

Seminarium Studium Doktoranckiego NCBJ

Thursday, 2 July, 9:00

<https://www.gotomeet.me/NCBJmeetings/phd-seminar>

Speaker:

Albin Nilsson (Studium Doktoranckie NCBJ)

Title:

Aspects of Lorentz and CPT violation in Cosmology

Abstract:

The breaking of Lorentz symmetry can give rise to a wealth of observational consequences. In this talk I will summarise the work which comprises my PhD thesis. In a nutshell, my goal was to explore models of gravitation and cosmology with Lorentz symmetry violation. Five Lorentz-violating models or frameworks are outlined in this talk, and three of these are subsequently chosen and studied. Doubly General Relativity breaks Lorentz symmetry through a modification of the dispersion relation of particles. This is combined with the kinematic modified dispersion relations common in phenomenological studies of Lorentz violation with high-energy gamma rays. By applying a large cosmological dataset to the resulting model, it is found that the lower limit on the energy scale of Lorentz violation is 10^{16} GeV. Horava-Lifshitz gravity is a possibly UV-complete quantum-gravity theory candidate. By again applying a large updated cosmological dataset new constraints on the cosmological parameters are found. In particular, the curvature density parameter is found to be non-zero; moreover, this model is discussed in context of the Hubble parameter tension, through which the Horava-Lifshitz coupling parameter is given new constraints. It is found that Lorentz violation can contribute up to 38% of the Hubble tension. The Standard-Model Extension is a general, theory-agnostic framework for testing Lorentz and CPT violation. Here, the Hamiltonian formulation of the Standard-Model Extension gravitational sector is presented.