Session 22W

Astronomy, Medicine and Energy: New fields for millikelvin technology. 22W1

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Traditionally millikelvin temperatures produced mostly by dilution refrigerators are used in the laboratory to cool all sorts of samples to examine their fundamental properties. We briefly discuss here how millikelvin temperatures are or could be used in fields like detectors of gravitational waves, NMR imaging and clean nuclear fusion.

CUORE: Low Temperature Techniques for Neutrino Physics 22W2

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Neutrino physics represents today a hot topic in elementary particle physics, due to the observations of flavour oscillations both in the atmospheric and in the solar sector. This proves the existence of finite neutrino masses. In order to fix their absolute values, sensitive experiments on Neutrinoless Double Beta Decay (a rare nuclear process) must be carried on. The here described experiment CUORE (Cryogenics Underground Observatory for Rare Events) can extend the neutrino mass sensitivity down to 30 meV. CUORE will consist of a large, closely-packed, high-granularity array of 1000 tellurite (TeO_2) low temperature calorimeters, operated at 10 mK and with a total mass of 800 Kg. The final structure of the detector and the preliminary tests are presented and discussed.