

NSYSU

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Quantum Toolbox in Julia

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Quantum dynamics describes the time evolution of quantum systems. While the dynamics of closed quantum systems are governed by the Schrödinger equation, open quantum systems require more general theoretical frameworks to accurately capture complex interactions and potential non-Markovian effects arising from their couplings to the surrounding environments. In such cases, analytical solutions are rarely available. To address this, the Quantum Toolbox in Julia project (developed as a sub-project of the QuTiP organization) provides two open-source software packages, `QuantumToolbox.jl` and `HierarchicalEOM.jl`, for numerically simulating open quantum system dynamics. Both packages are implemented in Julia programming language and support high-performance computing on CPUs and GPUs. Combining computational efficiency with syntax familiar to QuTiP users, these tools serve as powerful resources for both theoretical research and practical applications in quantum science.



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