

# Bolshoi

This simulation is good for

- Modelling galaxies with stellar masses above  $\sim 10^{7.5} M_{\text{sun}}$
- Probing scales up to  $250 h^{-1}$  Mpc (without repetition)
- Resolving small structures with high time resolution

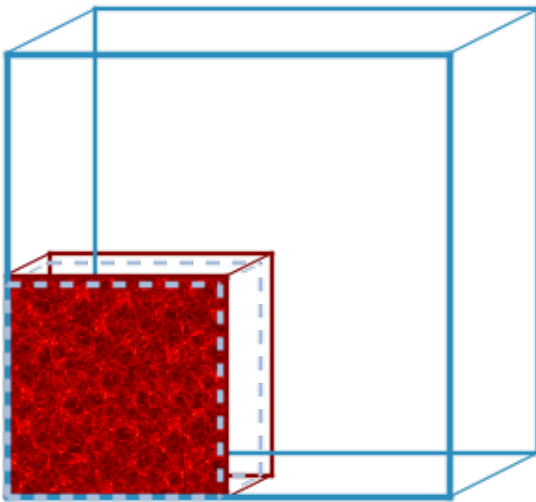
## Overview

The Bolshoi simulation was run with the Adaptive Refinement Tree (ART) code. It has nearly the same number of particles as [Millennium](#), but was catered to high resolution rather than a large box size. It is, therefore, favourable for working with satellite galaxies and low-density environments. Full details of the simulation can be found in the paper by [Klypin et al. \(2011\)](#) and at [this address](#).

## Size

Box length:  $250 h^{-1}$  cMpc

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



## Resolution

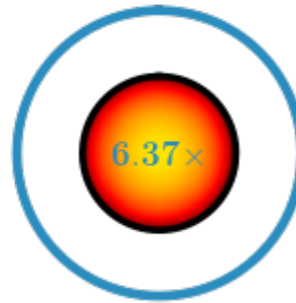
Particle mass:  $1.35 \times 10^8 h^{-1} M_{\text{sun}}$

Gravitational softening:  $1 h^{-1}$  ckpc

Number of particles:  $2048^3$

Number of snapshots to  $z=0$ : 181

Particle size compared to [Millennium](#):



Bolshoi has 6.37 times higher mass resolution than Millennium, meaning a Bolshoi halo contains 6.37 times the number of particles of a Millennium halo of equivalent mass.

## Cosmology

The cosmological parameters for Bolshoi are based on *WMAP-7* data ([Jarosik et al. 2011](#)), but maintain consistency with earlier *WMAP* releases.

$\Omega_m = 0.27$

$\Omega_b = 0.0469$

$h = 0.7$

$\sigma_8 = 0.82$

$n_s = 0.95$

$h = 0.7$

## Halo

Halo and subhalo were identified using [ROCKSTAR](#), with merger trees subsequently built with [CONSISTENT-TREES](#). Where other codes might only use the positions of particles to build halo, ROCKSTAR uses the velocities of particles as well. The trees follow all (sub)halo down to as few as 2 particles.

## Semi-analytic galaxies

Galaxy catalogues for Bolshoi available on *TAO* have been built with the following semi-analytic models:

[SAGE](#)