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STERILE NEUTRINO SEARCH THROUGH DISAPPEARANCE STUDIES WITH A HIGH-INTENSITY ^{51}Cr SOURCE AND THE BOREXINO DETECTOR

Abstract: Solar neutrino experiments, reactor flux analysis and cosmological models suggest the existence of a new kind of neutrino. Immune to chromodynamic and electroweak interactions, the proposed particle would be called “sterile”. Other sets of data already provide strong constraints on its hypothetical mass splitting and mixing angles. New experiments are needed to test the light (~1eV) sterile neutrino models (3+1 or 3+N_s).

Capitalizing on unique resolution and position reconstruction precision of the Borexino detector, we will explore the phase space where sterile neutrino(s) may lie. After the current solar program, a ~10MCi ^{51}Cr source will be placed under Borexino, where oscillations of its electron neutrino flux into the sterile state could be detected, if present. We show the status of the plans for chromium irradiation and source activity measurement, as well as future projects with neutrino sources inside Borexino.

Summary: Development of a high-activity chromium neutrino source to further study the neutrino anomalies through a short-baseline search for light sterile neutrinos, with the liquid scintillator Borexino detector.

Keywords: *sterile neutrino, chromium, short baseline, radioactive source, anomaly, liquid scintillator, Borexino, SOX*