Embedding Quantum Simulator[1] ROBERTO DI CANDIA, University of the Basque Country UPV/EHU, BERNABÉ MEJIA, HERNAN CASTILLO, Pontificia Universidad Católica del Perú, JULEN SIMON PEDERNALES, JORGE CASANOVA, ENRIQUE SOLANO, University of the Basque Country UPV/EHU — We introduce the concept of embedding quantum simulator, a paradigm allowing efficient computation of dynamical quantities requiring full quantum tomography in a standard quantum simulator (one-to-one quantum simulator). The concept consists in the suitable encoding of a simulated quantum dynamics in the enlarged Hilbert space of an embedding quantum simulator. In this manner, non-trivial quantities are mapped onto physical observables, overcoming the necessity of full tomography, and reducing drastically the experimental requirements. As examples, we discuss how to evaluate entanglement monotones and time correlation functions, each in a suitable embedding quantum simulator. Finally, we expect that the proposed embedding framework paves the way for a general theory of enhanced one-to-one quantum simulators.

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