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Title: Splitting methods with complex coefficients to the numerical integration of quantum systems

Abstract: The evolution of most quantum systems is modeled by differential equation in the complex space. However, in general, the equations are numerically solved using integrators with real coefficients. To consider complex coefficients usually does not make the schemes computationally more costly and can provide more accurate results. In this talk, we explore the applicability of splitting methods involving complex coefficients to solve numerically the time-dependent Schrödinger equation. There are pros (high accuracy and not to increase the cost) and cons (instability and loose of qualitative properties) when using complex coefficients. However, there is a class of methods with complex coefficients with a particular symmetry that keep most pros while avoid most cons. This class of integrators are stable and behave as conjugate to unitary methods for sufficiently small step sizes. These are promising methods that we will explore: we build new methods and we analyze their performance on several examples.