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Title: The Time Dependent Schrodinger Equation: a multiresolution approach

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We establish a new method for a numerical solution to the time dependent Schrödinger equation, directly extendable to multielectron, multicenter systems. We accomplish this by an explicit numerical scheme for an accurate time evolution described by a band-limited, gradient-symplectic propagator. The approach employs an adaptive, discontinuous spectral element basis which automatically adjusts to the requested precision and uses separated representations of operators for efficient computation in multiple dimensions. We illustrate the method calculating accurate bound and continuum transition probabilities along with the photoelectron spectra for H(1s), He⁺(1s), and Li²⁺(2s) in three dimensions and H₂⁺ in three and four dimensions in a two-cycle attosecond laser pulse.