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Using Monte Carlo Methods to Calculate Some Properties of Finite Mass Helium S.A. ALEXANDER, Southwestern University, R.L. COLDWELL, Retired — If one is interested in evaluating atomic properties to high precision then the finite mass of the atom needs to be explicitly incorporated. We have developed a simple method that includes the kinetic energy of the nucleus into atomic calculations and does not increase the time or the complexity of these calculations. To test this method we have optimized compact, explicitly correlated trial wave functions for the three lowest states of the helium atom with symmetry ^{1}S, ^{1}P, ^{1}D, ^{3}S, ^{3}P, and ^{3}D. With these wavefunctions we then calculated a variety of properties to illustrate some of the advantages of our method.

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