

Homework 2

Thursday, January 26, 2023 6:23 PM

Units: 10^{12} Solar masses

Galaxy Name	Halo (1)	Disk (2)	Bulge (3)	Total mass	f_{bar}
M31	1.921	.12	.019	2.06	.0675
M33	.187	.009	0	.196	.0459
MW	1.975	.075	.01	2.06	.0413
Local group	4.083	.204	.029	4.316	.0540

- 1) Their total masses are the same although their composition is different. Dark matter dominates mass for both galaxies, but the Milky Way has more dark matter.
- 2) M31 has more stellar mass than the Milky Way and thus I expect it to be more luminous.
- 3) M31 has less dark matter than the Milky Way. This is surprising; I would've thought that higher stellar mass necessitates more dark matter mass, but this does not seem to be the case. I'm not super well versed in why this is, but I would guess that maybe it has to do with density of each galaxy.
- 4) This is much higher than the baryonic fraction I calculated for the local group galaxies. I would guess that there are other areas of space where there is no dark matter but some baryonic matter. Perhaps there is gas but no dark matter between galaxies or galaxy clusters, and this significantly raises the universal baryonic fraction