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New 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 ($0\nu\beta\beta$) decay that has been able to reach the one-ton scale. The detector, located at the Laboratori Nazionali del Gran Sasso in Italy, consists of an array of 988 TeO₂ crystals arranged in a compact cylindrical structure of 19 towers. Following the completion of the detector construction in August 2016, CUORE began its first physics data run in 2017 at a base temperature of about 10 mK. Following multiple optimization campaigns in 2018, CUORE is currently in stable operating mode. In 2019, CUORE released its 2nd result of the search for $0\nu\beta\beta$ corresponding to a TeO₂ exposure of 372.5 kg·yr and a median exclusion sensitivity to a ¹³⁰Te $0\nu\beta\beta$ decay half-life of 1.7×10^{25} yr. We find no evidence for $0\nu\beta\beta$ decay and set a 90% C.L. Bayesian lower limit of 3.2×10^{25} yr on the ¹³⁰Te $0\nu\beta\beta$ decay half-life. In this talk, we present the current status of CUORE's search for $0\nu\beta\beta$, as well as review the detector performance. We finally give an update of the CUORE background model and the measurement of the ¹³⁰Te two neutrino double-beta ($2\nu\beta\beta$) decay half-life.

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