

The failure of the standard cosmological model and first steps towards a possible new direction

Pavel Kroupa

*Argelander Institute for Astronomy (AIfA), University of Bonn, Auf dem Huegel 71,
D-53121 Bonn, Germany*

The current cosmological model rests on Einstein's theory of general relativity. In order for it to be consistent with large-scale structure data, the existence of cosmologically relevant physical processes need to be postulated: inflation, cold dark matter (CDM) particles and dark energy (Λ). Each of these is not well understood, but assuming the resulting mathematical "LCDM" description is a representation of cosmological reality, this representation can be tested in a different regime, namely on the scales of the Local Volume of galaxies down to individual galaxies. It is found that each test which has been designed shows the LCDM description to fail such that the LCDM model needs to be discarded. In particular, the Dual-Dwarf-Galaxy Theorem, which must be true in the standard model, is falsified. The data on star-forming galaxies suggest a different cosmological model, but a definite final description is yet to be found.