

Fate Of Stars At Sun's Location In The Disc Of M31

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March 8, 2018

Our star system, the solar system lies 8 kpc away from the center of our galaxy, Milky Way. At this distance from the galactic center, sun formed about 4.5 billion years ago and did not become unbound. It orbits the galactic center with an average speed of about 220 km/s. The goal of my project is to simulate the life of stars at sun's location but in M31's disk and predict their fate.

This is an important topic in the study of galaxy evolution because star formation is an important process in galaxy evolution. Collision of galaxies can also give birth to new stars as it can ignite gas in the galaxy. Although it is unusual for stars to directly collide during a galaxy collision, stars are rearranged into new structures, some becomes unbound and drifts away into intergalactic space while most falls back in the original galaxy. Since M31 is predicted to collide with our own galaxy in about 4 billion years, fate of stars in sun's location in M31's disk is an important topics to study.

Using the simulation data, I can study the kinematics and positions of the sun's analogs. I will study how the kinematics and positions change as a function of time. I also want to keep track of whether some of them become unbound and the percentage of unbound analogs. In the simulation I will calculate the 3D position and velocity of the desired particles (particles at 8kpc of galactic center) using the CenterOfMass.py code we developed in class. By doing this for multiple snapshots (individual points in time), I can study the position and kinematics of sun's analogs as a function of time. I can also keep track of unbound analogs by checking if any of the analogs have a higher velocity than the escape velocity of M31 and thus obtain a percentage by comparing it to the total number of analogs.