

Project Proposal

Quadry Chance

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1 Stellar Disk Particle Kinematics

I'm planning to investigate whether the Milky Way and M31 reassert disks between collisions and whether the remnant system is rotating or has a disk present.

2 Why it Matters

This question is relevant to galaxy evolution because it seeks to answer if dry mergers can result in lenticular galaxies or rapidly rotating ellipticals. The formation of S0 galaxies is poorly understood. They seem to represent some transition from disk galaxies to elliptical ones. Using this simulation I can investigate if a lenticular galaxy is a possible remnant of the MW-M31 collision from a merger without gas.

3 How Will I Know?

The simulation data contains velocity data for each particle and I can think of a few ways to use that information. The could be compared the velocity dispersion to the circular velocity over time. Changes in the dominant support mechanism would indicate a change in the morphology of the merging galaxies. There should be distinct signatures for disk and elliptical galaxies. It would be a little harder to tell a spiral from a lenticular. This could be done at multiple radii to account for a large bulge indicative of a lenticular or disk forming in the interior of the remnant. I could also compare the velocity dispersions in the x, y ,and z directions to see if there is a preferred direction of movement.

4 Tools I Will Need

I can use our existing code for most of these questions. The velocity distributions and orbital velocities should tell the story accurately enough if I'm looking at the right particles. I may need to write a script to identify particles that were previously identified as disk particles before them into bulge particles

if the remnant is indeed a lenticular galaxy. I could also develop a code to view the remnant from random angles to compare the axial ratios to that of a spiral galaxy. Lenticulars will have more angles with a large axis ratio than spiral galaxies. I'm not sure if I can use the particle density as a proxy for luminosity, but if I can, the luminosity profile of the remnant would also be useful in answering these questions.