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Towards a Precise Test of King's Linearity in Ca^{+1} PAIGE ROBICHAUD, JACOB LEZBERG, S. CHARLES DORET, Williams College — We report progress towards a precise measurement of the isotope shifts in the $4^2S_{1/2} \rightarrow 3^2D_{3/2}$ 732 nm electric quadrupole transition in Ca^+. We co-trap two isotopes and simultaneously excite both ions using frequency sidebands on a single laser, dramatically reducing systematic uncertainties from many sources such as laser frequency drift and magnetic field instabilities. Such measurements have the potential to reach Hz-level precision or better, as with our recent ppb measurement of the parallel $4^2S_{1/2} \rightarrow 3^2D_{5/2}$ transition. When combined into a King Plot, these two measurements will test King's linearity with heretofore unprecedented precision, offering a path toward probing new physics beyond the Standard Model and also providing benchmarks for ever-improving theory of atomic and nuclear structure.

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