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Transport dynamics in quantum lattice models and the discrete truncated Wigner approximation JOHANNES SCHACHENMAYER, JILA, CU Boulder & NIST, GUIDO PUPILLO, EDOARDO TIGNONE, Univ. Strasbourg, CLAUDIU GENES, Univ. Innsbruck, ALEXANDER PIKOVSKI, ANA MARIA REY, JILA, CU Boulder & NIST — Transport of physical quantities such as energy, charge, or information plays a crucial role in a vast variety of scientific fields ranging from materials science/solid-state physics, to photonics/quantum information, to biological systems. The robustness of quantum coherences in the presence of de-coherent sources, and how those affect transport efficiency are important open questions. Addressing them can not only impact our fundamental understanding of quantum science but at the same time can lead to important technological applications. Here, we present a scheme of how to dramatically enhance the energy transport efficiency of a material by coupling it to a cavity mode, an idea with profound implications for organic semi-conductor materials. In addition we report on progress of how to numerically tackle the problem of quantum transport dynamics with a newly developed method, the dTWA, which allows to simulate quantum-dynamics even in large systems and high dimensions.

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