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ABSTRACT

We use the NIHAO galaxy formation simulations to study ultra-violet (UV) emission from circum-galactic medium (CGM) in galaxies ranging from dwarf ($M_{\rm halo} \sim 10^{10}{\rm M}_\odot$) to Milky Way ($M_{\rm halo} \sim 10^{12}{\rm M}_\odot$) masses. We analyze the spatially-extended structures of emission lines from OVI and Ly*alpha*.

Key words: galaxies: evolution – galaxies: formation – galaxies: dwarf – galaxies: spiral – methods: numerical – cosmology: theory

1 INTRODUCTION

This paper is organized as follows: The cosmological hydrodynamical simulations and the methodology for computing metal line emission are briefly described in §2; In §3 we present the results including the Ly*alpha* and OVI emission map, surface brightness and luminosity evolutions of all galaxies in NIHAO sample; §4 gives discussion and summary of our results.

2 METHODOLOGY

2.1 Simulations

The simulations studied in this work are from the NIHAO (Numerical Investigation of a Hundred Astrophysical Objects) project (Wang et al. 2015). The halos to be re-simulated with baryons have been extracted from 3 different pure N-body simulations with a box size of 60, 20 and 15 h^{-1} Mpc respectivelyDutton & Macciò (2014). All halos across the whole mass range with typically a million dark matter particles inside the virial radius of the target halo at redshift $z = 0$. We adopted the latest compilation of cosmological parameters from the Planck satellite (the Planck Collaboration et al. 2014).

We use the SPH hydrodynamics code GASOLINE (Wadsley et al. 2004), with a revised treatment of hydrodynamics as described in Keller et al. (2014). The code includes a subgrid model for turbulent mixing of metal and energy (Wadsley et al. 2008), heating and cooling include photoelectric heating of dust grains, ultraviolet (UV) heating and ionization and cooling due to hydrogen, helium and metals (Shen et al. 2010). The star formation and feedback modeling follows what was used in the MaGICC simulations (Stinson et al. 2013). There are two small changes in NIHAO simulations: The change in number of neighbors and the new combination of softening length and particle mass means the threshold for star formation increased from 9.3 to 10.3 cm^{-3}, the increase of pre-SN feedback efficiency $\epsilon_{\rm ESF}$, from 0.1 to 0.13. The more detail on star formation and feedback modeling can be found in Wang et al. (2015).

2.2 Emissivity Calculation

We first assign the number densities and temperatures of all gas particles inside $2R_{\rm vir}$ to $200 \times 200 \times 200$ grids according SPH spline kernel (Monaghan & Lattanzio 1985):

$$W(r, h) = \frac{8}{\pi h^3} \tag{1}$$

The emissivities are computed as a function of gas temperature and

3 RESULTS

4 SUMMARY

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