

Measuring solar neutrinos over gigayear timescales with paleo detectors

Measuring the solar neutrino flux over gigayear timescales could provide a new window to inform the solar standard model as well as studies of the Earth's long-term climate. We demonstrate the feasibility of measuring the time evolution of the B8 solar neutrino flux over gigayear timescales using paleo detectors, naturally occurring minerals which record neutrino-induced recoil tracks over geological times. We explore suitable minerals and identify track lengths of 15–30 nm to be a practical window to detect the B8 solar neutrino flux. A collection of ultraradiopure minerals of different ages, each some 0.1 kg by mass, can be used to probe the rise of the B8 solar neutrino flux over the recent gigayear of the Sun's evolution. We also show that the time-integrated tracks are sensitive to models of the Sun. And how this results can be used to complement Dark Matter searches.

Secondary category for the parallel session (optional)

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Session Classification: Parallel: Neutrino 1

Track Classification: Parallel Sessions: Neutrino Physics