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Birth of a quasi-stationary black hole in an outcoupled Bose-Einstein condensate[1] FERNANDO SOLS, JUAN R. M. DE NOVA, Universidad Complutense de Madrid, DAVID GUERY-ODELIN, Universite de Toulouse, IVAR ZAPATA, Universidad Complutense de Madrid — We study the evolution of an initially confined atom condensate, which is progressively outcoupled by gradually lowering the confining barrier on one side. The goal is to identify protocols that best lead to a quasi-stationary sonic black hole separating regions of subsonic and supersonic flow. An optical lattice is found to be more efficient than a single barrier in yielding a long-time stationary flow. This is best achieved if the final conduction band is broad and its minimum is not much lower than the initial chemical potential. An optical lattice with a realistic Gaussian envelope yields similar results. We analytically prove and numerically check that, within a spatially coarse-grained description, the sonic horizon is bound to lie right at the envelope maximum. We derive an analytical formula for the Hawking temperature in that setup. Work appeared in New J. Phys. 16, 123033 (2014).

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