



## Poster session 1 - Monday 4 July

### P1.077 Cherenkov light identification in TeO<sub>2</sub> crystals with Si low-temperature detectors

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Large mass thermal detectors are powerful tools for the search for neutrinoless double beta decay. Next generation experiments plan to exploit their excellent properties to push the sensitivity inside the inverted hierarchy region of neutrino masses.

Tellurium dioxide is one of the favourite compounds for the next generation bolometric experiments because of the excellent quality and purity of the crystals, high isotopic abundance and excellent bolometric performance. Recently, the idea of exploiting Cherenkov emission to tag the electrons produced in the double beta decay was proposed. At the typical energy of the decay products, electrons are above threshold for the Cherenkov emission, while alphas are not.

We will present a new generation of cryogenic light detectors, developed in the CUPID-INFN context, that have been used to detect the Cherenkov light emitted by the electrons interacting in 1cm<sup>3</sup> TeO<sub>2</sub> crystals. Thanks to the excellent performance of these devices, it was possible to be sensitive to the interaction of a few photons with our light detectors. This allowed a high significance event-by-event discrimination between alpha and beta/gamma interactions at the <sup>130</sup>Te neutrinoless double beta decay Q-value with a resulting discrimination power of ~5. A corresponding alpha background reduction by a factor 10<sup>3</sup> with a signal efficiency >99% is evaluated with a toy Monte Carlo accounting for both the Poisson statistics of the photons number and the smearing of alpha and beta/gamma bands due to the detector noise.

This results demonstrate that this technique is able to satisfy the requirements on background reduction of the proposed CUORE successor experiment (CUPID) once the scalability on larger devices will be proven. For this reason, improvements of the light collection efficiency with optimised reflectors, geometries and light detectors coatings are also under investigation.