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CUORE: Cryogenic challenges and prospects for a future upgrade

VIVEK SINGH, University of California, Berkeley, CUORE COLLABORATION

— The Cryogenic Underground Observatory for Rare Events (CUORE) is a ton-scale bolometric experiment searching for the $0\nu\beta\beta$ decay in ^{130}Te. It consists of a closely packed array of 988 TeO_2 crystals (5 x 5 x 5 cm^3 each) and will be hosted in one of the largest cryostats ever constructed to reach a base temperature of ∼10 mK. With a background goal of 10 c/keV/ton/y and an expected energy resolution of ∼5 keV in the region of interest, CUORE has the potential to probe the effective Majorana neutrino mass down to 50-130 meV (90% C.L). A natural follow-up to CUORE would be a ton-scale bolometric experiment which can be sensitive to the effective mass of ∼10 meV, covering the entire inverted hierarchy region of the mass spectrum. CUPID (CUORE Upgrade with Particle ID) is a proposed next-generation bolometric experiment which aims to use the CUORE cryogenic infrastructure in conjunction with new detector technologies and novel background mitigation techniques. After briefly outlining the design of CUORE with a focus on its novel cryogenic system, an overview of the current status of CUORE commissioning effort would be presented. The talk will then delve on some of the R&D activities which are being actively pursued under the CUPID framework.

Vivek Singh
University of California, Berkeley

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