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Implications of pp-cycle and CNO-cycle neutrino measurements for solar physics

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The detection of neutrinos produced by pp-chain and CNO-cycle provide us fundamental informations on the thermal stratification and on the chemical composition of the solar core.

These can be used to verify the predictions of the so-called Standard Solar Models (SSMs), which represent a benchmark for stellar evolution, and to constrain standard and non/standard energy generation and transfer mechanisms, standard and non/standard chemical evolution paradigms for the Sun, etc.

The CNO neutrino measurements, combined with precise determinations of ^8B and ^7Be fluxes, can also provide clues for the solution of the so-called solar abundance problem, i.e. the fact that SSMs implementing the latest determination of surface heavy element abundances, obtained by 3D hydrodynamic models of the solar atmosphere, do not reproduce helioseismic constraints. All proposed modifications to physical processes in SSMs (e.g. anomalous diffusion, accretions, mass loss, etc) offer, at best, only partial solutions to this unsolved puzzle.

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Session Classification: Why and How the Sun and the Stars Shine: the Borexino Experiment

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