

Carl Ingebretsen ASTR400B answers:

- 1) The Milky way and Andromeda make 3 passes before finally merging. These correspond to the minimums in the separation graph.
- 2) As the separation grows smaller between the galaxies, the frequency of the velocity oscillations grows larger. This makes sense since as the galaxies grow closer they orbit faster which means the velocity oscillates faster.
- 3) The Milky Way and the Andromeda Galaxy merge at around 6.4 Gyrs from the start of the simulation. At around the same time the velocity separation of M33 and M31 seems to stabilize and spiral in separation at a roughly constant rate.
- 4) The decay rate of M33's orbit based on the ratio of successive apocenters seems to be maybe 15 kpc/Gyr. This would imply M33 would merge with the MW/M31 galaxy in about 11 Gyrs after the start of the simulation.