

Neutrino astrophysics with Borexino: comprehensive study of proton-proton chain solar neutrinos

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For thousands of years of human evolution we were curious about what the Sun is? Answers began to come during recent 50 years, thanks to development of astrophysics and helioseismology, particle and neutrino physics. The latter research field allows studying the Sun's deep interior and achieved enormous progress during last ten years. This period of Sun's studies is marked by the operation of the currently most sensitive solar neutrino detector Borexino, which takes data in Gran Sasso national laboratories in Italy. Thanks to extreme radiopurity achieved in Borexino, this is for the first time that a single detector is able to separately measure neutrinos produced in various nuclear reactions of the solar proton-proton fusion chain. Borexino results indicate the preference of high over low metallicity solar models - the step forward of extreme importance for solar physics. Neutrino physics gains as well: for the first time Borexino examines the MSW-LMA neutrino oscillation paradigm both in the vacuum and the matter dominated regimes. In this talk I overview the wide set of Borexino accomplishments done in the fields of solar and neutrino physics.

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