The evolution of the intergalactic medium and the origin of the galaxy luminosity function

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ABSTRACT. The coupling of the Press and Schechter prescription, with the CDM scenario and the Hoyle-Rees-Ostriker cooling criterion leads to a galaxy formation scenario in which galaxies are overproduced by a large factor. Although star formation might be suppressed in the smaller haloes, a large amount of energy per galactic mass is needed to account for the present number density of galaxies. The evolution of the IGM provides a simple criterion to prevent galaxy formation without requiring feedback, since haloes with small virial temperatures are not able to retain the infalling hot gas of the IGM. If the ionising background has decreased since $z \sim 1-2$, then this criterion explains the slope of the luminosity function at the faint end. In addition, this scenario predicts two populations of dwarf galaxies, well differenciated in age, gas content, stellar populations and clustering properties, which can be identified with dE and dIm galaxies.