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Wigner function approach to the classical limit of quantum Brownian motion and to the derivation of open quantum Brownian motion

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Open quantum Brownian motion (OQBM) represents a new type of Brownian motion with an additional quantum internal degree of freedom. This framework was introduced by Bauer, Bernard, and Tilloy [1] as a scaling limit of discrete-time open quantum walks [2,3]. Sinayskiy and Petruccione (SP) have shown that OQBM can be derived from the microscopic Hamiltonian of the system, bath, and system bath interaction [4,5]. In this contribution, we report on the generalization of SP work. In our model, the inner degree of freedom is given by a two-level system, and the position operator describes the external degree of freedom. We derive the QBM master equation and use the Wigner function approach to perform the classical limit to obtain OQBM.

- [1] M. Bauer, D. Bernard, and A. Tilloy, 2014 J. Stat. Mech. P09001.
- [2] S. Attal, F. Petruccione, C. Sabot, and I. Sinayskiy, 2012 J. Stat. Phys. **147**, 832.
- [3] S. Attal, F. Petruccione, and I. Sinayskiy, 2012 Phys. Rev. A **376**, 1545.
- [4] I. Sinayskiy, and F. Petruccione, 2015 Phys. Scr. T **165**, 014017.
- [5] I. Sinayskiy, and F. Petruccione, 2017 Fortschr. Phys. **65**, 1600063.

Apply to be considered for a student ; award (Yes / No)?

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PhD

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