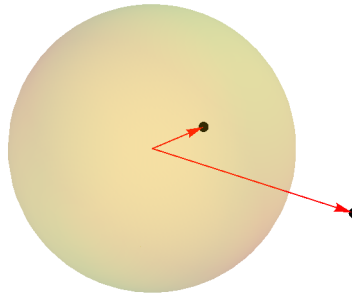


Arvind Borde

# AST 10: Homework 9

1. How does the CfA redshift survey determine distances to the galaxies?
2. What have the CfA redshift and Sloan Digital Sky surveys found about the 3D structure of the Universe?
3. What are the differences among the stellar populations of elliptical and spiral galaxies?
4. Do observations show that stars in galaxies have higher or lower orbital velocities than indicated by the visible matter? What is the implication of this?
5. What's a QSO?
6. Why was the discovery of quasars significant?
7. Can we watch galaxies evolve and interact in "real time"? If not, how do we know the different stages of galactic behavior?
8. Suppose you have a spherical distribution of matter with a fixed density, as shown below:



The "safe" orbital velocity (so that you neither fall to the center nor spiral out) obeys

$$v \propto \begin{cases} r & \text{inside} \\ \frac{1}{\sqrt{r}} & \text{outside} \end{cases}$$

- a) When you are inside the sphere does the orbital velocity go up or down as  $r$  increases?
- b) When you are outside the sphere does the orbital velocity go up or down as  $r$  increases?
- c) Is this consistent with the *expected* rotation curve of galaxies?