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**Real-time dynamics of dissipative quantum systems** MICHAEL ZWOLAK, GIL REFAEL, California Institute of Technology — Dissipation in quantum systems is the source of a number of interesting and important phenomena. In quantum computing, for instance, environmental memory can have a significant effect on the operation of solid state devices and on error correction. In condensed matter, strong dissipation can cause phase transitions, as in the ubiquitous spin-boson model. In an effort to create a generic computational method for studying real-time non-Markovian and strongly dissipative dynamics, we have examined the construction of master equations containing memory. We have found this approach lacking because most of the physics beyond weak coupling is contained within the memory kernel of the master equation. Therefore, the majority of the effort in solving for the dynamics goes into the calculation of a system specific memory kernel. We discuss these issues as well as a potential solution based on the use of ancillary systems which represent part of the environment.

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