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Characterizing infrared scintillation light in xenon

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Xenon, in both gaseous and liquid phases, is an excellent target material for rare-event searches due to its excellent scintillation properties. While ultraviolet (UV) scintillation in xenon is well established and widely exploited in current detectors, scintillation in the infrared (IR) remains largely unexplored. This contribution presents recent progress in the characterization of xenon IR scintillation, which is essential for assessing its potential in future high-precision detectors.

Measurements were performed using dedicated experimental setups and show promising results for detector applications. Systematic studies in gaseous xenon reveal a substantial IR light yield of approximately 6000 photons/MeV, comparable in magnitude to that of UV scintillation. For the first time, the time response of the IR emission was measured, finding a dominant microsecond-scale component that challenges existing models of xenon de-excitation pathways. In addition, a dual-phase xenon time projection chamber with broadband sensitivity from the UV to the IR was operated, yielding signals consistent with IR scintillation in both the liquid and gaseous phases.

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