

Abstract Submitted
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Core polarizability of rubidium using Rydberg spectroscopy¹

SETH BERL, JIRAKAN NUNKAEW, CHARLES SACKETT, THOMAS GALLAGHER, University of Virginia — The electric polarizability of heavy alkali atoms includes a small but significant contribution from the ionic core. This contribution is important for precision applications such as black-body radiation shifts in atomic clocks and interpreting parity violation measurements. The polarizability of the core can be determined through spectroscopy of high angular momentum Rydberg states. We present the results of a high-precision measurements of the intervals between the $\ell = 4$ to 6 levels of rubidium Rydberg states of $n=17$ to 19. The measurements have been done using radio frequency and microwave spectroscopy of atoms in a thermal beam. The measurement results are precise enough that it is necessary to consider non-adiabatic corrections to the core polarization. We find a dipole polarizability $\alpha_d = 9.127(7) a_0^3$, about three times more precise than previous results and in good agreement with theoretical expectations. .

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