
Thesis subject

Name of the laboratory: Laboratoire d'Astrophysique de Marseille

Thesis advisor: **Emmanuel Nezri**

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Co-advisor:

Subject's title: Cosmological simulations of Milky-Way like galaxies and dark matter phenomenology.

Subject description:

The dark matter question is a very hot topic of cosmology and particle physics [1]. If we have gravitational evidences suggesting its presence in the Universe, the discovery of this elusive component is still missing.

This PhD is interdisciplinary especially linking cosmological simulations and dark matter phenomenology, focusing on the galactic scale.

The work will be two folded :

- Cosmological simulations of Milky-Way like galaxies [2].

Using the so called zoom-in technique, the candidate will run numerical simulations of spiral galaxies in a full cosmological environment.

- Dark matter phenomenology and detection [1].

Driven by the simulation results, the candidate will investigate especially the dark matter distribution features (modelling of mass profile, clumpiness, phase space...) and the direct and indirect detection.

Candidate profile : Master of theoretical physics or astrophysics.

Analytical and numerical skills.

Bibliography:

[1] Bertone, Silk, Hooper, Phys.Rept.405:279-390,2005,

<https://arxiv.org/abs/hep-ph/0404175>

[2] Mollitor, Nezri, Teyssier, MNRAS Volume 447, Issue 2, p.1353-1369,

<https://arxiv.org/abs/1405.4318>