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Many-Body scattering through mesoscopic chaotic cavities: Universal effects of indistinguishability and interaction JOSEF MICHL, MARKUS BIBERGER, Institute of Theoretical Physics - University of Regensburg, JACK KUIPERS, Computational Biology Group - ETH Zurich, JUAN DIEGO URBINA, KLAUS RICHTER, Institute of Theoretical Physics - University of Regensburg — We consider the mesoscopic scattering of identical particles, and study the interplay between three physical effects: universality of single-particle transport, many-body correlations due to quantum indistinguishability, similar to the Hong-Ou-Mandel effect in quantum optics, and the presence of interparticle interactions. Starting from a rigorous construction of the many-body scattering amplitudes, the well-known universality of chaotic wave transport is encoded in the statistical correlations between single-particle scattering matrices and ultimately between classical single-particle paths joining incoming and outgoing channels. For non-interacting systems, very non-trivial combinations of scattering matrices arise due to the symmetrization postulate and a mesoscopic version of the Hong-Ou-Mandel profile is obtained[1]. In a further step, a universal Hamiltonian representing interactions in the base of scattering single-particle states is constructed that allows us to study how interparticle interactions affect the Hong-Ou-Mandel correlations in the regime of mesoscopic chaotic transport.

[1] J. D. Urbina, J. Kuipers, Q. Hummel, K. Richter, arXiv:1409.1558v1

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