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Latest results from the CUORE experiment: $0\nu\beta\beta$ limit and background model

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The Cryogenic Underground Observatory for Rare Events (CUORE) is the first bolometric experiment searching for $0\nu\beta\beta$ decay that has been able to reach the one-tonne mass scale. The detector, located at the LNGS in Italy, consists of an array of 988 TeO₂ crystals arranged in a compact cylindrical structure of 19 towers. CUORE began its first physics data run in 2017 at a base temperature of about 10 mK and in April 2021 released its 3rd result of the search for $0\nu\beta\beta$, corresponding to a tonne-year of TeO₂ exposure. This is the largest amount of data ever acquired with a solid state detector and the most sensitive measurement of $0\nu\beta\beta$ decay in ¹³⁰Te ever conducted, with a median exclusion sensitivity of 2.8×10^{25} yr. We find no evidence of $0\nu\beta\beta$ decay and set a lower bound of 2.2×10^{25} yr at a 90% credibility interval on the ¹³⁰Te half-life for this process. In this talk, we present the current status of CUORE search for $0\nu\beta\beta$ with the updated statistics of one tonne-yr. We also show the latest results on the CUORE background model and the measurement of the ¹³⁰Te $2\nu\beta\beta$ decay half-life, study performed using an exposure of 300.7 kg·yr.

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