Victor Rufo Pastor Astrophysics **Type of address: Visiting address.** Professorsgatan 1B Rm A408 223 64 Lund Sweden **Type of address: Postal address.** Box 118 221 00 Lund Sweden **Email:** victor.rufo pastor@fysik.lu.se

Research

I am PhD student in Dr. Oscar Agertz's group at the Division of Astrophysics, Department of Physics, Lund University. My research focuses on galaxy formation and evolution using simulations. My main goal is to understand what channels drive the quick formation of the thin disc and the thick disc in Milky Way-type galaxies.

Galaxy observations are improving all the time, but there is an inherent limitation: observations are images at a particular cosmological time. Cosmological simulations allow us to reconstruct the evolution of the Universe using computational techniques, physical laws and different models.

The formation and evolution of galaxies is a complex subject, driven by broad and interconnected multi-scale mechanisms, such as star formation, supernova feedback, gas flows, satellite interactions or mergers.

By combining these two elements, galaxy evolution and simulations, we have access to a complete and detailed evolution of galaxies, frame by frame, from early epochs of the virtual universe to the present.

A topic of high interest is disc-forming channels. These can be studied by analysing the gas (temperature, density, cooling efficiency), the star formation in the galaxy, the emigration of material within the galaxy and between the galaxy and the circumgalactic/intergalactic medium, the angular momentum, and the satellite and merger effects, among other elements. Therefore, my work consists on extracting physical information from simulations related to the evolution of galaxies and disc formation. By collecting the appropriate information, it is possible to make comparisons with observations and other simulations. This will answer the questions: how do galaxies and their discs form, how good is our theoretical knowledge, and how does it affect the current cosmological scenario?

Employment

Doctoral student Astrophysics Lund University Lund, Sweden 2023 Oct 2 → present

Student research internship

Max Planck Institute for Astrophysic Garching, Germany 2023 Feb 1 \rightarrow 2023 Jul 1

Student research internship

Universitäts-Sternwarte München Munich, Germany 2022 Apr 1 → 2022 Jul 1

Research Assistant

Autonomous University of Madrid E-28049 Madrid, Spain 2020 Nov 1 → 2022 Mar 1

Student research internship

Astrophysics - Cosmological Simulations Max Planck Institute for Astrophysics Garching bei München, Germany 2023 Feb → 2023 July

Student research internship

Astrophysics - Cosmological Simulations Universitäts-Sternwarte München (USM/LMU) Munich, Germany 2022 April, 2022 July

Research assistant. Youth Employment Initiative contract

Astrophysics - Cosmological Simulations - Software development Universidad Autónoma de Madrid Madrid, Spain 2020 Nov → 2022 Mar

Projects

The formation of galactic discs using simulations Rufo Pastor, V. (Researcher), Agertz, O. (Supervisor) & Roca Fabrega, S. (Assistant supervisor)

Education

MSc in Astrophysics and BSc degree in Physics

Universidad Complutense de Madrid Madrid, Spain 2016 → 2021