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Tune-out wavelength for the 1s2s ^{3}S – 1s3p ^{3}P transition of helium: relativistic effects[1] GORDON W.F. DRAKE, JACOB MANALO, University of Windsor — The tune-out wavelength is the wavelength at which the frequency dependent polarizability of an atom vanishes. It can be measured to very high precision by means of an interferometric comparison between two beams. This paper is part of a joint theoretical/ experimental project with K. Baldwin et al. (Australian National University) [1] and L.-Y. Tang et al. (Wuhan Institute of Physics and Mathematics) [2] to perform a high precision comparison between theory and experiment as a probe of atomic structure, including relativistic and quantum electrodynamic effects. We will report the results of calculations for the tune-out wavelength that is closest to the $1s2s\ ^3S - 1s3p\ ^3P$ transition of ^{4}He. Our result for the $M = 0$ magnetic substate, obtained with a fully correlated Hylleraas basis set, is 413.079 958 51(12) nm. This includes a leading relativistic contribution of −0.059 218 5(16) nm from the Breit interaction as a perturbation, and a relativistic recoil contribution of −0.000 044 47(17) nm. The results will be compared with recent relativistic CI calculations [2].
[1] B. M. Henson et al., Phys. Rev. Lett. **115**, 043004 (2015).
[2] Y.-H. Zhang et al., Phys. Rev. A **93**, 052516 (2016).

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