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Mimicking interacting relativistic theories with stationary pulses of light DIMITRIS G. ANGELAKIS, Science Department, Technical University of Crete, Chania, Crete, Greece; Centre for Quantum Technologies, National University of Singapore, MING-XIA HUO, Centre for Quantum Technologies, National University of Singapore, DARRICK CHANG, ICFO, Institute of Photonic Sciences, Barcelona, Spain, LEONG CHUAN KWEK, Centre for Quantum Technologies, National University of Singapore; IAS and NIE, Nanyang Technological University, Singapore, VLADIMIR KOREPIN, C.N. Yang Institute for Theoretical Physics, State University of New York at Stony Brook, NY, USA — Photonic quantum simulations of one dimensional many-body systems have attracted renewed interest lately with works on photon crystallization and Luttinger liquids. In this work we show that the quantum Thirring model for interacting fermions in (1+1) dimension can be realized using stationary polaritons in hollow waveguides filled with atoms. By controlling optical parameters such as one-photon detunings and external laser intensities, the massless and the massive Thirring models are realizable. Coherently mapping the polaritons into propagating photons allows for the direct probing of the relevant correlation functions and scaling behaviours characteristic of the underlying theories in question.

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