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Towards accurate confirmation of spontaneous Hawking radiation in degenerate atomic gases via interference of Hawking pairs

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Distinguishing spontaneous Hawking radiation from different thermal effects is possible by measuring correlations of Hawking pairs. However, measuring the local density is expected to be substantially more accurate than measuring density correlations. In our proposed sonic analogue, Hawking temperature can be extracted directly by studying the amplitude of a density modulation originated by the interference of Hawking pairs. In fact, in the proposed sonic analogue in degenerate atomic gases, Hawking partners meet again at some time and interfere. The produced modulation in the density can be as high as one quarter of the density and implies also reduced atom number fluctuations compared to the case of zero temperature and negligible Hawking radiation. By discussing the details of a possible realistic experimental realization we illustrate the accuracy and power of the proposal in order to confirm Hawking radiation.

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