Solar Neutrinos at the Conclusion of the Sudbury Neutrino Observatory

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The study of solar neutrinos began with the idea that one could use the neutrinos to learn about the fusion processes going on in the interior of the sun. This goal was temporarily put on hold when it was found that fewer electron-flavor neutrinos than expected were reaching the earth. The Sudbury Neutrino Observatory (SNO) definitively solved that mystery when it discovered a $\nu_\mu + \nu_\tau$ component to the solar-neutrino flux. SNO primarily measures the ^{8}B solar-neutrino flux by observing Cherenkov radiation with an array of photomultiplier tubes. The neutral-current disintegration of deuterium makes possible a flavor-independent measurement of the neutrino flux. SNO has completed its third and final phase in which an array ^{3}He proportional counters was installed to make a parallel measurement of the neutral-current flux. While results from this phase have not yet been released, the measurement of the mixing angle, θ_{12}, will be the most precise in the foreseeable future. By combining the SNO results with other solar-neutrino measurements and the results of the KamLAND reactor neutrino experiment the oscillation parameters θ_{12} and Δm^2_{21} are well understood. At this stage of precision solar-neutrino physics we can finally return to the goal of using the solar neutrinos to peer into the core of the sun.