

# Department of Physics

Particle Physics  
The Denys Wilkinson Building, Keble Road, Oxford OX1 3RH



## Experimental Particle Physics Seminar

at 2.15 pm

Dennis Sciama Lecture Theatre

Tuesday 19<sup>th</sup> February 2019

Professor Oliviero Cremonesi  
INFN & University of Milano-Bicocca

The CUORE experiment at LNGS

### Abstract

Neutrinoless double beta decay (NDBD) is a direct probe of new physics beyond the Standard Model. Its discovery would demonstrate that the lepton number is not a symmetry of nature and would provide unique information on the nature and mass of the neutrinos. Among the possible experimental techniques, thermal detectors fulfill the requirements for a sensitive search, showing an excellent energy resolution, an almost complete independence from the isotope choice and the possibility of scaling to very large masses. Characterized by an exceptionally high natural abundance in  $^{130}\text{Te}$  and excellent mechanical and thermal properties,  $\text{TeO}_2$  has long been recognized as an ideal candidate, and a number of increasing mass bolometers have been developed along the past 30 years. The Cryogenic Underground Observatory for Rare Events (CUORE) is just the latest step of this development. With a mass of 741 kg, the detector consists of an array of 988  $\text{TeO}_2$  crystals arranged in a cylindrical compact structure of 19 towers. The installation of the 19 towers in the CUORE cryostat was completed in August 2016, followed by the cooldown to base temperature in December 2016. This result marks a fundamental milestone in low temperature detectors techniques, opening the path for future ton-scale bolometric experiments searching for rare events. CUORE has been taking science data since Spring 2017. The performance of the detector and the initial results will be presented.