HW-6

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1 Answers

1. The MW and M31 will have 2 close encounters and in the fourth encounter, the system in going to merge into one. Notice that there is a slight bump in the separation curve after the third encounter. So, just to be on the safe side, I said it is going to take 4 encounters for the MW-M31 system to merge.

2. As the separation decreases with time, the orbital velocity of the systems (MW-M31 and M31-M33) increases proportionally.

3. The final merger of MW and M31 is shown at around 8 Gyr. During the second approach ($\approx$ 6 Gyr), the orbit of M33 seems to deviate from its perfect parabolic (decaying) path. At the instance of the final merger, the orbit of M33 seems to come within 50 kpc of the merging system. From there on, the orbit of M33 continuously decays.

4. After 6 Gyr, the M33 galaxy seems to decay at around 50 kpc per year (I am hand-waving here) and that decay rate roughly stays constants. So, if M33 is 75 kpc away and it maintains this decay rate, then it will take 1.5 years to merge with the combined remnant of MW and M31.