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Evaluation of Breit and QED effects on the $3d^9\ ^2D_{3/2} \rightarrow 3d^9\ ^2D_{5/2}$ transition energy using different approximations[1] RAN SI, CHARLOTTE FISCHER, University of British Columbia, TOMAS BRAGE, Lund University, CHONGYANG CHEN, Fudan University — The multiconfiguration Dirac-Hartree-Fock (MCDHF) theory is used to calculate the $3d^9\ ^2D_{3/2} \rightarrow 3d^9\ ^2D_{5/2}$ transition energy for Co-like ions with $Z = 27 - 100$. We investigate how electron correlation, frequency independent and dependent Breit interaction, and QED corrections vary along the sequence. Our study shows that the frequency independent Breit contribution Breit(0) has the largest contribution for all ions, correlation effect decreases rapidly with Z, the frequency dependent Breit contribution Breit(ω) is significant especially for high-Z ions, self energy becomes the largest correction for $Z > 50$. The self energy corrections are calculated using three different approximation methods, i.e., the approach implemented in the GRASP2K package [P. Jönsson et al. *Comput. Phys. Commun.* **184**, 2197 (2013)], the method based on Welton's concept [J. A. Lowe et al. *Radiat. Phys. Chem.* **85**, 118 (2013)], the QEDMOD approach [V. M. Shabaev et al. *Phys. Rev. A* **88**, 012513 (2013)]. Through the comparison with the experimental values, it seems that the QEDMOD results have the best agreement with the experimental values, the differences for high-Z ions are about 0.03%-0.04%.

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