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Toward the observation of Hawking Radiation in a polariton fluid

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Analog Gravity experiments aim at observing effects initially predicted by quantum field theory on curved space time such as the Hawking effect and rotational superradiance in systems at laboratory scales with similar dynamics [1]. The high tunability of such systems enable to shed light on phenomena that are either currently eluding our comprehension or simply unreachable by their very nature. Analog systems are the theater of rich physics coming from both condensed matter and quantum fields on curved spaces that yield many interesting crossovers in the physical interpretations.

Here we propose to experimentally investigate the Hawking effect in a quantum fluid of polaritons [2] based on the knowledge that the basic process at the heart of the Hawking effect leads to the emission of sound waves from the sonic horizon in a transsonic fluid flow. We use a SLM to easily create and tune an acoustic black hole including an event horizon on which we send controlled Bogoliubov perturbations in order to stimulate the Hawking effect. The modes scattered by the horizon should enable to recover the scattering matrix of the black hole, which is a step towards the measurement of the spontaneous Hawking effect.

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