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Solar and Supernova Neutrinos in Super-Kamiokande

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Super-Kamiokande (SK), the world's largest water Cherenkov detector has collected over 320 kt-years of solar neutrino data. It has observed ~90k Boron-8 solar neutrinos by using neutrino-electron elastic scattering. SK searches for distortions of the solar neutrino energy spectrum caused by matter effects within the core of the Sun. SK also searches for earth matter effects, resulting in a day/night asymmetry of the SK interaction rate. Currently SK has a threshold of 3.5 MeV kinetic energy of recoiling electrons. SK also monitors for galactic supernova neutrino bursts, giving early warning to astronomers. A supernova 8.5 kpc away has 300 expected elastic scattering events, which SK would be able to use to indicate the supernova direction. With an expected 8000 inverse beta events, a precise study of burst time structure and anti-neutrino energy spectrum can be performed. SK also searches for the diffuse signal from distant supernova and has the world's best upper limit.

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