

# The CROSS demonstrator: structure, performance and physics reach

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Cryogenic particle detectors represent a promising avenue for conducting experiments on neutrinoless double beta decay, as demonstrated by the successful operation and sensitivity of current and previous experiments such as CUORE, CUPID-0 and CUPID-Mo. However, the development of new bolometric technologies for effective background rejection is needed to get a higher sensitivity to the  $0\nu\nu\beta\beta$  decay in future experiments.

CROSS (Cryogenic Rare-event Observatory with Surface Sensitivity) aims at studying and optimizing bolometric techniques for next-generation neutrinoless double beta decay experiments of  $^{100}\text{Mo}$  and  $^{130}\text{Te}$ . Situated at the Laboratorio Subterráneo de Canfranc (LSC) in Spain, the final CROSS demonstrator will include 36  $\text{Li}_2\text{MoO}_4$  crystals and 6  $\text{TeO}_2$  crystals of size  $4.5 \times 4.5 \times 4.5 \text{ cm}^3$  facing 42 Neganov-Trofimov-Luke (NTL) Germanium light detectors divided into 3 towers. The commencement of operation of the final experiment is scheduled for the end of 2024. Currently, one tower containing one-third of the final demonstrator's configuration is undergoing testing at LSC.

One of the objectives of our tests is the evaluation of the performance of the NTL light detectors, crucial for the rejection of alpha particles and random coincidences of ordinary  $2\nu\nu\beta\beta$  decay of  $^{100}\text{Mo}$ . Simultaneously, efforts are underway to develop and test thin-film crystal coating techniques aimed at surface events discrimination. In this poster, we will provide an overview of the current status of the CROSS experiment, discussing the achieved detector performance - energy resolution,  $\alpha/\beta$  discrimination power, pile-up rejection capability - along with the physics reach of the CROSS demonstrator.

## Poster prize

Yes

## Given name

Mariia

## Surname

Buchynska

## First affiliation

CNRS, IJCLab, Université Paris-Saclay

## Second affiliation

## Institutional email

mariia.buchynska@ijclab.in2p3.fr

## Gender

Female

**Collaboration (if any)**

CROSS

**Primary author:** BUCHYNSKA, Mariia (IJCLab, Université Paris-Saclay)

**Presenter:** BUCHYNSKA, Mariia (IJCLab, Université Paris-Saclay)

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