Contribution ID: **39** Type: **Poster**

Cryogenic light readout of NaI(Tl) crystals for dark matter detection

Wednesday, June 15, 2022 3:25 PM (1 minute)

The most discussed topic in direct search for dark matter is arguably the verification of the DAMA claim. In fact, the observed annual modulation of the signal rate in an array of NaI(Tl) detectors can be interpreted as the awaited signature of dark matter interaction. Several experimental groups are currently engaged in the attempt to verify such a game-changing claim in a model-independent way, i.e. with the same target material. However, all present-day designs are based on a light readout via Photomultiplier Tubes (PMT), whose high noise makes it challenging to achieve a low background in the 1-6keV energy region of the signal. Even harder it would be to break below 1 keV energy threshold, where a large signal fraction potentially awaits to be uncovered. ASTAROTH is an R&D project to overcome these limitations by using Silicon Photomultipliers (SiPM) matrices to collect scintillation light. The all-active design based on cubic crystals is operating in the 87-150K temperature range where SiPM noise can be even a hundred times lower with respect to PMTs. The cryostat was developed following an innovative design and is based on a copper chamber immersed in a liquid argon bath that can be instrumented as a veto detector. We have characterized separately the crystal and the SiPM response at low temperature and we have proceeded to the first operation of a NaI(Tl) crystal read by SiPM in cryogeny.

Primary author: ZANI, Andrea

Co-author: D'ANGELO, DAVIDE (INFN)

Presenter: D'ANGELO, DAVIDE (INFN)

Session Classification: LRT 2022 - poster session

Track Classification: Experiment Backgrounds, Models, Simulations