Zvonimir Vlah

Thesis Abstract:

We develop theoretical models and tools for describing the dark matter and galaxy distribution in the Universe. Importance of developing these models lies in our interest to reveal the structure of the Universe, its composition and initial conditions that seeded the evolution, using the data from large scale structure surveys.
We focus on the accurate modelling of redshift space distortions effects in the dark matter power spectrum in the mildly-nonlinear regime, using the phase space distribution function approach as a newly developed tool. Then this approach is generalized in the second study to include the galaxy bias effects, i.e. to extend the validity of the model to include the observable objects. In the separate study we explore the Lagrangian perturbation theory results for dark matter and develop a novice parametric model which allows consistent modelling of power spectrum and correlation function.