Abstract Submitted
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Local Integrals of Motion without a complete set of localized eigenstates[1] R. N. BHATT, SCOTT GERAEDTS, Department of Electrical Engineering, Princeton University, Princeton, NJ 08544, RAHUL NANDKISHORE, Department of Physics and Center for Theory of Quantum Matter, University of Colorado, Boulder, Colorado 80309 — Many body localized systems where all energy eigenstates are localized are known to display an emergent local integrability, i.e., an extensive number of operators can be constructed that are localized in space and commute with the Hamiltonian. We examine [1] if emergent local integrability requires a complete set of localized eigenstates. We show that given a set of localized eigenstates comprising nonzero fraction (1-f) of the full many body spectrum, one can construct an extensive number of integrals of motion which are local in the sense that, in the thermodynamic limit, they have nonzero weight in a compact region of real space. However, these modified integrals of motion have a "global dressing" whose weight vanishes as f tends to 0. Consequently, the existence of a non-zero fraction of localized eigenstates is sufficient for emergent local integrability. We discuss the implications of our findings for systems where the spectrum contains delocalized states, for systems with projected Hilbert spaces, and for the robustness of quantum integrability. [1] Scott D. Geraedts, R. N. Bhatt and Rahul Nandkishore, arXiv 1608.01328 (https://arxiv.org/pdf/1608.01328.pdf)

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Ravindra Bhatt
Department of Electrical Engineering, Princeton University, Princeton, NJ 08544

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