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Background-Enhanced Axion Force by Axion Dark Matter

Monday 10 November 2025 15:30 (20 minutes)

In this talk, I will discuss the impact of axion dark matter on spin-independent forces between nucleons. Our study shows that when the axion dark matter background is taken into account, the axion-mediated force changes its distance dependence from 1/r^3 to 1/r, and its magnitude is significantly enhanced proportionally to the axion number density. This amplification allows fifth-force experiments—such as Casimir-less setups and torsion balance tests—to place constraints on the axion decay constant several orders of magnitude stronger than previously estimated, across a wide range of axion masses. These results suggest that such experiments are even more sensitive to axion detection than previously understood.

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Session Classification: Parallel session - Pheno I