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Seed Seminar of Mathematics and Physics

Mercredi 9 Juillet 2025, 12 :00
IHES, Amphithéâtre Léon Motchane
Domaines : math-ph

Titre : *The effective field theory realizations of the perfect fluid*

Orateur : **Fanny Eustachon (CPhT, École polytechnique)**

Résumé : *Hydrodynamics is one of the oldest example of field theories, describing the long- range behaviour of many-body systems and its study remained mostly classical. Nevertheless, near zero temperature, quantum fluctuations grow in importance raising the natural question : is there a consistent quantum picture of a perfect fluid at zero temperature ?*

In this talk, I will review the subtly inequivalent Lagrangians realizations of the perfect fluid through the lens of modern effective field theory (EFT). I will then discuss its particularity, naming the presence of an infinitely dimensional symmetry. As we will see, its main implication is the existence of transverse modes with vanishing dispersion relation at the classical level, and an infinitely degenerate spectrum and UV-IR mixing at the quantum level.

This is based on a work with G. Cuomo, E. Firat, B. Henning and R. Rattazzi https ://arxiv.org/abs/2412.10344.