Minicolloque n° 10 ▣ **Oral** ☐ **Poster**

Quantum depletion in quasi-1D sonic black hole analogues

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The recent measurement of Hawking-like radiation in sonic analogues is undoubtedly one of the most important experimental milestones in analogue gravity physics [1]. Yet, the gravity interpretations of this phenomenon may depend nontrivially on theoretical aspects of the condensed matter system dynamics not commonly incorporated into the analysis. One such aspect is the unavoidable quantum depletion (QD) in Bose-Einstein condensates (BEC), which we study in this work by revisiting a quasi-one-dimensional (quasi-1D) sonic black hole configuration in a flowing dilute BEC [2]. We show that an accurate treatment of the dimensional reduction to quasi-1D regime leads to a well-defined QD even for axially infinite systems, and that the measured radiation spectrum cannot be thermal. We also predict a QD signature for the emergence of sonic horizons, which offers alternative experimental routes for probing such effect.

[1] J. R. M. de Nova, K. Golubkov, V. I. Kolobov, and J. Steinhauer, Nature 569, 688-691 (2019).
[2] C. C. H. Ribeiro, S.-S. Baak, and U. R. Fischer, [arXiv:2103.05015].