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Temperature Stabilization of the Borexino Detector for the CNO Quest

The detection of the Solar Neutrino interaction rate from the CNO-cycle through the spectral analysis in Borexino is extremely difficult, given its spectral similarity with the Bi-210 background. The current strategy is based on the Bi-210 (β-, τ = 7 d) background independent constraint, coming from Pb-210 (β-, τ = 32 y) and decaying into Po-210(α, τ = 200 d) through the A=210 decay chain. In practice, the Bi-210 rate can be inferred by the Po-210 rate if sufficient thermodynamics equilibrium conditions of the detector are reached. Since 2011, we have been observing consistent migrations (convection and diffusion) of Po-210 in the scintillator liquid from the containment vessel. This observation has motivated the Collaboration to make an effort in deploying temperature control and thermal insulation systems to reduce Po-210 migration. Detailed 2D and 3D fluid dynamics simulations and performance of the thermal insulation system will be discussed.

Mini-abstract

Thermal insulation of Boreixno for improving sensitivity to CNO neutrinos.

Experiment/Collaboration

BOREXINO

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