

Nuclear Experiment

Measurement of the ν_e and Total ν^8 Solar Neutrino Fluxes with the Sudbury Neutrino Observatory Phase-III Data Set

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This paper details the solar neutrino analysis of the 385.17-day Phase-III data set acquired by the Sudbury Neutrino Observatory (SNO). An array of ^3He proportional counters was installed in the heavy-water target to measure precisely the rate of neutrino-deuteron neutral-current interactions. This technique to determine the total active ν^8 solar neutrino flux was largely independent of the methods employed in previous phases. The total flux of active neutrinos was measured to be $5.54^{+0.33}_{-0.31}(\text{stat.})^{+0.36}_{-0.34}(\text{syst.}) \times 10^6 \text{ cm}^{-2} \text{ s}^{-1}$, consistent with previous measurements and standard solar models. A global analysis of solar and reactor neutrino mixing parameters yielded the best-fit values of $\Delta m^2 = 7.59^{+0.19}_{-0.21} \times 10^{-5} \text{ eV}^2$ and $\theta = 34.4^{+1.3}_{-1.2}$ degrees.

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