# ASTR 400B Homework 3

Peter Hartman

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## 1 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 | 0.075 | 0.01 | 2.06 | 0.041 |
| M31 | 1.921 | 0.12 | 0.019 | 2.06 | 0.067 |
| M33 | 0.187 | 0.009 | 0.0 | 0.196 | 0.046 |
| Local Group | 4.083 | 0.204 | 0.029 | 4.316 | 0.054 |

## 2 Questions

1. The Milky Way and M31 have near-equal masses in this simulation, and the Dark Matter Halo dominates the mass for both.
2. The Stellar Mass (Bulge + Disk) of M31 is significantly higher than that of the Milky Way, so M31 should be more luminous.
3. The Dark Matter Mass of the Milky way is significantly higher than that of M31, which is expected given that the two galaxies have the same total mass and M31 has more stellar mass
4. The Baryon fractions are 4.1% (MW), 6.7% (M31), 4.6% (M33). These are 4x less than the fraction for the whole Universe. Considering that the gas mass is not large compared to the stellar mass, the rest of the matter must be outside of the galaxies in a circum-galactic medium, or inter-galactic medium.