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Cosmology
Pre-class reading 9

1) Low efficiency of star formation in halos with T<10^4K and T>10^7K due to inefficient rates of cooling of baryons to form stars. For T>10^7K, we get groups and clusters which have a low fraction of baryons that have turned into stars (within galaxies). For T<10^4K, these are expected to have formed stars only at very high redshifts when the density was very high.

2) Usually the infall speeds of the gas are much larger than the sound speed because the gas is cool. This makes the inflating gas supersonic, causing shock fronts to develop, which causes the dissipation of kinetic energy into heat. Applying the viral theorem the gas, 1/2 of the potential energy is equal to the kinetic energy which becomes heat.

3) At high halo masses > 10^12 M, the L vs. M relation flattens out. This is due to the poor efficiency of star formation (the L comes from stars) in these halos which only form groups or clusters. The distribution of low luminosity galaxies flattens out at low luminosities <10^10 L_sun. This can again be attributed to inefficient cooling, wherein halos of these masses <10^10 M could have formed stars only at high redshifts.