Abstract Submitted
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Helium P-State Energies and Quantum Defect Analysis[1] TRAVIS VALDEZ, RYAN PECK, GORDON W.F. DRAKE, University of Windsor — Quantum defects provide a simple and accurate method of extending known atomic energies for low principal quantum number n to higher n up to the series limit, and including the scattering phase shift beyond. We will present new calculations of improved accuracy for the $1snp\ ^1P$ and ^3P states of helium up to $n = 12$, based on variational calculations in Hylleraas coordinates. The results will be used to determine accurate values for the coefficients in the quantum defect expansion, $\delta = \delta_0 + \delta_2/n^{*2} + \delta_4/n^{*4} + \cdots$, where $n^* = n - \delta$. We will also test the usual assumption that only the even powers of $1/n^*$ need be included [1]. In addition, we will study the effectiveness of a unitary transformation in reducing the numerical linear dependence of the basis set for large basis sets.

[1] G.W.F. Drake, Adv. At. Mol. Opt. Phys. **32**, 93 (1994).

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