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**A Disappearance Search for Sterile Neutrinos with the CAPTAIN-Mills Detector at the Los Alamos Neutron Science Center**  
ROBERT COOPER, New Mexico State Univ — The LSND and MiniBooNE short baseline neutrino oscillation experiments have shown evidence for sterile neutrinos at  $\Delta m^2 \sim 1 \text{ eV}^2$ . Both experiments used pure muon neutrino beams to search for electron neutrino appearance, i.e.,  $\nu_\mu \rightarrow \nu_e$ , yet corresponding disappearance experiments have shown no anomalies. We will deploy the CAPTAIN-Mills detector, a 7-ton fiducial volume, single-phase, liquid argon scintillation detector, and use the coherent elastic neutrino-nucleus scattering ( $\text{CE}\nu\text{NS}$ ) process to measure muon neutrino disappearance at the Lujan Facility at the Los Alamos Neutron Science Center. Using  $\text{CE}\nu\text{NS}$  greatly enhances the event rate compared to other oscillation experiments. Lujan is a 100-kW stopped pion source that nominally delivers a 250-ns wide, 800-MeV proton beam onto a tungsten target at 30 Hz, but the beam width can be significantly narrowed to 30 ns. Lujan's fast pulsing is advantageous for isolating the prompt 30-MeV muon neutrino from the delayed muon-decay neutrinos and neutron backgrounds. In this talk, I will describe the CAPTAIN-Mills detector, the Lujan neutrino source, the expected sensitivities for sterile neutrinos, and show results from our neutron background survey.

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