In the standard cosmological picture, galaxies grow hierarchically through the accretion of smaller galaxies. Across the Universe we see snapshots of galaxies undergoing minor and major mergers, but only in very nearby galaxies do we have access to the wealth of observations necessary to piece together the full accretion history of a galaxy. In particular, in the Milky Way we can make detailed observations of the positions, velocities and compositions of individual stars from which a full story of our Galaxy can be built.

The ground-breaking astrometric satellite Gaia has opened up this possibility. Gaia's measurements of the locations and motions of stars in the Galaxy have been combined with results from spectroscopic surveys, e.g., APOGEE, which measure the chemical abundances in stars. From this rich data, it is clear that the stars in our Galaxy clump in particular chemo-dynamical configurations, indicative of a series of past merger events. The most significant of these merger events appears to be the Gaia-Sausage, or Gaia-Enceladus, merger about 10 Gyr ago, although a number of other smaller merger events have been suggested (e.g., Sequoia). Further evidence for this early merger is found in the population of Milky Way globular clusters that show a clear chemo-dynamical separation into in-situ (those formed in the Milky Way) and accreted (some of which can be associated with the Gaia-Sausage).

The exact details of the Gaia-Sausage merger event (e.g., its infalling orbit and its gas content) are debated, but clues may lie in the effect the merger had on the stars of the early Milky Way disc, which is expected to have been severely disrupted. Lower-mass analogues of these early merger events are currently ongoing in the Milky Way, e.g., the Sagittarius dwarf galaxy and the Magellanic Clouds. Both of these mergers are perturbing the Milky Way disc and halo, leaving characteristic dynamical patterns – another key discovery of the Gaia satellite.

In this essay, you should review the current understanding of the accretion history of the Milky Way and discuss the methods employed to reach these conclusions. Your essay could address the following points:

1. The chemical and dynamical evidence for an early major merger event in the Milky Way, and the likely properties of the merger (e.g., mass, merger time and orbit).

2. The possible impact of this merger on the early Milky Way, and its observational signatures.

3. The hunt for smaller accretion events.

4. The properties of the Milky Way's globular cluster population.

5. Ongoing accretion onto the Milky Way and its effect on the dynamics of the Galaxy.

**Suggested references**


