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Supercluster characterization in cosmological simulations

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when the velocities of a group of galaxies converge to a single structure, they are said to be part of the same supercluster. This structure has quantifiable properties such as mass, volume, density and inertia, among others. Here we compare cosmological simulations of N-bodies with the results obtained by Tully et al. (2014) when determining these characteristics in Laniakea, our local supercluster. Given the position, velocity and mass data for each body of a simulation, the three-dimensional space is discretized in order to obtain a vector map with the velocity of the center of mass of each voxel. Taking into account the Gaussian behavior of the primordial perturbations in the field of gravity that gave rise to the formation of structure on a large scale, the velocity field in the three axes is smoothed with a Gaussian filter of a certain width σ-vox. To determine the structure formation, the accretion for each voxel is quantified and a scalar field with this information is created. We implemented the watershed algorithm in the scalar field to reconstruct and segregate the superclusters present in the simulation. Evaluating geometric and physical properties we find that Laniakea is an atypical event in terms of form, volume and mass within the framework of cosmological simulations

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