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The role of low temperature detectors in neutrino physics

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Neutrinos are the most abundant fundamental massive particles in nature. Despite that, many of their basic properties are still unknown, e.g. the absolute value of their mass, their mass hierarchy, the eventuality that they coincide with their own antiparticles, and many others. Answering these open questions is of unvaluable importance to discern among theories beyond the Standard Model and to understand our Universe and its evolution.
Neutrinos are also extremely elusive particles, therefore studying their properties requires challenging technologies and huge mass detectors.
Low temperature detectors can give a crucial contribution to this field. Since their first appearance in the neutrino physics scene in 1984, they have experienced an impressive technological progress that makes them extremely appealing devices for competing experiments.
In fact, low temperature detectors play already a leading role in the search for neutrinoless double beta decay, a rare nuclear process that could shed light on the nature of neutrinos. Moreover, competitive experiments using low temperature detectors are just entering the scene for the direct measurement of the neutrino mass. Also, promising projects aiming at the neutrino coherent scattering detection are being developed.
The challenges and the techniques of running and proposed experiments using low temperature detectors will be reviewed in this talk.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

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