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Interaction of a Single-Mode Laser With a Generalized Sturmian Description of Helium: Application of a Space-Time Basis Time Propagation Algorithm JUSTIN MCDOWELL, EDDIE RED, ALBERT WYNN III, CHARLES WEATHERFORD, Florida A&M University — The method of Generalized Sturmians is applied to the calculation of the ground and excited states of the helium atom. In the process, the screening constant of each one-electron Sturmian orbital is non- iteratively uniquely determined. Also, the usual Hartree-Fock calculation is avoided. The entire helium spectrum is thus calculated with approximately the same accuracy for the excited and ground states. The interaction of a single-mode laser with helium is then simulated by solving the time-dependent Schrödinger equation using a space-time basis propagation algorithm. The method is implicit and is quite stable. The STIRAP (Stimulated Raman Adiabatic Passage) noniterative control scheme will be used to manipulate the helium excitation by the laser.

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