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Current status & plan of JSNS2/JSNS2-II

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The JSNS2 (J-PARC Sterile Neutrino Search at the J-PARC Spallation Neutron Source) experiment will search for neutrino oscillations over a short 24 m baseline with Δm^2 near 1 eV^2 at the J-PARC Materials and Life Science Experimental Facility. The JSNS2 detector is filled with 17 tons of gadolinium-loaded liquid scintillator (LS) with an additional 31 tons of unloaded LS in the intermediate gamma-catcher and outer veto. A 1 MW proton beam (3 GeV) incident on a mercury target produces an intense neutrino beam from muon decay-at-rest. The experiment will search for muon antineutrino to electron antineutrino oscillations, detected via the inverse beta decay reaction (electron antineutrino + proton \rightarrow positron + neutron), which is then tagged by the distinctive gammas from neutron capture on gadolinium. JSNS2 is expected to provide the ultimate test of the LSND anomaly by replicating nearly identical conditions with a much better S/N ratio. JSNS2 has physics data in June 2020, and also has taken data currently since Jan. 2021 with scintillator filled. And we have a plan for constructing another detector as a 2nd phase of the experiment (JSNS2-II). The 2nd detector will be filled with 35 tons of Gd-LS, and have a 48m baseline. Analysis using both 2 detectors will give significantly better sensitivity, especially in low Δm^2 region with the longer baseline than the 1st detector. In this talk, we will summarize the detector operation (including scintillator filling&extraction), data acquisition & preliminary analysis status from physics data, and plan for JSNS2-II.

Collaboration name

JSNS2 experiment

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