

AN ELEMENTARY CONSTRUCTION OF THE GKSL MASTER EQUATION FOR N-LEVEL OPEN QUANTUM SYSTEMS

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Irreversible open quantum systems are often modeled by semigroups of operators having various properties which are justified physically. We call such semigroups quantum dynamical semigroups (QDSs).

In 1976, in a paper by Gorini, Kossakowski, and Sudarshan and, in another by Lindblad, the form of the generator of a QDS was characterized in the case when the QDS is uniformly continuous. Their characterisation, now referred to as the GKSL master equation or the Lindblad equation, is used quite extensively in the study of open quantum systems.

In this talk, we will discuss an elementary construction of the GKSL master equation while carefully examining how each defining property of the semigroup contributes to the form of the generator. We will not do this in the general case, but rather for QDSs for N-level systems, which means the underlying Hilbert space is finite dimensional. This allows us to assume only a modest knowledge of linear algebra and so the talk should be accessible to a large audience.