

Full α background rejection in a CUORE-size TeO₂ bolometer using a Neganov-Luke-effect light detector

CUPID (CUORE Upgrade with Particle IDentification) will be a tonne-scale bolometric experiment searching for the neutrinoless double beta decay. CUPID aims to improve CUORE sensitivity to this nuclear transition by isotope enrichment and substantial background reduction. The CUORE limiting background is due to degraded-energy α particles emitted at surfaces close to the detector, that a pure calorimetric measurement - like the one performed by CUORE - is not able to tag. We will present the potential of using the feeble light emitted by TeO₂ crystals, used by the CUORE experiment to study the promising isotope ¹³⁰Te, to separate the α particles from the signals. In particular we will show the results obtained by a bolometric light detector assisted by the Neganov-Luke effect, which amplifies the weak light signals thanks to an electric field. This device, coupled to a CUORE-size crystal, was able to reject 99.9% of α 's with an acceptance of 96.3% of β events.

Session and Location

Monday Session, Poster Wall #75 (Auditorium Gallery Right)

Poster included in proceedings:

yes

Primary author: Ms NOVATI, Valentina (CSNSM)

Co-authors: BENOÎT, Alain (CNRS-Néel); BRONIATOWSKI, Alexandre (CSNSM); JUILLARD, Alexandre (IPNL); ZOLOTAROVA, Anastasiia (CEA); GIULIANI, Andrea (CSNSM); CAZES, Antoine (IPNL); LAURENT, Bergé (CSNSM); PAUL, Bernard (CEA); SIEBENBORN, Bernhard (KIT); NONES, Claudia (CEA); AUGIER, Corinne (IPNL); PODA, Denys (CSNSM); QUEGUINER, Emeline (IPNL); OLIVIERI, Emiliano (CSNSM); ARMENGAUD, Eric (CEA); YAKUSHEV, Evgeny (JINR); CHARLIEUX, Florence (IPNL); KRAUS, Hans (University of Oxford); LE SUEUR, Helene (CSNSM); GASCON, Jules (IPNL); BILLARD, Julien (IPNL); EITEL, Klaus (KIT); VAGNERON, Lionel (IPNL); DUMOULIN, Louis (CSNSM); WEBER, Marc (KIT); DE JESUS, Maryvonne (IPNL); KLEIFGES, Matthias (KIT); DE COMBARIEU, Matthieu (CEA); CHAPPELLIER, Maurice (CSNSM); GROS, Michel (CEA); FOERSTER, Nadine (KIT); PARI, Patrick (CEA); CAMUS, Philippe (CNRS-Néel); DE MARCILLAC, Pierre (CSNSM); MAISONOBE, Romain (IPNL); ROZOV, Sergey (JINR); MARNIEROS, Stefanos (CSNSM); REDON, Thierry (CSNSM); KOZLOV, Valentin (KIT); KUDRYAVTSEV, Vitaly (University of Sheffield); SANGLARD, Véronique (IPNL); NAVICK, Xavier-francois (CEA); JIN, Yong (Laboratoire de Photonique et de Nanostructures)

Presenter: Ms NOVATI, Valentina (CSNSM)

Track Classification: Poster (participating in poster prize competition)