

Abstract Submitted
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Quantum Control of Atomic Hydrogen Using Laser Fields¹

XINGJUN ZHANG, EDDIE RED, ALBERT WYNN III, CHARLES WEATHERFORD, Florida A&M University — A method for the ab initio simulation of STIRAP (stimulated Raman adiabatic passage) [1,2] laser quantum control of the energy level populations of atomic ions will be described. The method employs a new algorithm for the solution of the time- dependent Schrödinger equation which avoids the time-propagator and uses spectral elements in time with a spectral spatial basis.[3] This results in a set of coupled simultaneous equations and is thus an implicit stable procedure. In order to treat the continuum problem (ionization), a complex absorbing potential is used. The spectral spatial basis used is the Coulomb Sturmians.[4] As an initial application, the control of the levels of atomic hydrogen will be presented. [1] S.A. Rice and M. Zhao, *Optical Control of Molecular Dynamics*, Wiley, New York, 2000. [2] M. Shapiro and P. Brumer, *Principles of the Quantum Control of Molecular Processes*, Wiley, New York, 2003. [3] C.A. Weatherford, E. Red, and A. Wynn III, *J. Mol. Structure (Theochem)* 592, 47 (2002). [4] J. Avery, *Hyperspherical Harmonics and Generalized Sturmians*, Kluwer, Dordrecht, 2000.

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Charles Weatherford
Florida A&M University

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