

# Reissner-Nordström Black Hole in Bose-Einstein Condensates of Light

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By fabricating suitable devices, it is possible to create a sink for light in the center of a microcavity. This sink results in the creation of a so-called radial vortex, which is in fact a two-dimensional Reissner-Nordström black-hole analogue. We theoretically investigate the analogue Hawking radiation and the associated greybody factor of this Reissner-Nordström black-hole in a Bose-Einstein condensate (BEC) of photons. Finally, we determine the density-density and velocity-velocity correlation functions of this Hawking radiation, which can be measured by observing the spatial correlations in the fluctuations in the light emitted by the cavity.

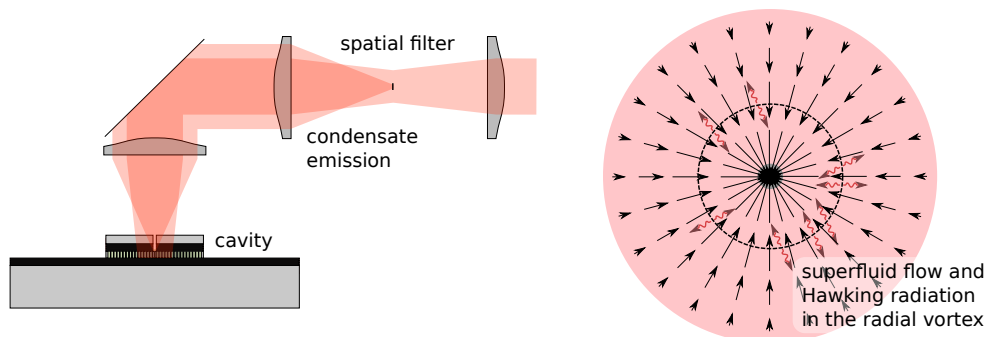


Figure 1: Schematic illustrating the black-hole experiment. We fabricate a cavity with a small hole in the top mirror in the center of the cavity. Light from the condensate leaks out from this hole, which induces a flow in the photon condensate towards the hole and results in a so-called sonic horizon.