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Emulating Hawking physics with cavity polaritons

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Over the last decade, cavity polaritons have emerged as a powerful platform to explore the physics of quantum fluids of light [1]. They are quasi-particles arising from the strong coupling regime between photons trapped in a cavity and excitons confined in quantum wells. They propagate like photons but show strong interactions thanks to their matter part. Several theoretical works propose to make use of cavity polaritons for the emulation of Hawking physics [2-3] based on the design of an abrupt interface between a supersonic and a superfluid region.
In this talk I will describe how, making use of nanotechnology, it is indeed possible to engineer the shape of a 1D channel and to realize an acoustic black hole for cavity polaritons [4]. I will also address the possibility of engineering exotic types of Dirac cones with honeycomb polariton lattices [5], which are also relevant for the realization of analogue black holes [6].

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[6] G.E. Volovik, JETP Lett.104, 645–648 (2016)

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