MENDIETA: A Subhalo Finder

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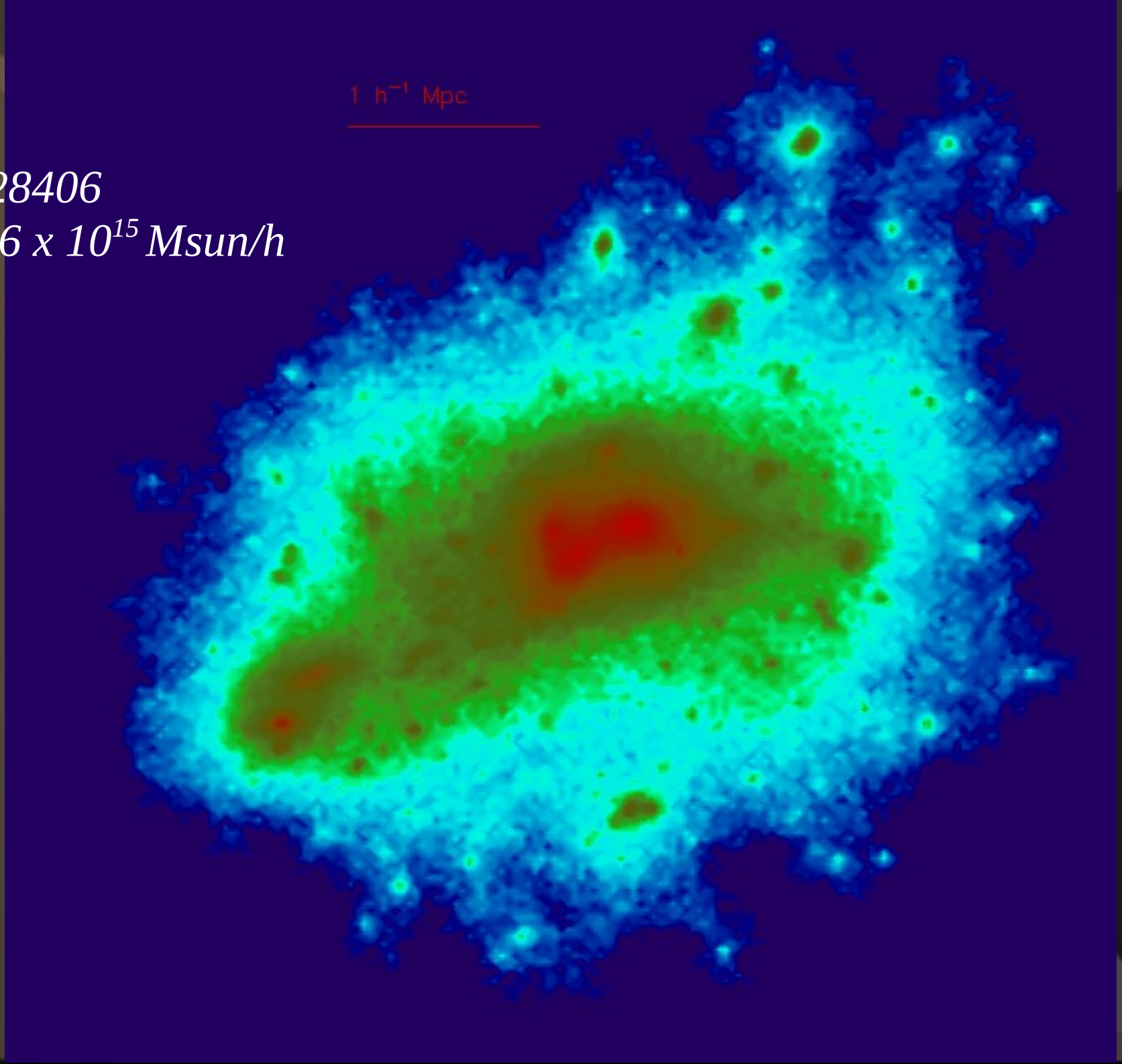
Friends of Friends Meeting - April 12th 2011 - Córdoba

N = 828406

M ~ 1.6 x 10^{15} Msun/h



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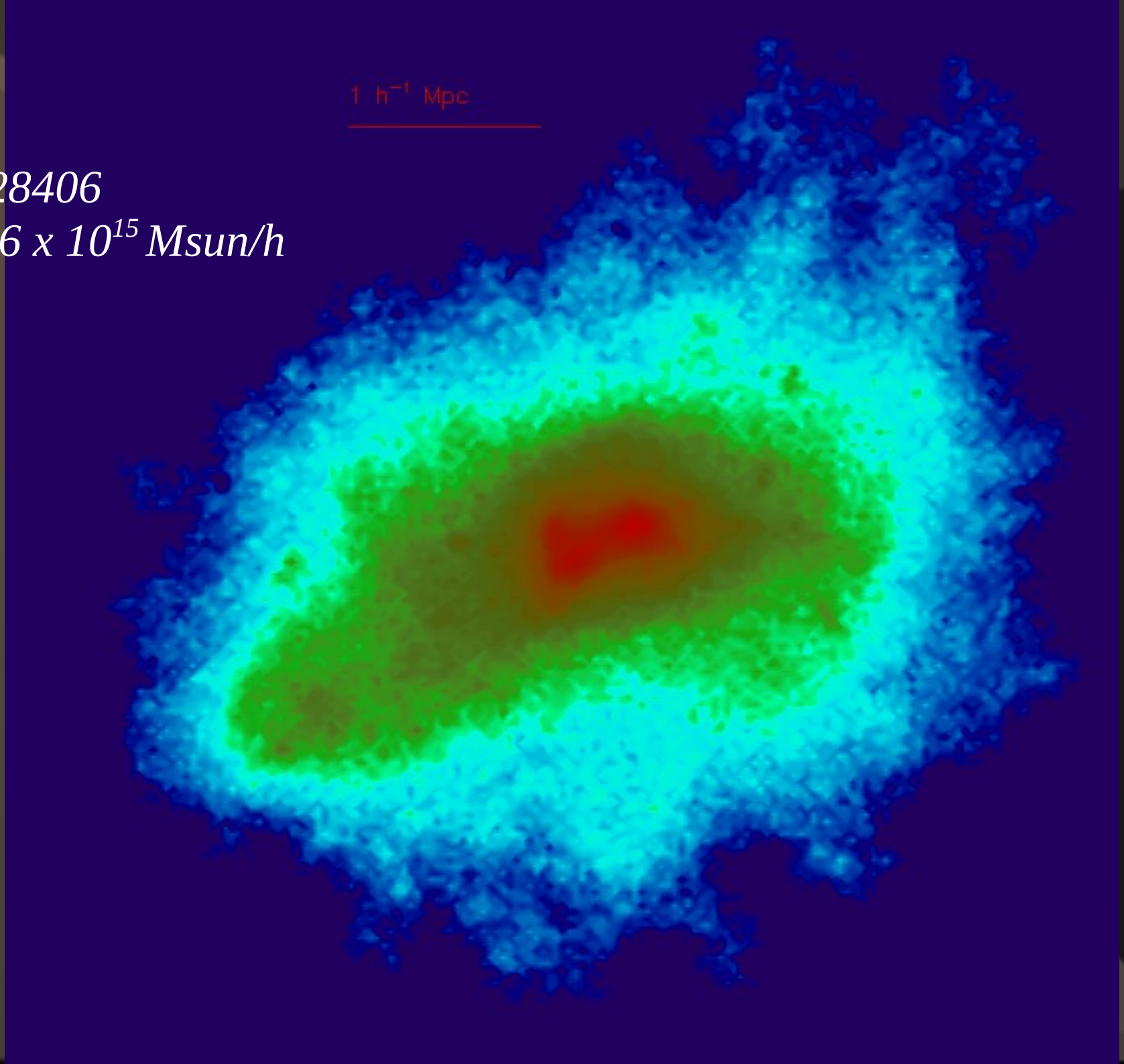


Algorithm

I - A FoF identification over the cosmological N-body simulation is performed in the aim to construct a halo catalogue. Only halos which has more particles than some threshold number N_T are considered.

II - For each dark matter halo a second FoF identification with a shorter linking length is made to isolate local overdensities and a subhalo catalogue is obtained.

III - All particles that are not linked to any subhalo by the FoF identification or particles in subhalos with less than N_T particles are assigned to the main subhalo (i.e., the most massive subhalo).

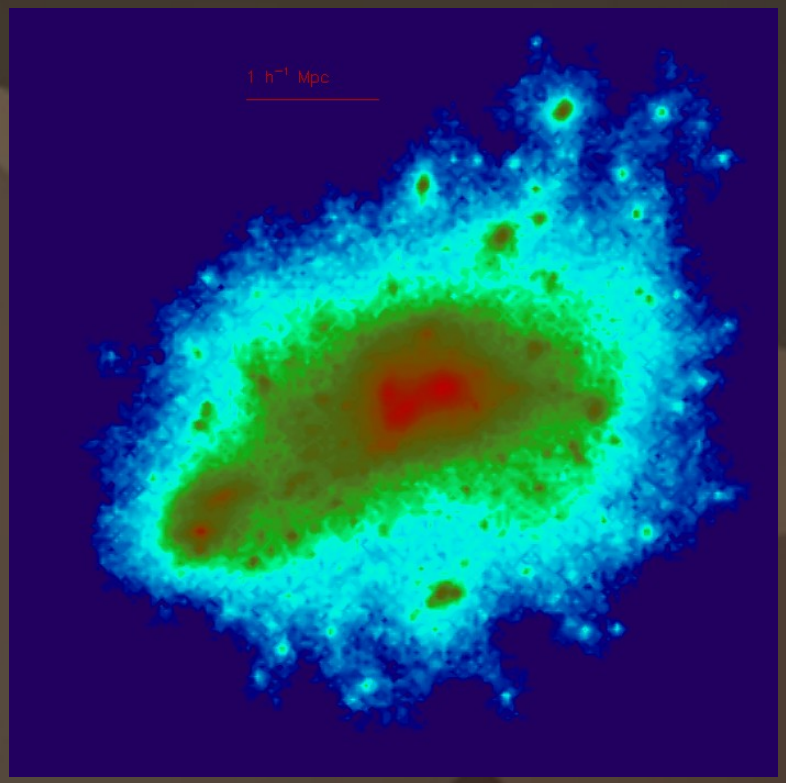
IV - For each subhalo, all unbounded particles are identified as those with positive total energy. The total potential energy of one particle is computed by considering the gravitational interaction of the particle itself with the rest of the subhalo particles added to its own potential energy. The total kinetic energy is calculated with respect to the velocity of the center of mass of the subhalo summed to the Hubble flow. These particles are removed from their host subhalo and assigned to the main one. Subhalos with less tan N_T particles after the removal of all unbounded particles are then extracted from the subhalo catalogue and their particles assigned to the most massive subhalo.

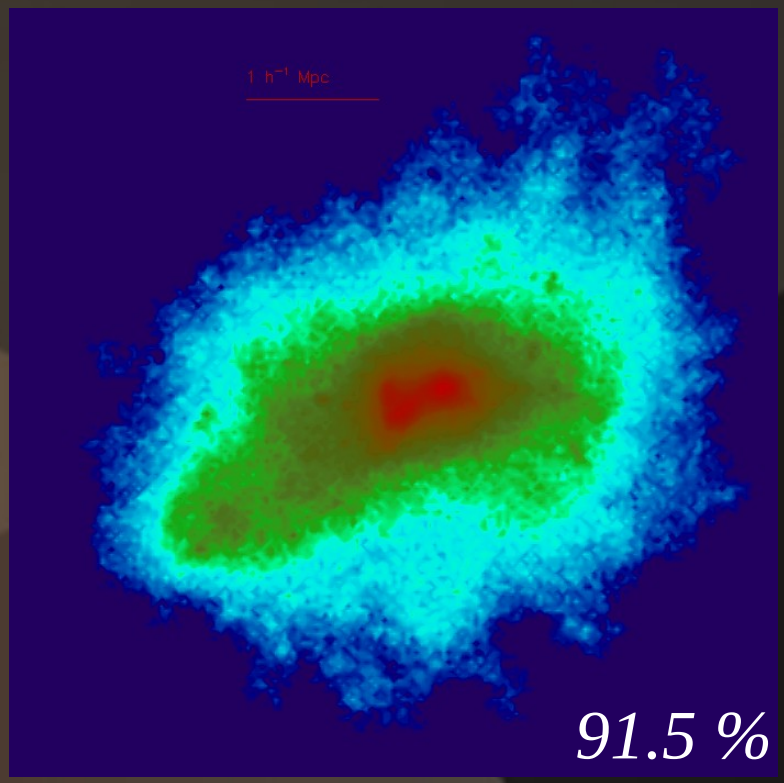
V - The same energy criterion is applied to all particles in the main subhalo. In this case all unbounded particles are marked as particles that do not belong to any substructure.

VI - The resulting subhalo catalogue is used as a new input catalogue, then the entire procedure is repeated from (II) a number N_S of steps, decreasing the linking lenght parameter on each step.

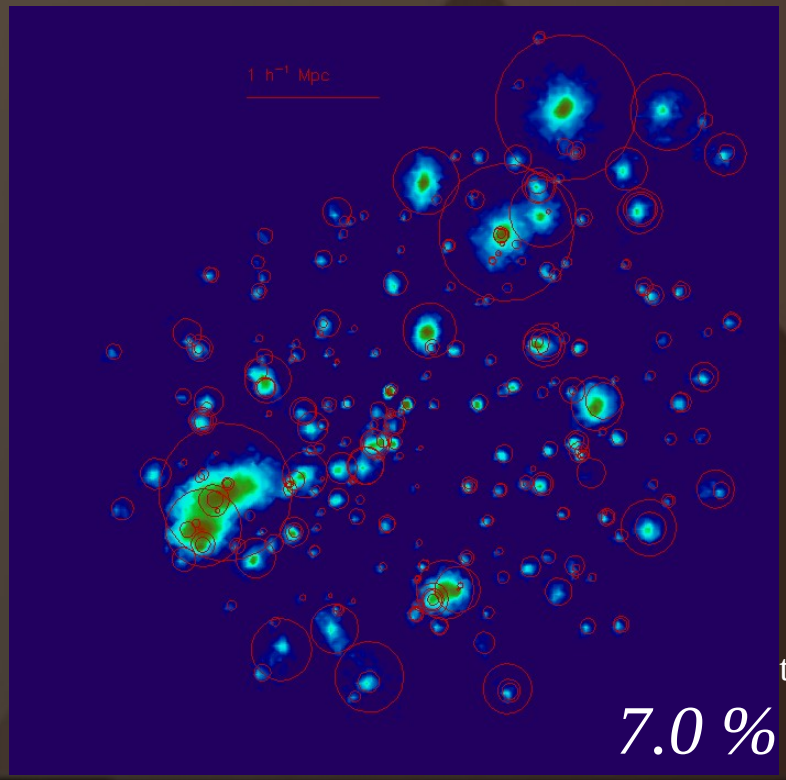
$N_T = 10$

$N_S = 9$

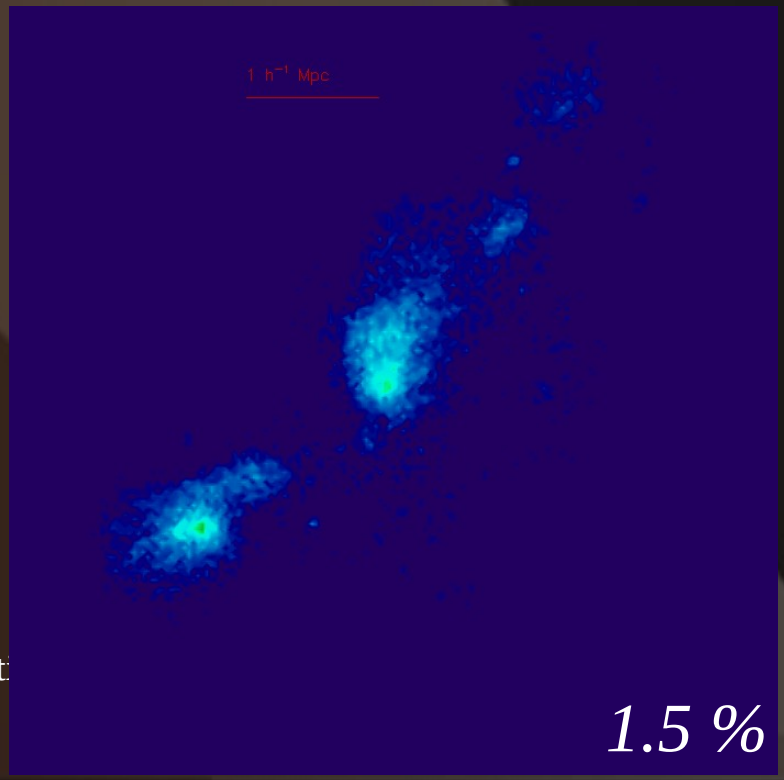




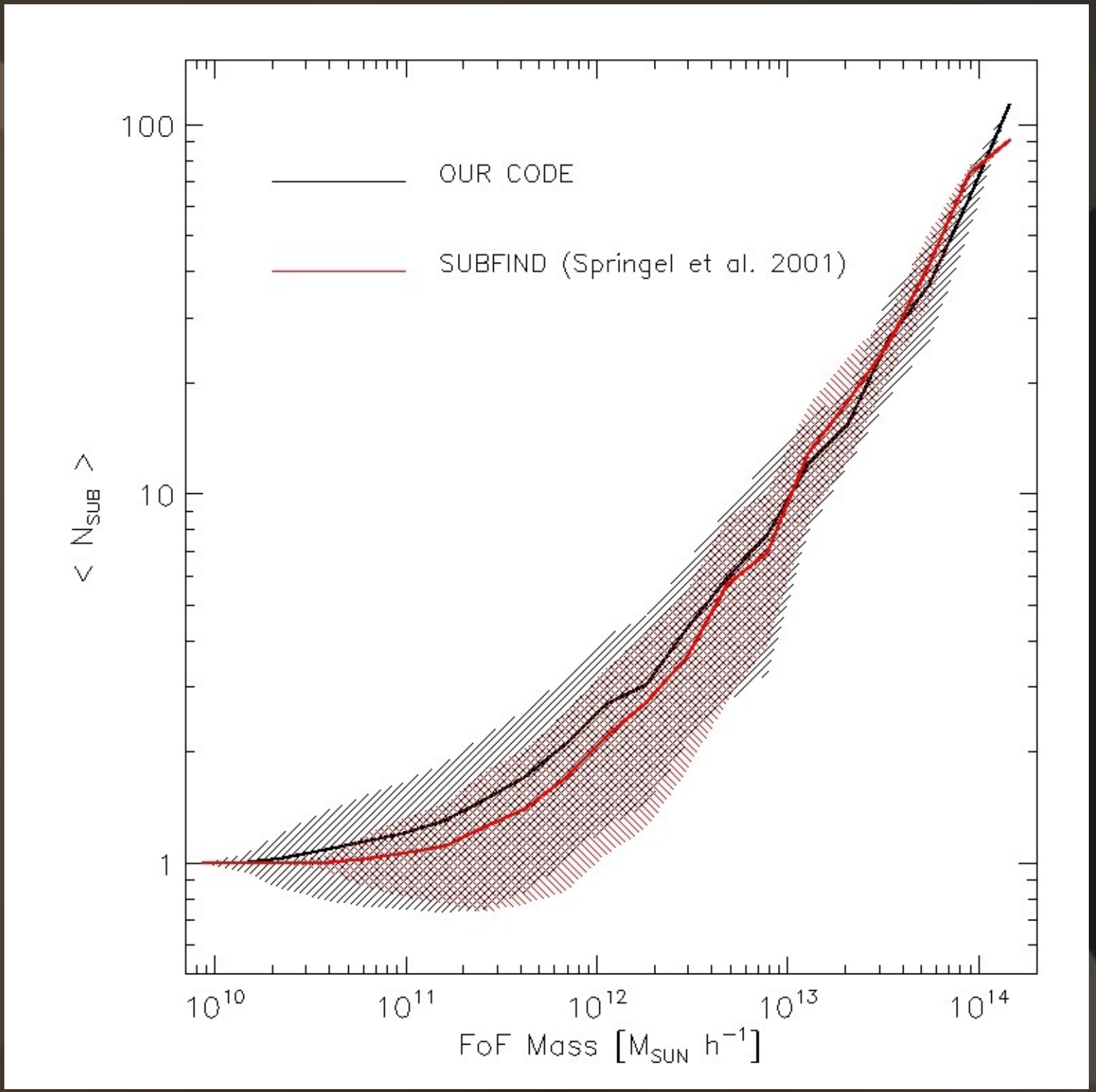
91.5 %

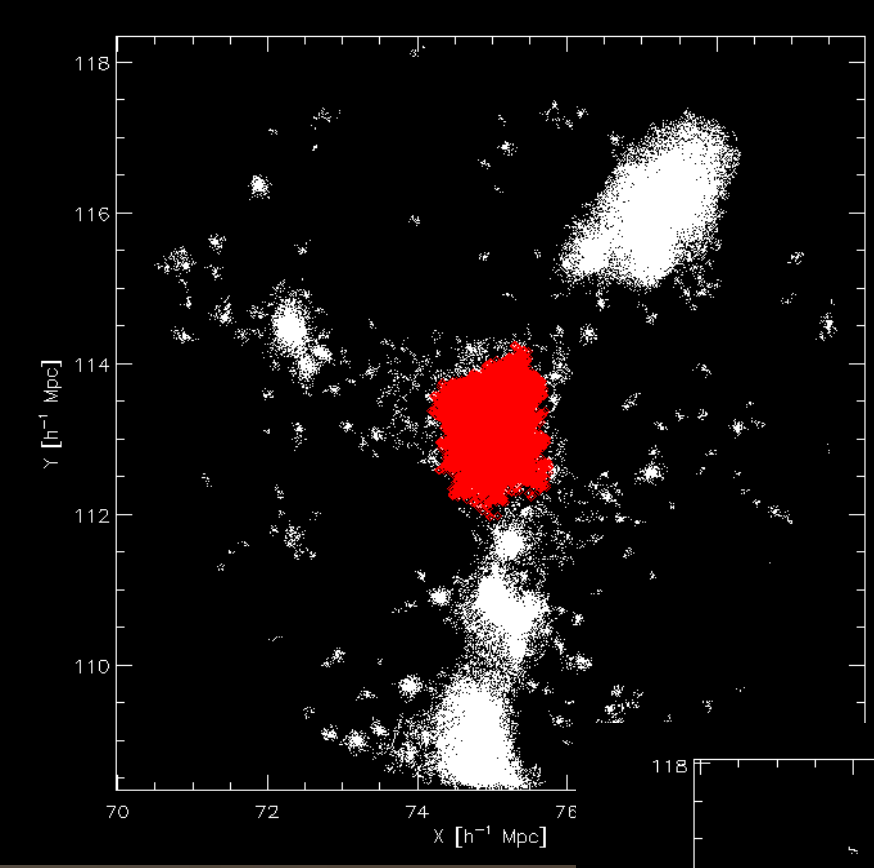


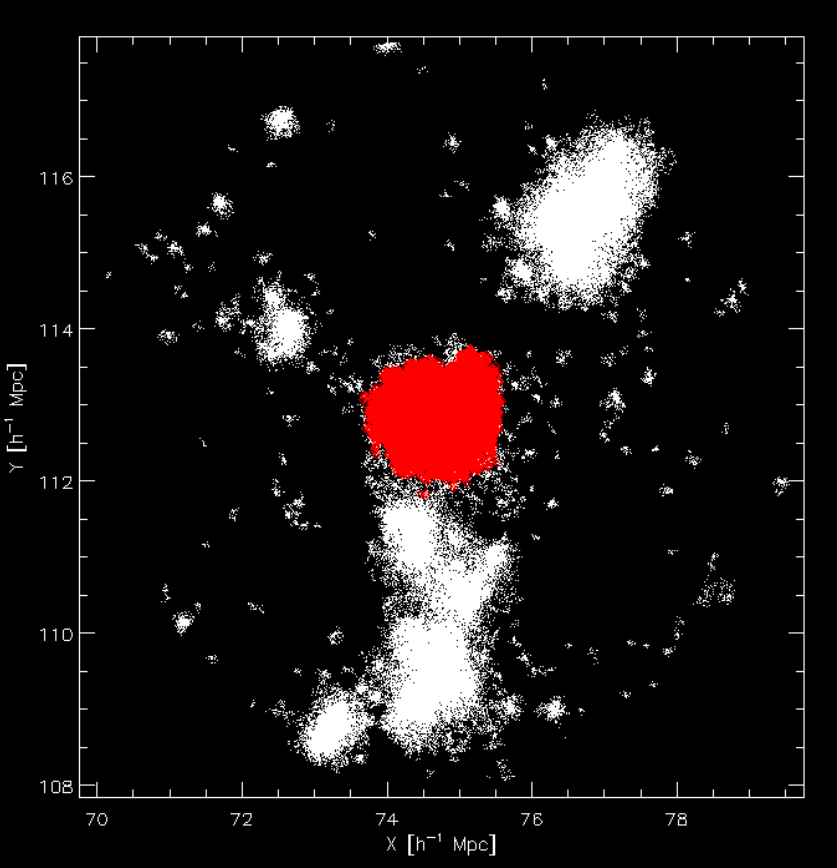
7.0 %



1.5 %


100
10
1
OUR CODE
SUBFIND (Springel et al. 2001)
< N_SUB >
10^10
10^11
10^12
10^13
10^14
FoF Mass [M_SUN h^-1]


118
116
114
112
110
Y [h⁻¹ Mpc]
70
72
74
76
X [h⁻¹ Mpc]


116
114
112
110
108
Y [h⁻¹ Mpc]
70
72
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78
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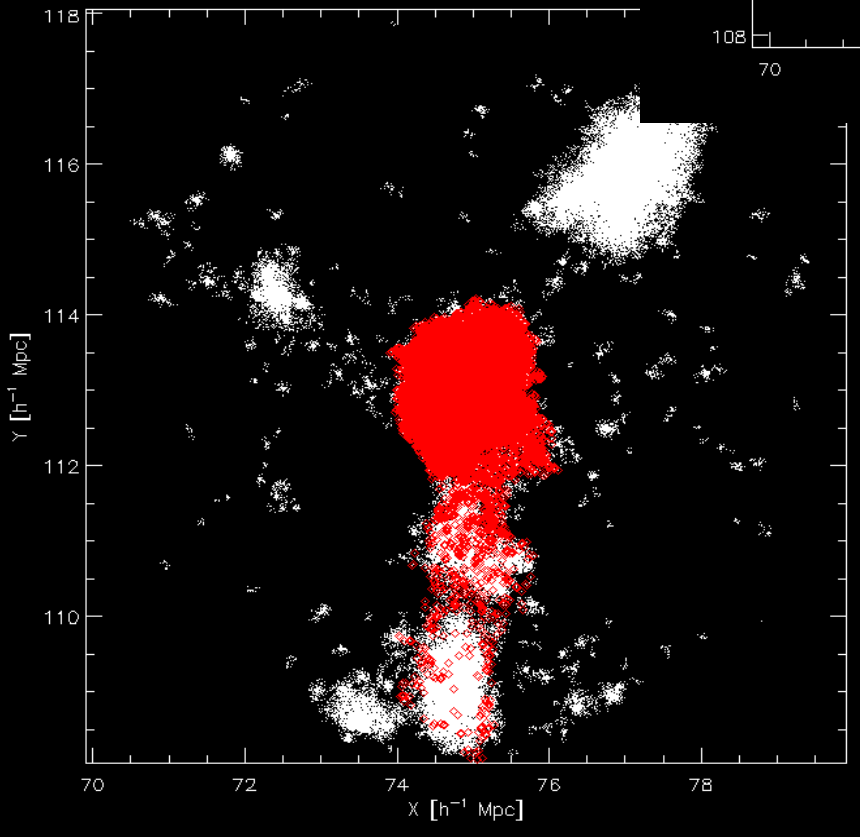
118
116
114
112
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Y [h⁻¹ Mpc]
70
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78
X [h⁻¹ Mpc]

rdoba