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Excited states with high orbital angular momentum of the muon in muonic-electronic helium atoms

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The variational method is used to study the energy levels of muonic helium (μ− − e− − He) with an electron in the ground state and a muon in an excited state with principal and orbital quantum numbers n ~ l + 1 ~ 14 (the Rydberg muon states). The variational wave functions are chosen in the Gaussian form. The matrix elements of the Hamiltonian in the nonrelativistic approximation, as well as corrections for the vacuum polarization and relativism, are calculated analytically. A series of energies of the high-angular-momentum muon states is obtained, which can be studied experimentally.

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