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Measurement of the radial matrix elements of the 6s $^2\mathbf{S}_{1/2} \rightarrow$ 7p $^2\mathbf{P}_J$ transitions in atomic cesium[1] DANIEL ELLIOTT, DIONYSIS ANTYPAS, Purdue University — We report measurements of the absorption strength of the cesium 6s $^2S_{1/2} \rightarrow 7p\ ^2P_{3/2}$ and the 6s $^2S_{1/2} \rightarrow 7p\ ^2P_{1/2}$ transitions at $\lambda = 456$ nm and 459 nm, respectively. We simultaneously measure the absorption strength on the Cs D_1 line (6s $^2S_{1/2} \rightarrow 6p\ ^2P_{1/2}$) at $\lambda = 894$ nm, for which the electric dipole transition moment is precisely known, allowing us to precisely determine the reduced dipole matrix elements for these two lines. Our results are $\langle 7P_{3/2}||r||6S_{1/2}\rangle = 0.5780\ (7)\ a_0$ and $\langle 7P_{1/2}||r||6S_{1/2}\rangle = 0.2789\ (16)\ a_0$, with fractional uncertainties of 0.12% and 0.6%, respectively. These new values allow a more precise determination of the scalar polarizability for the Cs 6s $^2S_{1/2} \rightarrow 7s\ ^2S_{1/2}$ transition, which in turn leads to a more precise value of the vector polarizability for this same transition. The vector polarizability has played a critical role in measurements of the parity nonconserving transition amplitude E_{PNC} in cesium. This revised value of the vector polarizability is in reasonable agreement with the value determined through the nuclear spin dependent component of the transition magnetic dipole moment.

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