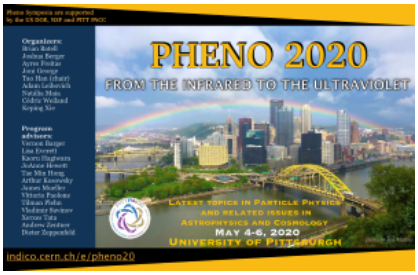

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New Directions for Axion Searches via Scattering at Reactor Neutrino Experiments

Monday 4 May 2020 15:45 (15 minutes)

Searches for pseudoscalar axion-like-particles (ALPs) typically rely on their decay in beam dumps or their conversion into photons in haloscopes and helioscopes. We point out a new experimental direction for ALP probes through their production via the Primakoff process or Compton-like scattering off of electrons or nuclei. We consider ALPs produced by the intense gamma ray flux available from megawatt-scale nuclear reactors at neutrino experiments through Primakoff-like or Compton-like channels. Low-threshold detectors in close proximity to the core will have visibility to ALP decays and inverse Primakoff and Compton scattering, providing sensitivity to the ALP-photon and ALP-electron couplings. We find that the sensitivity to these couplings at the ongoing MINER neutrino experiment exceeds existing limits set by laboratory experiments and, for the ALP-electron coupling, we forecast the world's best laboratory-based constraints over a large portion of the sub-MeV ALP mass range.

Summary

Axions and ALPs

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