

INTERNSHIP PROPOSAL

Laboratory name: LPTMC

CNRS identification code: UMR 7600

Internship director's surname: Pricoupenko

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Internship location: Campus Jussieu

Thesis possibility after internship: YES

Funding: NO

If YES, which type of funding:

Universal properties in isolated resonances of few-body systems

The universality of properties in quantum systems with a small number of strongly interacting bodies has been predicted and observed at completely different energy scales, ranging from nuclear physics (particularly with halo states) to cold atoms. The Efimov effect, first observed in cold atomic gases, is the most striking example of this. The proposed internship is in the continuation of this theme, considering resonance phenomena in few-body systems, i.e. bound or quasi-bound states at low energy, whose universal nature has been much less studied than in the Efimov case [1-3]. In addition to their intrinsic properties and the question of their observability, which has been predicted in cold atomic gases, their implications for the N-body problem are still in their infancy.

Several internship topics are possible (for example, playing on the effect of dimensionality, the nature of interactions, particle statistics, the lifetime of these states, etc.), with a more or less pronounced focus on the use of analytical or numerical methods depending on the topic chosen.

[1] L. Pricoupenko, arXiv:2406.11372,

[2] L. Pricoupenko, SciPost Phys. 17, 108 (2024) or arXiv:2311.18372,

[3] L. Pricoupenko, Phys. Rev. A 108, 013315 (2023) or arXiv:2303.12637

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES

Soft Matter and Biological Physics: NO

Quantum Physics: YES

Theoretical Physics: YES