2. Both models agree reasonably well until M33 has its closest approach with M31, after which M33 rebounds for a far longer time in the analytical model. In the numerical model, a ~Gyr after the first close approach, M33 begins accelerating back towards M31. In the analytical model, this doesn't happen until much later. At later times, M33 continues to draw closer to M31 in the numerical model whereas M33's average distance to M31 stays the same in the analytical model.
3. The missing physics needs to be something that would cause M33 to accelerate back towards Andromeda after a close approach. This most likely is dynamical drag, wherein M33's rearrangement of M31's halo leaves a dark matter overdensity behind it, which tugs M33 back towards Andromeda harder than the original configuration of dark matter. This process over time draws M33 towards M31, accounting for the difference between the end behavior of the numerical and analytic models.
4. We could account for the Milky Way the same way we accounted for Andromeda, by modelling its three components as each creating a potential M33 travels through. We would simply sum the MW-induced accelerations and the M31-induced accelerations. As MW and M31 merge, this approach would make less and less sense, necessitating a numerical model. However, we may be able to return to an analytical model if we learn the properties of the Milkdromeda galaxy and treat it as one potential-creator.