

Tunneling method for Hawking radiation in analogue gravity

Thursday, January 23, 2025 3:10 PM (25 minutes)

Analogue Hawking radiation from acoustic horizons is now a well-established phenomenon, both theoretically and experimentally. Its persistence, despite the modified dispersion relations characterizing phonons in analogue spacetimes, represents an evidence of the robustness of this effect against the ultraviolet non-relativistic modification of the particles' behavior. Previous theoretical explanations of this effect are based on Bogoliubov transformations, relating asymptotic states, for which an analytical treatment represents a hard challenge and usually stops at the leading order around the relativistic limit.

In this talk (based on ArXiv:2406.14603) I will address the analogue Hawking effect making use of the tunneling method. Within a unified treatment, I will show how the simplicity of this method allows to describe both the case of superluminal and subluminal dispersion relations, going beyond the leading order approximation. I will clarify also the mechanism behind the puzzling appearance of excitations for horizonless spacetimes, namely for a subcritical flow, which are expected in the case of subluminal dispersions.

Primary author: DEL PORRO, Francesco (Niels Bohr Institute)

Presenter: DEL PORRO, Francesco (Niels Bohr Institute)