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Precision Low-Energy Experiments to Search for signs of Quantum Gravity and Dark Matter Particles

Monday 9 December 2024 11:30 (30 minutes)

The Quantum Technologies and Dark Matter research laboratory at the University of Western Australia has a rich history of developing precision tools for testing fundamental physics at low energies. This includes the efforts to discover "Beyond Standard Model"physics, including the nature of Dark Matter and the unification of Quantum Mechanics with General Relativity to help uncover a unified theory of everything. In particular, our work includes searches for Lorentz invariance violations in the photon, phonon, and gravity sectors, possible variations in fundamental constants, searches for wave-like dark matter, tests of quantum gravity, and the determination of temporal geometric phases. This includes experiments that take advantage of axion-photon coupling and axion-spin coupling to search for axion dark matter. High acoustic Q phonon systems to search for Lorentz violations, high-frequency gravity waves, scalar dark matter, tests of quantum gravity from the possible modification of the Heisenberg uncertainty principle, and the new proposal to undertake a temporal Pound-Rebka experiment as gravitational Aharonov-Bohm effect.

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