ID contributo: **602** Tipo: **Poster**

Improving scintillating cryogenic calorimeters for the search of rare events

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Cryogenic calorimeters are particle detectors that measure energy as a temperature rise. To achieve adequate sensitivity, they must be operated at ∼10mK, where they achieve optimum energy resolution. When using a scintillating crystal as a particle absorber, reading the scintillation light from a second cryocalorimeter provides particle identification. Both elements have NTD thermistors for temperature change readout.
These detectors have proven to be a powerful tool for current (e.g. CUORE) and future (e.g. CUPID) experiments in the rare element research landscape.
We have been testing innovative solutions for different elements of the detector to assess the possibility of achieving higher sensitivities and better light collection, resulting in increased performance and better background discrimination.
To reduce detector response time, we tested NTDs fabricated using ^{11}B and ^{10}B implantation. It is expected that the sensitivity and response time of the calorimeters will be affected by the different low-temperature specific heats of these materials. We have tested calorimeters in operation with different NTDs and have evaluated the effect on detector performance.
To improve scintillation light collection and thus background discrimination, we operated Li_2MoO_4 scintillating calorimeters coated with Al.
In order to increase the response of the light detector, we are designing transparent electrodes to implement the phonon amplification by charge drift (Neganov-Trofimov-Luke effect) and we are testing the possibility of using photosensitive thin films to increase the light collection efficiency.
We will show the performance, measured at the Milano~-~Bicocca Cryogenic Laboratory, of several thermal detectors realised with the aforementioned novel techniques in the framework of CUPID R\&D.

Poster prize

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