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Results from the CUORE experiment

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The Cryogenic Underground Observatory for Rare Events (CUORE) is the first bolometric experiment searching for neutrinoless double beta decay ($0\nu\beta\beta$) that has been able to reach the one-ton scale. The detector consists of an array of 988 TeO₂ crystals arranged in a compact cylindrical structure of 19 towers. The construction of the experiment was completed in August 2016 with the installation of all towers in the cryostat. Following a cooldown, diagnostic, and optimization campaign, routine data-taking began in spring 2017. In this talk, we present the $0\nu\beta\beta$ results of CUORE from examining a total TeO₂ exposure of 86.3 kg·yr, characterized by an average energy resolution of 7.7 keV FWHM and a background in the region of interest of 0.014 counts/(keV·kg·yr). In this physics run, CUORE placed the current best lower limit on the ¹³⁰Te $0\nu\beta\beta$ half-life of $> 1.3 \times 10^{25}$ yr (90% C.L.). We then discuss the additional improvements in the detector performance achieved in 2018, the latest evaluation of the CUORE background budget, and we finally present the most precise measurement of the ¹³⁰Te $2\nu\beta\beta$ half-life to date.

Collaboration name

CUORE

Primary authors: SINGH, Vivek (University of California); CUORE COLLABORATION

Presenter: SINGH, Vivek (University of California)

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