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Helioseismology and solar neutrinos

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Analysis of solar neutrinos and studies of the solar interior by means of helioseismology, based on observed solar oscillations, have had a close interplay over many decades. Early calculations of solar oscillations were motivated by a proposed mixing mechanism to reduce (temporarily) the flux of electron neutrinos from the solar core. Early observations of solar oscillations showed that the observed frequencies were inconsistent with proposed non-standard models with a reduced neutrino flux, pointing towards a non-astrophysical solution to the observed neutrino deficit. With increasingly tight helioseismic constraints on solar structure this strongly supported the search for a solution involving neutrino-flavour changes, triumphantly realized with the SNO observations. Given the increasingly tightly constrained neutrino properties, from independent measurements, the observed neutrino fluxes can now (finally) contribute to our knowledge about conditions in the solar core, in a manner that complements helioseismic investigations.

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