Millennium-XXL

This simulation is good for

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

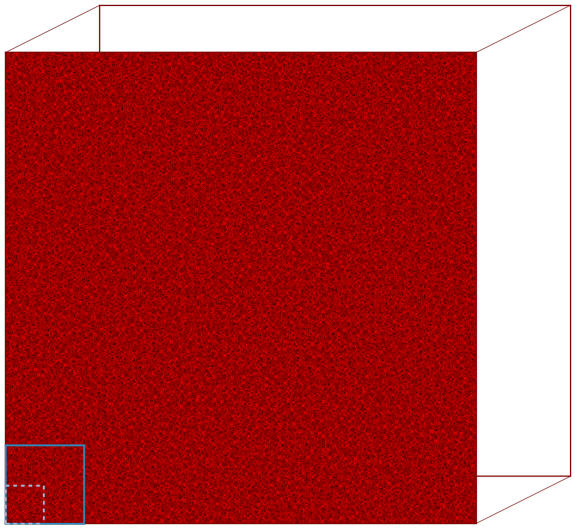
Overview

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: **$3000/h^{-1}$ cMpc**

Relative volume to Millennium and an all-sky survey out to z=0.05:



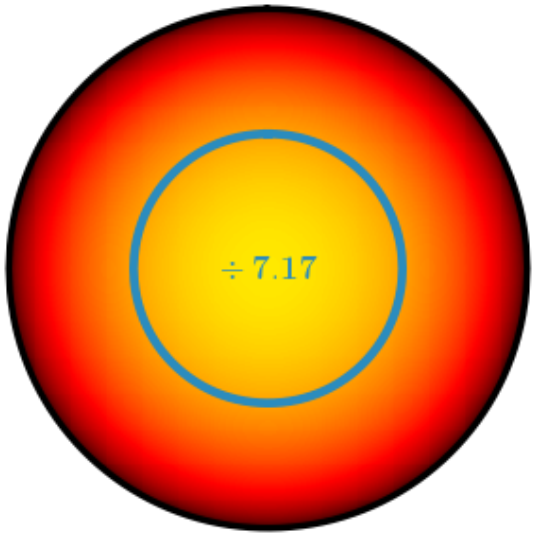
Resolution

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

Gravitational softening: **$10/h^{-1}$ 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).

$_M$ = 0.25
$_\Lambda$ = 0.75
$_b$ = 0.045

$_8$ = 0.9
***n* = 1**
***h* = 0.73**

Haloes

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