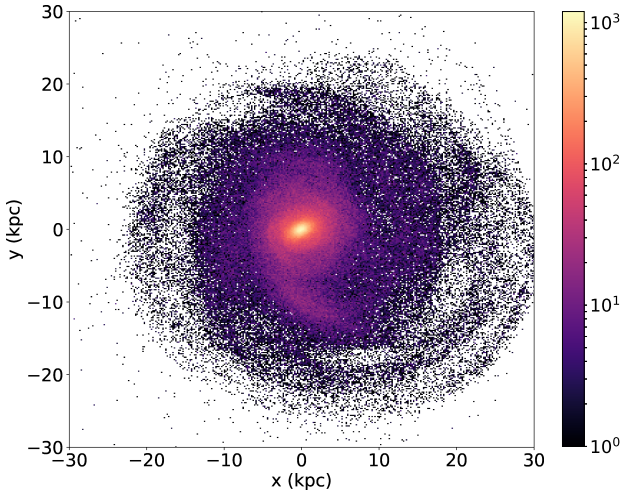
ASTR 400B In Class Lab 6: Contour Plots

Feb 22nd 2018

The goal of this lab is to make contour density plots of a high resolution simulated Milky Way disk and bulge.



1. Update your clone of the Class Github Repo (git pull)
2. Under InClassLabs/InClassLab6 you should find a template jupyter notebook and script called 'InClassLab6_Template'.
3. There is also a file called MW_HR_000.txt, which is a higher resolution of the MW file you have been working with in previous assignments. All columns are the same as in previous data files but the particle masses will be smaller.

1 Part 1

- The template creates a CenterofMass() object and uses that to calculate the COM position of the disk particles.
- The positions of the particles in this file have already been defined for you.

- You will create a contour version of the binned 2D histogram you created in InClassLab 5 (Feb 15th; see Figure).
- The contours are put in by hand using 'mylevels'. Right now, only the max and min contour levels are entered.
- Add more values between the max and min values in 'mylevels' to plot more contours to reveal the disk structure.

2 Part 2

- The template next creates a CenterOfMass() object for the Bulge and calculates the COM position of the bulge particles
- Using only particles in the inner 5 kpc, the a binned 2D histogram revealing the bulge density is plotted for reference in the YZ projection.
- Does the bulge look spherical?

3 Part 3

- The template next plots contours for the bulge density profile.
- Once again, only the extrema are plotted - fill in values between the max and min values in 'mylevels' to plot more contours.
- Over plotted is a red circle. The size of the circle is set by Radius. Add more circles to the plots.
- Do the circles provide a good fit to the contours?

4 Part 4

- If circles don't fit the simulation data, try plotting ellipses instead.
- A and B set the axial ratio of the ellipse and Radius sets the size of the ellipse. Vary these parameters to get red contours that match the black contours (keep A fixed and vary B or vice versa). You don't need to be very precise with this.
- What is the best fit axial ratio of the bulge in this projection (short axis/long axis)?