

SC13 VISUALIZATION SHOW CASE SUBMISSION:

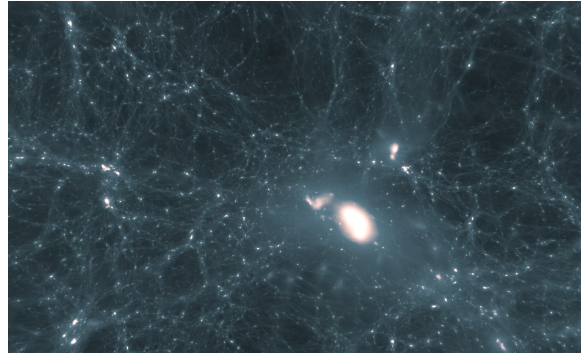
FORMATION OF THE COSMIC WEB

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ABSTRACT:

This animation is based on a cosmological N-body dark matter simulation of the formation of the large-scale structure in the Universe. It shows how gravity amplifies small dark matter density fluctuations generated shortly after the Big Bang, leading to the formation of galaxies in the cosmic web. Features of the web, like sheets, filaments and halos, the latter hosting galaxies made out of normal, baryonic matter, become clearly visible.

The visualization was generated using a highly accurate GPU-based rendering method that employs full phase-space information to generate a tetrahedral tessellation of the computational domain, with mesh vertices defined by the simulation's dark matter tracer particle positions. Over time the mesh is deformed by gravitational forces as computed by the N-body code, which causes the tetrahedral cells to warp and overlap. About 4 billion tetrahedral elements contributed to each time step in this visualization.

Movie URL:

http://www.slac.stanford.edu/~kaehler/movies/tmp/sc13_kaehler.mov