

The structure of the early cosmos in a Bose-Einstein condensate

Prof. Dr. Stefan Flörchinger

Theoretisch-Physikalisches Institut, Universität Jena

The large-scale structure of our Universe is seen as a result of quantum field fluctuations amplified by the evolution of space-time itself. Quantum fields in curved spacetimes have many tantalizing theoretical properties, for example particles are being produced by the time-dependence of the geometry. I will describe how quantum fields in geometries with spacetime curvature and different cosmologies can be quantum-simulated with Bose-Einstein condensates in specifically designed trapping potentials and with time-dependent interaction strengths. New analytical results for relativistic scalar fields in cosmologies with 2+1 spacetime dimensions will be compared with recent experimental results obtained in Heidelberg laboratories.