STEVEN RIEDER
03-04-1983

In this PhD thesis, I describe work done in the CosmoGrid and AMUSE projects.

CosmoGrid is a ΛCDM N-body simulation containing 8.5 billion dark matter particles within a volume of only (30 Mpc)^3, resulting in very high mass resolution. In order to run such a large simulation, we investigate a method of combining multiple supercomputers via a fast network; combining them into one large machine for the final calculation.

We compare the results of CosmoGrid to previous ΛCDM simulations, and use the finalised CosmoGrid data to investigate how an aligned group of galaxies in a void region might have formed.

Combining CosmoGrid with the Astrophysical Multipurpose Software Environment (AMUSE), we investigate a method to embed simulated star clusters in a large-scale environment such as a dark matter halo. Finally, we use this method to run self-consistent simulations of open star clusters embedded in a forming Milky Way-like galaxy.

THE
CLUSTERED
UNIVERSE

STEVEN RIEDER