

## An active noise cancellation technique for the CUORE Pulse Tube Cryocoolers

The CUORE experiment at Gran Sasso National Laboratory searches for neutrino-less double beta decay ( $0\nu\beta\beta$ ) using TeO<sub>2</sub> crystals operated as cryogenic bolometers. The ton-scale detector is kept at 10 mK by a custom made dilution cryostat, the today's biggest milli-Kelvin infrastructure in the world. The success of the experiment stands on the capability to mitigate the mechanical vibrations induced by the five Pulse Tube (PT). To address this problem, we developed an innovative technique to drive the PT pressure oscillations in order to reduce the vibrations transmitted to the detectors. The "active PT noise cancellation" (APTNC) system allows to suppress the detector noise by reducing the amplitude of PT harmonics up to a factor  $\sim 100$ . The APTNC technique has been applied during the first CUORE data taking, which lead to the current best limit on the  $0\nu\beta\beta$  half-life of  $^{130}\text{Te}$ . This result will ease the development of large cryogen-free systems for future large-mass rare events searches.

### Authorship annotation

for the CUORE collaboration

### Session and Location

Monday Session, Poster Wall #85 (Auditorium Gallery Left)

### Poster included in proceedings:

no

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**Track Classification:** Poster (not participating in poster prize competition)