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Borexino–A Breakthrough in Spectroscopy of Low Energy Neutrinos from the Sun[1]

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Low energy (< 1 MeV) solar neutrinos account for 99+% of the emitted flux providing the essential window on energy production in the sun. For many decades of solar neutrino research, these could not be directly measured because of the formidable background barrier below 3 MeV. This constraint was broken by the Borexino experiment which has now measured the flux of 0.862 MeV neutrinos from the decay of 7Be in the sun. Indeed, this result is the most precise (<5%) solar neutrino flux known today. A strong push is being made for results on other solar neutrinos. These results arising from extraordinary technical achievements, far exceed initial goals set for this project some 20 years ago. I will trace the development and brief history of this project, describe the salient features of the detector, point out the principal technical achievements and present the most recent results and their impact on our understanding of energy production in the sun via the proton-proton chain as well as the CNO cycle. The results bear vitally on neutrino phenomenology as well. In addition to the sun, Borexino has also measured neutrinos from the interior of the earth. Future directions and plans being discussed presently for Borexino will be indicated.

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