator for a higher mass experiment able to probe the entire inverted hierarchy region of the neutrino mass. In order to achieve this challenging result high resolution detectors with very low background and active background discrimination capability are required. This very interesting possibility can be largely fulfilled by scintillating bolometers thanks to the simultaneous read-out of heat and light emitted by the interactions in the detector or by pulse shape analysis.

The LUCIFER setup will consist of an array of individual module detectors, arranged in a tower-like structure. Each module will be composed by a ~0.5 kg scintillating crystal equipped with a Ge-crystal light detector operated as bolometers at ~10 mK.

We will present an overview on LUCIFER and the results obtained with a single module. Finally, we will also report on the first bolometric measurement of the two neutrino double beta decay of ^{100}Mo obtained with ZnMoO_4 crystals.

Collaboration

The Lucifer collaboration

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