Numerical Challenges in the Propagation of the KBEs

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Inaccurate numerical algorithms can be misleading and result in false conclusions about the physical system or the underlying description [1]. Therefore, it is mandatory to develop precise numerical solutions of the Kadanoff–Baym equations (KBEs), especially to describe the long-time evolution of large quantum systems.

Here, we focus on the numerical challenges that the time integration in the collision integral poses and present possible solutions [2].

Higher-order integration schemes can greatly reduce the computational costs of the propagation while tailor-made integration techniques further improve its stability.

A reliable check for a numerical algorithm turns out to be the test for time reversibility [3].

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[3] M. Scharnke, N. Schlünzen, and M. Bonitz, *J. Math. Phys.* **58**, 061903 (2017).

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