ASTR 400B Set 3

William Lake

January 30, 2018

Table

Galaxy Name	Halo Mass ($10^{12} M_\odot$)	Disk Mass ($10^{12} M_\odot$)	Bulge Mass ($10^{12} M_\odot$)	Total Mass ($10^{12} M_\odot$)	f_{bar}
Milky Way	1.975	$7.5 * 10^{-2}$	$1.001 * 10^{-2}$	2.06	0.024
M31	1.921	$1.2 * 10^{-1}$	$1.905 * 10^{-2}$	2.06	0.067
M33	$1.866 * 10^{-1}$	$9.3 * 10^{-3}$	0	$1.959 * 10^{-1}$	0.047
Local Group	4.083	$2.043 * 10^{-1}$	$2.906 * 10^{-2}$	4.316	0.054

Questions

1. The total masses of M31 and the Milky Way are the same in this simulation. They are dominated by the masses of their Halos.

2. The stellar mass of M31 is somewhat larger than that of the Milky Way, which implies that M31 will be more luminous.

3. The Milky Way has 2.8% more dark matter than M31. This is mildly surprising, given that M31 has more stellar matter, which one would imagine would indicate a higher concentration of dark matter, from gravitational considerations.

4. The Milky Way has a baryon fraction of 0.024, M31 0.067, and M33 0.047. These are significantly lower than the 15% observed universally. This could be because significant portions of stellar mass (but not of dark matter) are present in stellar clusters, as opposed to galaxies.