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Measuring Core Polarizability Of ^{87}Rb Using RF Spectroscopy Of Rydberg States SETH BERL, CHARLES SACKETT, THOMAS GALLAGHER, Univ of Virginia — The core electrons make a significant contribution to the total electric polarizability α of large atoms like Rb. If the core contribution can be determined accurately, the remaining valence contribution to α provides constraints on the wave function and matrix elements of the valence electron, which can be useful for interpreting experiments such as parity violation or radiation shifts in atomic clocks. We report here on a direct measurement of the core polarizability based on radio-frequency spectroscopy of Rydberg states with large angular momentum. With an anticipated accuracy in α approaching 0.01 atomic units, the residual uncertainty will be negligible even in the most sensitive applications. The measured value can also be compared to high-precision theoretical calculations to test many-body techniques.

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