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Search for Long-Lived Particles with Di-Muon Decays in the ICARUS Detector at Fermilab

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The ICARUS detector in the Short-Baseline Neutrino program at Fermilab is sensitive to "long-lived"new physics particles that would be produced in the Neutrinos at the Main Injector (NuMI) beam and decay inside the ICARUS liquid argon time projection chamber (LArTPC). We show results from a new analysis in ICARUS which searched for di-muon decays from a long-lived particle produced in kaon decay in the NuMI beam. The search is sensitive to new areas of parameter space for the Higgs portal scalar and an axion-like particle model. The sensitivity is also presented in a model-independent way applicable to any new physics model predicting the process $K \longrightarrow \pi + S(\longrightarrow \mu\mu)$, for a long-lived particle S. This is the first search for new physics performed with the ICARUS detector at Fermilab. It paves the way for the future program of long-lived particle searches at ICARUS.

Poster prize

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