

Title

Atomic Probes of Axionlike Particles and Dark Matter

Abstract

Ultra-low-mass axionlike dark matter particles produced after the Big Bang may form an oscillating classical field, which can be sought for with atomic magnetometry, ultracold neutron and torsion pendulum experiments. Recently, the nEDM collaboration performed the first experimental search for time-varying spin-dependent effects induced by axionlike dark matter, improving limits on the axion-gluon interaction by up to a factor of 1000 and improving on previous laboratory limits on the axion-nucleon interaction by up to a factor of 40. Axionlike particles and other bosons can also mediate anomalous fifth forces between ordinary-matter particles. Using data from atomic and molecular experiments, we have placed limits on various interactions mediated by bosonic particles, improving on previous laboratory bounds from other experiments by many orders of magnitude for a broad range of boson masses.

References

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