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Abstract

In this paper we describe solar neutrino detectors and solar neutrino observations. Seven detectors have searched for solar neutrinos since 1967. In 2007 Borexino, the last one put into operation, started data taking. At present, only two detectors, namely Super-Kamiokande and Borexino, are taking data. In a timescale of one year SNO+ will be operational at SNOlab, replacing the SNO detector. Fundamental accomplishments have been obtained through the study of solar neutrinos. Solar neutrino data have contributed in the understanding of neutrino mixing and the MSW mechanism. Between 1991 and 1997 data from the gallium experiments made stronger the idea of new physics for neutrinos, which was initially suggested by the chlorine experiment data. In 2001 SNO and Super-Kamiokande have shown evidence of solar neutrino flavor conversion in the matter of the Sun. In 2002 SNO made this evidence more robust with the observation of neutral current interactions. The recent measurement in real-time of pp solar neutrinos from Borexino in 2014 together with previous observations provide a fundamental test of the energy source in the Sun at the level of 8%, as it is calculated in the present work. In 2005 a significant discrepancy between helioseismology and the solar models was recognized. This discrepancy replaces the previous *solar neutrino problem*, solved in the framework of neutrino mixing and MSW mechanism, with the *solar abundance problem*. Future solar neutrino measurements of CNO neutrinos could shed light on this disagreement. We review the accomplishments obtained on solar neutrino observations, discuss

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