

Phenomenology 2025 Symposium



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Magnetic Levitation for Fundamental Physics: From Dark Matter to Non-Newtonian Gravity

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Magnetic levitation technology offers force and displacement sensitivities at the quantum frontier, making it an attractive platform for probing the feeble interactions expected of beyond the Standard Model physics. Despite its promise, the case for magnetic levitation in fundamental physics applications is only just being built. In this talk, I will demonstrate how a setup based on the Meissner levitation of a ferromagnet within a superconducting trap will have world-leading sensitivity to three fundamental physics problems: the search for ultralight dark matter, ultraheavy dark matter, and a non-Newtonian gravitational fifth force. In the first of these cases, I will present the first limit on ultralight dark matter using magnetic levitation technology around the dark matter mass $m_{\text{DM}} \sim 10^{-13} \text{ eV}/c^2$. Our results highlight the promise of this developing technology within the fundamental physics community and pave the way for exciting future applications.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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