

Vishnu

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This simulation is good for

- Modelling galaxies with stellar masses above $\sim 10^7 M_{\text{sun}}$
- Resolving small structures with high time resolution
- Tracking orbits of subhaloes
- Testing temporal resolution effects on galaxy properties in semi-analytic models

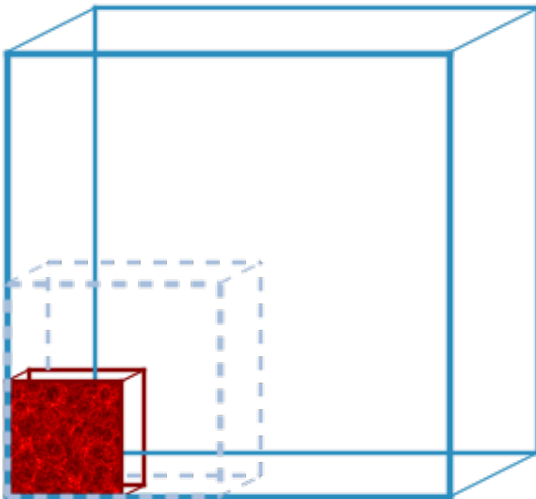
Overview

The Vishnu simulation currently has the highest mass resolution of the N -body simulations available on *TAO*. Two versions of the merger trees are available, which roughly match the temporal resolution of the Millennium and Bolshoi simulations (63 and 178 snapshots, respectively). A "full resolution" version of the simulation with 1000 snapshots will be added to *TAO* soon. Vishnu was designed for the purposes of tracking subhalo orbits. The simulation and trees will be discussed in full detail in the upcoming paper by Sinha et al.

Size

Box length: $130 h^{-1} \text{ cMpc}$

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



Resolution

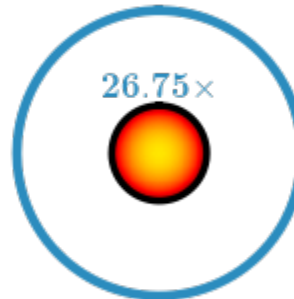
Particle mass: $3.215 \times 10^7 h^{-1} M_{\text{sun}}$

Gravitational softening: $2.2 h^{-1} \text{ ckpc}$

Number of particles: 1680^3

Number of snapshots to $z=0$: **63 or 178**

Particle size compared to [Millennium](#):



Vishnu has 26.75 times higher mass resolution than Millennium, meaning a Vishnu halo contains 26.75 times the number of particles of a Millennium halo of equivalent mass.

Cosmology

The cosmological parameters for Vishnu are based on *WMAP-1* data ([Spergel et al. 2003](#)).

$\Omega_m = 0.25$

$\Omega_b = 0.04$

$h = 0.7$

$\sigma_8 = 0.8$

$n = 1.0$

$h = 0.7$

Halo

Halo and subhaloes were identified using [ROCKSTAR](#), with merger trees subsequently constructed with [CONSISTENT-TREES](#). Vishnu includes subhaloes with as few as 2 particles.

Semi-analytic galaxies

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

[SAGE](#)