Full-Relativistic B-Spline R-Matrix Calculations for Electron Collisions with Gold Atoms.[1] OLEG ZATSARINNY, KLAUS BARTSCHAT, Drake University, CHARLOTTE FROESE FISCHER, National Institute of Standards and Technology — We have extended the B-spline R-matrix (close-coupling) method [1] to fully account for relativistic effects in a Dirac-Coulomb formulation. The newly developed computer code has been applied to electron-impact excitation of the $(5d^{10}6s)^2S_{1/2} \to (5d^{10}6p)^2P_{1/2,3/2}$ and $(5d^{10}6s)^2S_{1/2} \to (5d^96s^2)^2D_{5/2,3/2}$ transitions in Au. Our numerical implementation of the close-coupling method enables us to construct term-dependent, non-orthogonal sets of one-electron orbitals for the bound and continuum electrons. This is a critical aspect in the present problem, especially for the 5d and the 6s orbitals. Furthermore, strong core-polarization effects can be accounted for *ab initio* rather than through a semi-empirical and local model potential. Our results will be compared with recent experimental data [2] and predictions from other theoretical approaches [3]. [1] O. Zatsarinny, Comp. Phys. Commun. **174**, 273 (2006). [2] M. Maslov, P.J.O. Teubner, and M.J. Brunger, private communication (2008). [3] D.V. Fursa, I. Bray, and R.P. McEachran, private communication (2008).

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