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Novel constraints on neutrino physics beyond the standard model from the CONUS experiment

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The detection of coherent elastic neutrino-nucleus scattering (CEνNS) opens up new opportunities for neutrino physics within and beyond the standard model. Following the initial discovery at a spallation source in 2017, several experimental attempts are currently striving to detect it with a broad variety of modern detection technologies at reactor-site. As a leading reactor experiment, CONUS aims at an observation in the regime of fully coherent interaction with antineutrinos emitted from the powerful 3.9 $\mathrm{GW_{th}}$ reactor core of the nuclear power plant in Brokdorf (Germany). In particular, the application of ultra-low threshold, high-purity germanium detectors within a compact shield in close proximity to a nuclear reactor core represents another milestone on the road towards high-statistics neutrino physics. The acquired and future CONUS data sets allow further investigations of yet undetected neutrino interaction channels and electromagnetic properties. This talk will address constraints on beyond the standard model neutrino phenomenology that arise from the first two CONUS data collection periods. Bounds on non-standard neutrino-quark interactions of vector and tensor type from CEνNS are presented, and the parameter space of simplified scalar and vector mediators that is probed by CEνNS and elastic neutrino-electron scattering is discussed. Limits on an effective neutrino magnetic moment and an effective neutrino millicharge are also given. Finally, we discuss further investigation possibilities with current and future CEνNS data and the advantage of measurements with different neutrino sources as well as different target materials.

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