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Quantum Sensing and Radiative Decay

Monday 12 January 2026 14:30 (1 hour)

A novel strategy for detecting radiative decay of very weakly interacting particles is explored by leveraging the extreme sensitivity of quantum devices, to faint electromagnetic signals. By modeling the effective electric field induced by the decay photons, the response of quantum sensors is evaluated across two particle physics scenarios: the cosmic neutrino background and two-component dark matter. We assess the discovery potential of these devices and outline the parameter space accessible under current experimental capabilities. Analysis demonstrates that quantum sensors can probe radiative decays of dark matter candidates using existing technology, while probing neutrino magnetic moments beyond current limits will require scalable quantum architectures with enhanced coherence.

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