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Lifetimes for Rydberg States of Cs with $n < 45$ in a Black-Body Radiation Field JAMES TRUXON, University of Toledo, CONSTANTINE THEODOSIOU, Manhattan College — Natural and effective lifetimes have been calculated semi-empirically for high Rydberg states of neutral Cesium, using wave functions obtained through direct inward numerical integration of the Schrödinger equation with a central potential that includes relativistic and core-polarization corrections. A majority of experimental studies of Cesium lifetimes has been carried out at higher temperatures which allow thermal radiation to significantly deplete the lifetime of states with principal quantum number greater than $n16$. Therefore we have also explicitly included blackbody-induced transitions in our calculations, in order to evaluate the lifetimes at temperatures of 0K, 350K, and 600K. States with principal quantum numbers $n = 6 - 40$ and orbital angular momentum quantum numbers $l = 0 - 4$ were considered. We find good agreement between our calculations and experimental results across a range of energies, angular momenta, and temperatures, but identify specific areas for continued research. We present a table of select numerical results from this calculation, along with a comprehensive list of experimental data acquired from the literature between 1959 and 2011, and theoretical data acquired from the literature from 1981 through 2011.

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