

## **AST 250 – Spring 2018**

### **Homework Due: Monday April 23**

40. You're at the 21" telescope with your non-astronomy major friend and are looking at Andromeda. You, wanting to educate the masses on astronomy and having just had a high-quality lecture about galaxy collisions in your Astr 250 class, tell your friend that Andromeda is on a collision course with the Milky Way. Your friend starts freaking out, worried that the Earth and our Sun are going to collide with other stars during the major merger. You know what helps when people are freaking out? Math. Let's show your friend the likelihood of the sun colliding with another star in the Milky Way Andromeda merger. Or for that matter, the probability of any star in the Milky Way hitting any other star the M31

You can assume that the average star is a M dwarf ( $R = 0.3R_{\text{sun}}$ ) and the number density is 0.1 star per  $\text{pc}^3$  (the same as the Solar neighborhood of the Milky Way).

- 1) What is the collisional cross section of a star [convert to  $\text{pc}^2$ ]?
- 2) What is the rate of collisions [# of collisions/pc]?
- 3) If the total distance traveled through the galactic collision is the diameter of Andromeda (Andromeda is about as big as the Milky Way), what is the average number of collisions for any particular star?
- 4) With the total number of stars  $N=2 \times 10^{11}$  stars in M31, how many stars would you expect to have a collision?

Imagine life but every time u approximate it gets faster

