

New Windows on Fundamental Physics: from tabletop devices to large scale detectors



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Superradiant Neutrino Sources

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Many analogies exist between neutrino physics and optics because the neutrino is a nearly massless particle whose feeble environmental interactions permit coherent quantum effects. However, it is only relatively recently that we have begun to explore the potential of quantum phenomena in neutrino physics, with neutrino oscillations and coherent elastic neutrino-nucleus scattering as prominent examples. Superradiance—which emerges from collective spontaneous emission in optically pumped gases—may also have a parallel counterpart in neutrino physics. In my talk, I will discuss some of these analogies and introduce a new—and highly speculative—concept of superradiant neutrino emission from a radioactive Bose-Einstein condensate, which could form the basis for a superradiant neutrino laser.

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