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One-body density-matrix characterization of many-body localization FABIAN HEIDRICH-MEISNER, LMU Munich, Germany, SOUMYA BERA, MPI PKS Dresden, Germany, THOMAS MARTYNEC, TU Berlin, Germany, HENNING SCHOMERUS, Lancaster University, UK, JENS BARDARSON, MPI PKS Dresden, Germany — We present a comprehensive analysis of the one-body density matrix (OPDM) in a system of interacting fermions in the presence of disorder in a one-dimensional lattice. We show that the eigenstates of the OPDM are localized/delocalized in the many-body localized (MBL)/ergodic phase while the eigenvalues exhibit a characteristic discontinuity in MBL phase reminiscent of the momentum distribution function of a zero-temperature Fermi-liquid [1]. Based on these results, we discuss the connection of OPDM eigenstates to quasi-particle-like integrals of motion in the MBL phase [2]. [1] Bera et al. Phys. Rev. Lett. 115, 046603 (2015) [2] Bera et al. arXiv:1611.01687

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