

## Recent Solar Neutrino Results From Super-Kamiokande

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“Super-Kamiokande-IV data taking began in September of 2008, and with upgraded electronics and improvements to water system dynamics, calibration and analysis techniques, a clear solar neutrino signal could be extracted at recoil electron kinetic energies as low as 3.49 MeV. The SK-IV extracted solar neutrino flux between 3.99 and 19.49 MeV is found to be  $(2.34 \pm 0.03(\text{stat.}) \pm 0.04(\text{syst.})) \times 10^6 / (\text{cm}^2 \text{sec})$ . The SK combined recoil electron energy spectrum slightly favors the distorted shape predicted by MSW oscillations. A maximum likelihood fit to the amplitude of the expected solar zenith angle variation of the elastic neutrino-electron scattering rate in SK, results in a day/night asymmetry of  $-3.2 \pm 1.1(\text{stat}) \pm 0.5(\text{syst})\%$ . The 2.7  $\sigma$  significance of non-zero asymmetry is the first indication of the regeneration of electron type solar neutrinos as they travel through Earth’s matter. The combination of SK-I, II, III and IV solar neutrino data measure the solar mixing angle to  $\sin^2(\theta_{12}) = 0.342 \pm 0.028 - 0.023$  and the solar neutrino mass splitting to  $\Delta m^2 = 4.69 \pm 1.80 - 0.83 \times 10^{-5} \text{ eV}^2$ .”

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