THE EFFECT OF STAR FORMATION ON OBSERVED PROPERTIES OF HIGH REDSHIFT ABSORPTION SYSTEMS

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Damped Lyman-alpha absorber systems (DLAs) are thought to be one of the best probes to understand structure formation in the early universe. DLAs are defined as such systems with neutral hydrogen column density N(HI)> 2x1020 cm'2. They have also been considered to be the most important neutral-gas reservoir for star formation at high redshift, and the key to uncovering the mystery of the progenitors of present-day galaxies. For many years, there has been a debate on the nature of the galaxies causing these absorptions at high redshift. One idea is that DLAs are small proto-galaxy clumps formed in the process of hierarchical structure formation. Another idea is that DLAs can be best explained with rapidly rotating, large, cold disks of galaxies. It is believed that through full understanding of the mechanism that control the processes, we are able to construct the history of galaxy evolution. In order to test on these ideas, we used highresolution AMR (adaptive mesh refinement) hydrodynamics simulations to study kinematics properties and abundances of DLAs at redshift z = 3. Our simulations are based on standard cold dark matter cosmology ([Lambda]CDM), and include full radiative transfer and star formation/feedback recipes, which are considered to be the two key ingredients to solve the low velocity-widths problem found in previous numerical simulations. Our results show that although we are able to reproduce the observed column density distribution, our velocity widths are still much lower than the observations. Further more, we plot line profiles through the points with highest radial velocities, which we believe are in the violent star or galaxy forming regions. From the single line profile, we can see some star formation/feedback effects by comparing the simulation runs with and without star formation/feedback. However, in a larger picture, these effects are not very obvious. This is probably due to the small volume size and insufficient grid-resolution. We conclude that it is essential to include full radiative transfer in order to reproduce reasonable HI column density distribution, and for further simulations, we should have larger volume size, and much higher resolution in order to resolve substructures such as star forming regions or supernova explosions.

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