Gevolution: a cosmological N-body code based on General Relativity

Martin Kunz
University of Geneva
Geneva, Switzerland

Cosmological structure formation is a highly non-linear process that can only be studied with the help of numerical simulations. This process is mainly governed by gravity, which is the dominant force on large scales. A century after the formulation of general relativity, numerical codes for structure formation still use Newton's law of gravitation. In my talk I will present results from the first simulations of cosmic structure formation using equations consistently derived from general relativity. Our particle-mesh N-body code gevolution computes all six degrees of freedom of the metric and consistently solves the geodesic equation for particles, taking into account the relativistic potentials and the frame-dragging force. Thanks to this, we were able to study in detail for a standard ΛCDM cosmology the small relativistic effects that cannot be obtained within a purely Newtonian framework.