Abstract Submitted
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Electric dipole matrix elements for the $6p\ ^2P_J \rightarrow 7s\ ^2S_{1/2}$ transitions in atomic cesium[1] GEORGE TOH, AMY DAMITZ, NATHAN GLOTZBACH, JONAH QUIRK, Purdue University, I. C. STEVENSON, Columbia University, J. CHOI, Purdue University, M. S. SAFRONOVA, University of Delaware, D. S. ELLIOTT, Purdue University — We report a measurement of the ratio of electric dipole transition matrix elements of cesium for the $6p\,^2P_{1/2} \rightarrow 7s\,^2S_{1/2}$ and $6p\,^2P_{3/2} \rightarrow 7s\,^2S_{1/2}$ transitions. We determine this ratio of matrix elements through comparisons of two-color, two-photon excitation rates of the $7s\,^2S_{1/2}$ state using laser beams with polarizations parallel to one another vs. perpendicular to one another. Our result of $R \equiv \langle 7s\ ^2S_{1/2}||r||6p\ ^2P_{3/2}\rangle / \langle 7s\ ^2S_{1/2}||r||6p\ ^2P_{1/2}\rangle = 1.5272\ (17)$ is in excellent agreement with a theoretical prediction of $R = 1.5270\ (27)$, and the accuracy of our experimental ratio is sufficiently high to differentiate between various theoretical approaches. To our knowledge, there are no prior experimental measurements of R. Combined with our recent measurement of the lifetime of the $7s\,^2S_{1/2}$ state, we determine reduced dipole matrix elements for $\langle 7s\ ^2S_{1/2}||r||6p\ ^2P_{3/2}\rangle$ and $\langle 7s\ ^2S_{1/2}||r||6p\ ^2P_{1/2}\rangle$. These matrix elements are also in excellent agreement with theoretical calculations. Measurements like these improve knowledge of Cs properties needed for parity violation studies and provide benchmark

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