We have investigated the structures formed in our hydrodynamic cosmological simulation of reionization and its aftermath. We have identified dark matter haloes and peaks of I band luminosity (Harford & Gnedin 2004). We relate the clustering of these structures to the observed angular correlation of galaxies at redshift 4. The observed correlation is best modeled by the multiple occurrence of luminosity peaks in individual dark matter haloes. Preliminary examination of earlier stages of the simulation suggests the importance of tidal interactions between dark matter haloes.

The simulation reproduces the reionization history seen in the Lyman alpha forest of high redshift quasars (Gnedin, 2004) while having a star formation rate at Z = 4 matching the early estimate of Steidel et al., 1999. A comparison with recent measurements of the spectral energy density distribution is shown in fig. 1. The small box size of the simulation (8 h⁻¹ comoving Mpc) severely limits the number of haloes large enough to host more than one galaxy of low magnitude.

To isolate the single halo component of the angular correlation the positions and orientations of the parent haloes were randomized while preserving the relative positions of the luminosity peaks within the haloes. Agreement with observation is good (fig. 3).

References