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Solar neutrino spectroscopy with thermal detectors

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In the field of low background physics, cryogenic detectors demonstrated in the last years to be a promising technology, not fully explored yet, for the investigation of rare events. They feature excellent energy resolution over a wide energy range and, lately, scalability to large masses have been demonstrated, as well as the discrimination of the particle interactions.

This technology has been widely employed for the investigation of rare process thanks to their flexibility, since many different isotopes can be chosen as absorbing detector. In particular, by choosing a proper target isotope, thermal detectors can be used to detect solar neutrinos trough weak charged-current reactions, detecting the de-excitation products of the radioactive daughter nucleus. As an example, a thermal detector including Bromine, based on the charged current reaction on the Br-81 isotope, could be used to perform a precise study of the shape of the Be-7 line, allowing for a measurement of the central temperature of the Sun. A similar measurement could be performed by a thermal detector containing Molybdenum, detecting the charged current reaction on Mo-100 by the subsequent decay to Ru-100.

Thanks to their excellent energy resolution and to their granularity these detectors are ideal perform a precise spectroscopic measurement of the low energy neutrino fluxes from the Sun, solving important questions both in solar physics and neutrino physics.

In this contribution, the potentialities and the challenges of the application of thermal detectors to investigate solar neutrinos are discussed.

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