

AST 250 – Spring 2018
Homework Due: Monday April 16

36. In the 1933, Fritz Zwicky measured the mass of the Coma Galaxy Cluster using the Virial Theorem and the peculiar velocity dispersion of the galaxies ($\langle v \rangle \sim 1500$ km/s). The cluster is at a distance of 100 Mpc and has over 1000 galaxies within a radius of ~ 2 Mpc and a total luminosity of $\sim 10^{13} L_{\text{sun}}$. Calculate the mass to light ratio M/L (in units of $M_{\text{sun}}/L_{\text{sun}}$) and compare your number to the $M/L \sim 3 M_{\text{sun}}/L_{\text{sun}}$ observed in the solar neighborhood of the Milky Way. This classic calculation was the first evidence for Dark Matter. Hint: Assume that galaxies are distributed uniformly within the Coma cluster when you calculate the cluster potential energy.



Figure 1: Fritz Zwicky being silly.