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Measurement of the emission of Hawking radiation with the Hawking temperature in an analogue black hole (Q)

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Hawking [1] predicted the emission of radiation by the event horizon of a black hole with a thermal spectrum whose temperature is given by the surface gravity. However, the temperature of emission is extremely low, making its direct detection an almost impossible task. As an alternative, Unruh [2] proposed that the analogue of Hawking radiation could be observed in the subsonic-supersonic interface of a flowing fluid.

Here, we report the first experimental observation of the emission of Hawking radiation with a thermal spectrum in an analogue black hole [3]. The experimental setup is an updated version of that used in previous measurements [4], based on a Bose-Einstein condensate of ultracold Rubidium atoms. The measured spectrum is in excellent agreement with a thermal spectrum with the measured Hawking temperature, given here by the gradients of the flow and sound velocities at the acoustic horizon. The experimental results are well reproduced by numerical simulations of the system.

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Summary

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