

The Impurity Components in the 7Be Solar Neutrino Flux

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In the present work, a development [1], the flavor structure of the 7Be solar neutrino (SN) flux is investigated.

The electron spectrum of the $(\nu_e \bar{\nu}_e)$ e-scattering differs from the fairly flat spectra of all neutrinos. Such difference will open the way for the Borexino Collaboration to search for an antineutrino admixture in the SN flux [2].

If the part of this flux transforms into neutrinos of the second and third generations and related antiparticles $\bar{\nu}_e$, the total electroweak spectrum of recoil electrons can be written in the form:

$$(d\sigma/dT)_{tot} = P(\nu_e) (d\sigma(\nu_e e))/dT + P(\nu_\mu, \tau) (d\sigma(\nu_\mu, \tau e))/dT + P(\bar{\nu}_e) (d\sigma(\bar{\nu}_e e))/dT, (1)$$

where T is the kinetic energy of the final electron.

The table

$P(\bar{\nu}_e) (d\sigma/dT)_{tot}$

0 [0.28; 0.36]

0.05 [0.27; 0.39]

0.1 [0.27; 0.41]

0.2 [0.26; 0.46]

0.3 [0.25; 0.51]

shows the results of calculations based on the Borexino data: a limit of the conversion probability $P(\nu_e \rightarrow \bar{\nu}_e) < 0.35$ (90% C.L.) for 862 keV 7Be neutrinos [2], under the assumption of ν_e transition to other active neutrino flavors, the SN survival probability $P(\nu_e) = 0.51 \pm 0.07$ [3].

Each spectrum is presented by ten values of the differential cross sections, corresponding to the recoil electron kinetic energy for the kinematically allowed escape angles, determined by the segment $[0^\circ; 90^\circ]$.

The graphical image of these spectra is presented in the form of figures.

1. Yu.I. Romanov // Bull.RAS. Phys. 2015. V. 79. P. 945.
2. G. Bellini et al. (Borexino Collaboration) // Phys. Lett. B. 2011. V.696. P.191.
3. G. Bellini et al. (Borexino Collaboration) // Phys. Rev. Lett. 2011. V.107. P.141302.

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