

Millennium-XXL

This simulation is good for

- Light-Cone datasets extending to high redshift
- Probing Gpc scales

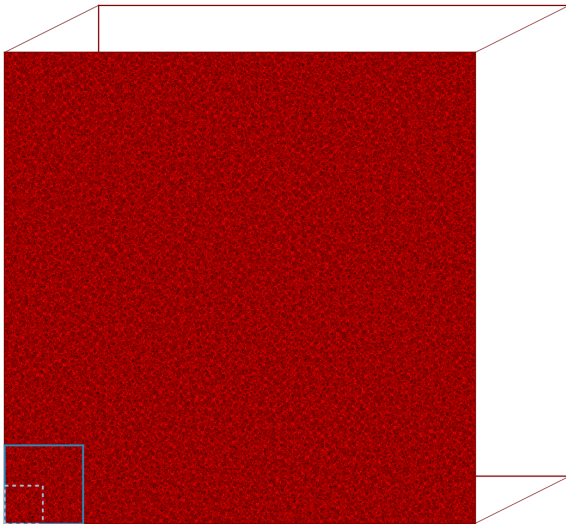
Overview

The Millennium-XXL (MXXL) N -body simulation uses the same cosmological parameters as the original [Millennium](#) simulation, but in a volume $6^3=216$ times as large. Despite the increase in particle number as well, this comes at the cost of a lower mass resolution by a factor of ~ 7 . The simulation was run with a modified version of GADGET3. Further details on the simulation can be found in the paper by [Angulo et al. \(2012\)](#). Currently on *TAO*, MXXL data products exist as Premade catalogues. These include 2 Light-Cones: one that extends to $z=2.2$ for halo properties, and one that extends to $z=0.8$ and includes galaxy properties as assigned by a Halo Occupation Distribution model. These Light-Cones are fully detailed by [Smith et al. \(2017\)](#).

Size

Box length: $3000 h^{-1} \text{ cMpc}$

Relative volume to [Millennium](#) and an all-sky survey out to $z=0.05$:



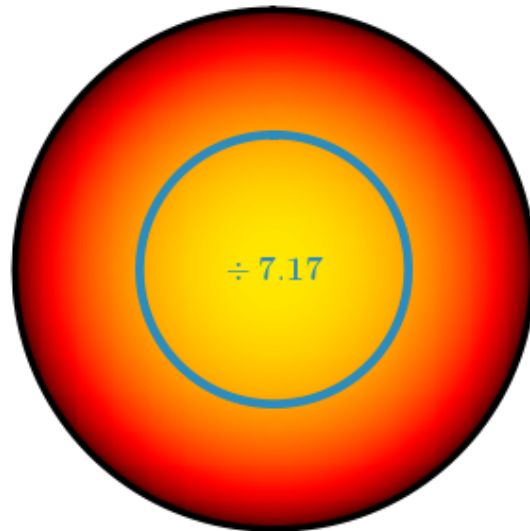
Resolution

Particle mass: $6.17 \times 10^9 h^{-1} M_{\text{sun}}$

Gravitational softening: $10 h^{-1} \text{ kpc}$

Number of particles: 6720^3

Particle size compared to [Millennium](#):



MXXL has 7.17 times lower mass resolution than Millennium, meaning a Millennium halo contains 7.17 times the number of particles of an MXXL halo of equivalent mass.

Cosmology

The cosmological parameters of the Millennium family of simulations, including Millennium-XXL, are based on *WMAP*-1 data ([Spergel et al. 2003](#)) and the 2dF Galaxy Redshift Survey ([Colless et al. 2001](#)).

$\Omega_{\text{m}} = 0.25$
 $\Omega_{\text{b}} = 0.045$
 $h = 0.73$

$\sigma_8 = 0.9$
 $n = 1$
 $h = 0.73$

Haloes

Haloes and subhaloes were identified using [SUBFIND](#), with further details outlined in [Angulo et al. \(2012\)](#).