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FLARES: a flexible scintillation light apparatus for rare event searches

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Compelling experimental evidences of neutrino oscillations and their implication that neutrinos are massive particles have given neutrinoless double beta decay (\bbzn) a central role in astroparticle physics. In fact, the discovery of this elusive decay, besides giving precious information concerning the absolute neutrino mass scale, would unambiguously demonstrate that neutrino and antineutrino are the same particle and that the lepton number is not conserved.
On the other hand, all current experimental programs to search for \bbzn\ are facing with the technical and financial challenge of increasing the experimental mass while maintaining incredibly low levels of spurious background.
The technique proposed here is the combination in a single device of all the demanding features needed by an ideal experiment: energy resolution, low cost mass scalability, isotope choice flexibility and many powerful handles to make the background negligible. Its novelty is the enhancement and optimization of the collection of the scintillation light emitted by ultra-pure crystals through the use of arrays of high performance silicon photodetectors cooled to 120\,K. This would provide scintillation detectors with 1\% level energy resolution and a μs time resolution.
The performances of a first production of matrices of Silicon Drift Detectors as well as first measurements of the low temperature light yield of a selection of high purity scintillation crystals will be presented and discussed.

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