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motivation

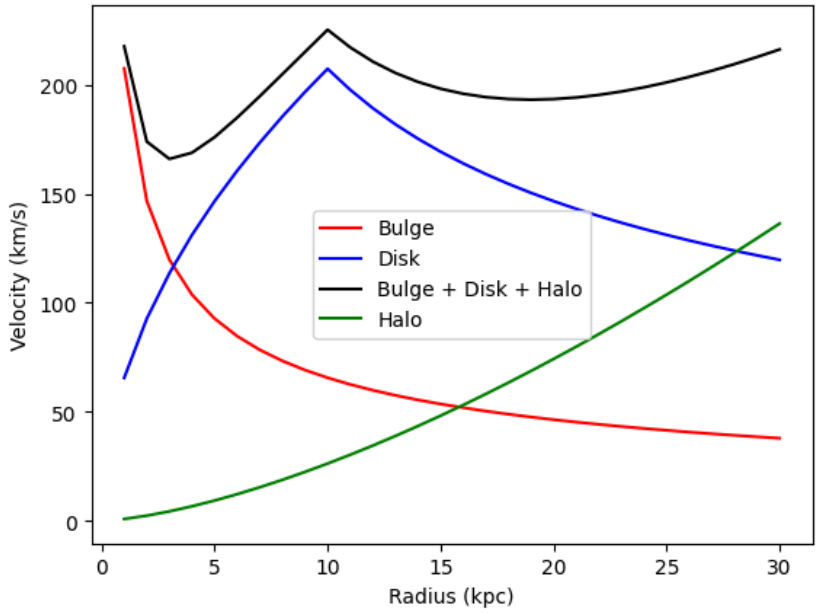
This project covered calculating the rotation curve of the Milky Way galaxy by individually finding the orbital velocity of the bulge, halo, and disk, and then adding them all together.

methods

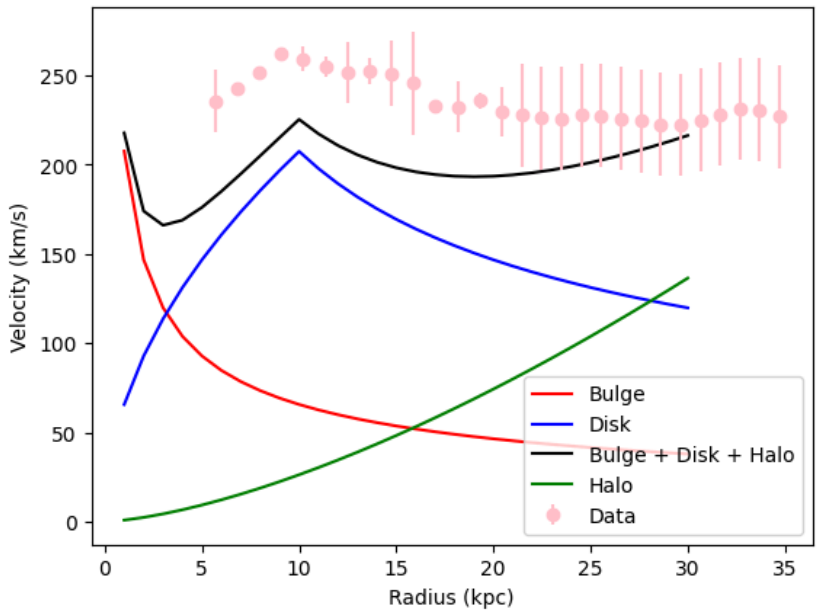
assumptions + calculations

Some general boundaries we have is that the graph spans 30 kiloparsecs.
For calculating the bulge, we assume that it weighs 10^10 solar masses and, again, spans from 1-30 KPC in radius. For the disk, we approximate it as a disk. We have it's mass as 10^11 solar masses, and cut off it's radius at 10 kpc. Finally, for the halo, we approximate it as a sphere with mass as 10^12 solar masses, and a radius of 30kpc.

results



Putting all of the data together, we receive this graph, which is pretty solid, though when compared the bulge and the disk are compared to other graphs of the rotational curve of the Milky Way, there seems to be another component missing. This missing chunk of mass of course is dark matter, which was added to the graph when the halo is factored in.



conclusions

Using data collected from a different yet comparable galaxy we can see that adding the halo made the total rotational curve more accurate.

AI acknowledgement

I used AI to generate code for the volume and enclosed volume of a sphere. Thank you to geminiAI to knowing what those were when I did not.