Abstract Submitted
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A novel technique for measuring the microwave transitions and the indirect spin-orbit splittings in the high angular momentum Rydberg states of barium[1] JIRAKAN NUNKAEW, Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, EVAN KIM, THOMAS GALLAGHER, Department of Physics, University of Virginia — We use a novel detection technique, selective laser excitation to the autoionizing states, to observe the microwave transitions of Ba from $6sng$ to $6snh$, $6sni$ and $6snk$ for n= 15, 16, 17 and 18. We extract the dipole and quadrupole polarizabilities of Ba^+ from the measured intervals between the $6snh - 6sni$ and $6sni - 6snk$ states of Ba using the non-adiabatic core polarization model. The values we determine for the dipole and quadrupole polarizabilities are $\alpha_d = 129.03(57)\ a_0^3$ and $\alpha_q = 1790(76)\ a_0^5$, respectively. The energies of the $6sn\ell$, $\ell \geq 5$ states are split by the indirect spin-orbit coupling of the Ba core to the Rydberg electron, producing the K splittings. From the K splittings we extract the ionic dipole and quadrupole matrix elements, $< 6s|r|6p >= 4.10(9)\ a_0$ and $< 6s|r^2|5d >= 9.64(15)\ a_0^2$, respectively.

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