



## Poster session 4 – Friday 8 July

### P4.053 The CUORE cryostat: a 10 mK infrastructure for large bolometric arrays

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*on behalf of CUORE collaboration*

The CUORE (Cryogenic Underground Observatory for Rare Events) experiment is presently in the final phases of its commissioning at the Gran Sasso Underground Laboratory (Italy). CUORE will search for the neutrinoless double beta decay of  $^{130}\text{Te}$  with an array of 988 bolometers. Each bolometer consists in a 750 g  $5 \times 5 \times 5 \text{ cm}^3$   $\text{TeO}_2$  crystal, for a total mass of over 740 kg for the whole detector.

The CUORE cryogenic system will have to guarantee the optimal operation temperature of the detector ( $\sim 10\text{mK}$ ) for a live-time of 5 years. Furthermore, to avoid radioactive background, about 7 tonnes of lead are cooled to below 4K and only few construction materials are acceptable. The cryostat consists of six nested vessels. The different stages thermalize at different temperatures, from about 300K to 10mK. In particular, two of them are vacuum-thigh. The Inner Vacuum Chamber contains the detector and the shielding lead.

Five pulse tubes provide the cooling down to 4 K. A Fast Cooling System was developed to speed up the cooling process. A Dilution Unit refrigerator for the circulation of a  $^3\text{He}/^4\text{He}$  mixture allows to reach the final temperatures of the various inner stages.

The CUORE detector will be by far the largest mass ever cooled to 10mK. In this poster, a description of the CUORE cryostat is presented and the specific characteristics and the performances are illustrated. The results of the (recently concluded) cryostat commissioning are also reported. They confirm that the CUORE cryostat is now ready to host the detector, thus confirming the possibility of realizing large bolometric arrays for rare event physics.