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Background mitigation techniques for the CUORE experiment

The Cryogenic Underground Observatory for Rare Events (CUORE) is the first bolometric experiment searching for neutrinoless double beta decay (0νββ) 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 TeO_2 crystals arranged in a compact cylindrical structure of 19 towers. The construction of the experiment was completed in August 2016 with the installation, in low radon, clean room environment, of all towers in the cryostat. Following a cooldown, diagnostic, and optimization campaign, routine data-taking began in spring 2017. The first CUORE physics run, corresponding to a total TeO_2 exposure of 86.3 kg·yr resulted in the best lower limit on the ^{130}Te 0νββ half-life of $T^{0\nu}_{1/2}(^{130}\mathrm{Te}) > 1.3 \times 10^{25}$ yr (90% C.L.). In this talk, we will describe the background mitigation techniques that CUORE employed to achieve the low background rate of (0.014 ± 0.002) counts/(keV·kg·yr) in the 0νββ region of interest. We will also describe improvements to the CUORE data analysis that is expected to reduce the background rate further.

Author: FUJIKAWA, Brian

Presenter: FUJIKAWA, Brian