The different physical mechanisms controlling the corpulence of galaxies in the TNG50 simulation

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Nearby dwarf galaxies display a wide variety of corpulence, that is effective radii (sizes) at given stellar mass, from diffuse dwarf spheroidals to compact ellipticals and ultra-compact dwarfs. This suggests different evolution mechanisms controlling their final 'stellar' size. The TNG hydrodynamical simulations present a bimodality in the z=0 size-mass relation (SMRz0) of dwarf galaxies, at half-stellar mass radius ~ 450 pc. Using the TNG50 cosmological hydrodynamical simulation, we explore the evolution of the most massive progenitors of dwarf galaxies (z=0 log(M_stars/M⊙) between 8.4 and 9.2), split into 4 classes of the SMRz0: 1) Normals from the central spine of the main branch; 2) Diffuses from the upper envelope of the main branch; 3) central Compacts from the lower envelope of the main branch and from the secondary branch, both which end up (remain) as centrals of their groups; 4) satellite Compacts from the same parts of the SMRz0, but which end up as satellites.

We have considered a large number of physical mechanisms to explain the compact or diffuse corpulence of some galaxies. I will present the two mechanisms controlling dwarf galaxy corpulence in TNG50, which are different from what people had previously proposed. Finally, compact dwarfs of similar sizes are observed in the GAMA survey, but the bimodality in sizes is less evident and the most compact dwarfs tend to be passive rather than star forming as in TNG50. Therefore, our conclusions should be confirmed with other and future well-resolved cosmological hydrodynamical simulations.