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Quasiprobabilistic approaches for quantum error mitigation and open system dynamics simulation

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We present quasiprobability methods that are aimed at effectively reducing or tailoring the quantum noise present in the output of noisy hardware simulations. These methods rely on a tomographic characterization of noisy quantum channels and then proceed by decomposing the desired quantum channels in terms of the noisy implementable ones. We discuss applications of these techniques to quantum error mitigation beyond probabilistic error cancellation (PEC) and to the simulation of open quantum systems.

[1] Benjamin McDonough, Andrea Mari, Nathan Shammah, Nathaniel T. Stemen, Misty Wahl, William J. Zeng, Peter P. Orth, Automated quantum error mitigation based on probabilistic error reduction, 2022 IEEE/ACM Third International Workshop on Quantum Computing Software (QCS), Dallas, TX, USA, 2022, pp. 83-93.

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