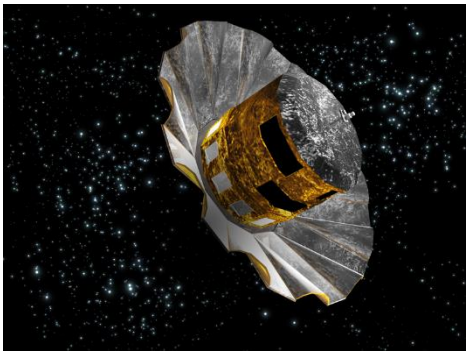
A HISTORY OF THE MILKY WAY

Looking at the summer Milky Way on a clear, dark night from the shore of a lake is a wonderful experience. It all looks so beautiful and peaceful. The images of other galaxies, such as the Andromeda Galaxy convey a similar feeling. However, these impressions are incorrect. Out there among the galaxies the prime directive is to eat or be eaten, sometimes at the same time. Our galaxy, the Milky Way, grew in this way, and at the moment is busy feasting on its smaller neighbours.

This new knowledge is the result of a recent big change in the way we do astronomy.

In the past we pointed telescopes at objects of interest, one at a time. However, we are now making telescopes that can observe huge areas of sky, collecting enormous amounts of data from everything they can "see". After a pause to let those who put the projects together get a first go at the data, it is made available to all researchers at sites in various countries around the world, like our Canadian Astronomy Data Centre.



One major instrument is Gaia, a space telescope system parked 1.5 million kilometres away in space. It has so far catalogued the motions and other properties of two billion objects in our galaxy. Stars can tell us a lot. How they are moving tells us where they were in the past and possibly where they came from. Their surface layers are made up of the stuff from which they formed, unaffected by their own energy production. Stars formed early in the history of the universe were composed of only hydrogen and helium. Later generations formed from clouds containing the remains of previous generations: elements other than hydrogen and helium. This tells us something about the age of the star and where it was born. The ability to sort through large numbers of observations seeking commonalities and finding out where stars were in the past is yielding some fascinating results.

Stars are often born in clusters or groups, sharing the same birth cloud. Then, when the newly born stars have burned their birth cloud away, they disperse. It has been possible to find siblings and track them back to their birth location. However, the biggest surprise was locating streams of stars and star clusters that came from the assimilation of other galaxies.

A Magellanic Cloud

At the moment the Milky Way is swallowing a small galaxy, which has an orbit oriented at almost right angles to the disc of our galaxy. It is also snacking on material from several small galaxies, including the Large and Small Magellanic Clouds. There is evidence of previous galaxies becoming part of ours. Now we believe this is how galaxies form and grow; small ones combine into bigger ones, which then gorge themselves on the neighbours.

We believe that the Milky Way was born shortly after the Big Bang, as a concentration of material, which pulled in more and more. It has been suggested that a big growth spurt happened some 11 billion years ago when the young Milky Way merged with another large galaxy, which has been referred to as the Kraken.

It might be surprising, but any inhabitants of planets orbiting stars in colliding galaxies are unlikely to be affected. Stars lie far apart and the chances of collisions are small. What those inhabitants would see is over time the appearance of their equivalent of the Milky Way in the sky might change, and the birth of lots of new stars will take place as the cosmic gas clouds collide.

The small chance of anything nasty happening is reassuring, as we are heading for a head-on collision with the Andromeda Galaxy, which is a bit larger than the Milky Way. We are heading for each other at more than 100 km/s and will collide in about 4.3 billion years. Mark your diaries.

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