MICROWAVE SPECTROSCOPY OF BARIUM $5d_{3/2} n\ell$ AUTOIONIZING STATES

EDWARD SHUMAN and TOM GALLAGHER, Department of Physics, University of Virginia, Charlottesville, VA 22903.

We have observed microwave resonance transitions between the autoionizing Ba $5d_{3/2} n g J = 2$ and $5d_{3/2} (n+1) h J = 3$ states for $45 \leq n \leq 49$. These measurements, made between 50 and 75 GHz, lead to quantum defects of $+0.019(2)$ and $+0.003(2)$ for this pair of $ng$ and $nh$ states. These measurements demonstrate that the core polarization model, widely used to characterize non penetrating Rydberg states, fails to describe Rydberg states converging to anisotropic or non $s$ cores. We believe that this is the first time spectroscopy of autoionizing states using microwaves has been performed.