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Solar Neutrinos as a Probe of Planetary Formation

WICK HAXTON, University of California, Berkeley

The "solar abundance problem" is the term used to describe the significant differences between standard solar models tuned to reproduce surface properties, as determined from photoabsorption line analyses, and those tuned to reproduce deep interior properties of the Sun, as determined from helioseismology. I will discuss the possibility that the photoabsorption and helioseismic data are both correct, and that the conflicting results instead reflect a shortcoming in our model of the Sun, namely the standard solar model assumption that the Sun was homogeneous when nuclear fusion first commenced. This speculation connects the solar abundance problem to two other puzzles, chemical differences between the Sun and "solar twin" stars and the anomalous composition of Jupiter, which suggest that the interesting chemistry of planetary disks alters both host stars and their planets. I discuss why further exploration of theses questions could be important to searches for exoplanets, and how neutrinos might become one of the explorers's tools.