

Invitation

to the seminar of Division of Elementary Particle Physics of the Institute of Physics of the Czech Academy of Sciences



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Interfacing supercomputer simulations of galaxy formation with precision cosmology

Abstract: Numerical calculations of cosmic structure formation have become a powerful tool in astrophysics. Starting right after the Big Bang, they are not only able to accurately predict the dark matter backbone of the cosmic web far into the non-linear regime, but are also capable of following baryonic physics with rapidly improving fidelity. In my talk, I will review the methodology and selected results of recent structure formation simulations that follow large parts of the observable universe. I will discuss some of the primary challenges in modelling strong, scale-dependent feedback processes that regulate star formation in galaxies, and highlight the important role played by supermassive black holes in galaxy formation. I will also discuss extremely large simulations and describe how they help to make reliable predictions for the impact of baryons and massive neutrinos on cosmological observables, effects that need to be understood to make full use of upcoming new survey data. The simulation results also shed light on cosmic reionization and magnetic field amplification during non-linear structure formation. Finally, I will highlight some of the methodological and technical challenges involved in obtaining future multi-physics, multi-scale simulations that aim for more accurate predictions.

When: Thursday, June 5, 2025 at 2PMWhere: Dvořák hall, FZU, Pod Vodárenskou věží 1, Prague

For more information, please see <u>https://indico.fzu.cz/event/302/</u>

Roman Lysák