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First Laboratory Bounds on Ultralight Dark Photon Dark Matter from Precision Atomic Spectroscopy

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Ultralight bosonic dark matter has come under increasing scrutiny as a dark matter candidate that can resolve numerous puzzles in astronomical observation. We demonstrate that high-precision measurements of time variation in the frequency ratios of atomic transitions achieves leading sensitivity to ultralight vector portal dark matter. These bounds are the first laboratory-based bounds on this class of dark matter models. We propose further measurements that could enhance sensitivity to ultralight dark photons.

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