Galaxy formation and evolution are ones of the fundamental processes in astrophysics that are not fully understood. According to the currently preferred cosmological model, galaxies are at least partly built in a hierarchical manner via the accretion of smaller fragments or dwarf galaxies. The evidence of these processes is best visible in the haloes (outskirts) of galaxies, where the accreted dwarf galaxies are tidally disrupted and form stellar streams. By studying these accreted components we can infer key properties of the host galaxy, such as its gravitation potential and assembly history.

Studying of galaxy haloes is a formidable observational challenge, because the density of stars in these regions is low, making them difficult to observe. An alternative approach is to use globular clusters (GCs) as tracers of the stellar properties. GCs are spherical collections of stars, comprising several thousand to several million members in each, making them very bright and easily observable objects. Due to its close proximity, our nearest neighbour, the Andromeda galaxy (M31) is a desirable target. It hosts more than 500 confirmed GCs, listed in the Revised Bologna Catalogue (RBC), over 100 of which are located in the far outskirts of the galaxy. In the past several years I led a major spectroscopic campaign, aiming to determine the radial velocities of the halo GCs around M31. The plot I am presenting conveys the key results coming from this work.

The basis of the plot is a panoramic view of the metal poor stars in M31. The map is slightly smoothed to enhance the various stellar over-densities in the halo, marked with the coloured contours, which are the remnants of past accretion events. The coloured points represent the GCs in the halo of M31, which were part of the spectroscopic survey. The colours represent their radial velocities, as if they were observed from the centre of our Galaxy, and they are corrected for the systemic motion of M31. The white points are halo GCs that are not yet spectroscopically observed, while the gray points are GCs lying in the disk of M31. The schematic on the top right of the plot corresponds to the orientation of the major and minor axis of M31. To guide the two circles having radii of 30 and 130 kpc are placed.

The first key result it is that the GCs in the halo are primarily projecting onto the substructures. Moreover, the groups GCs lying along particular substructures exhibit various velocity patterns and correlations, linking them to the stellar streams. Thus, it is seen how we can use GCs to study the build up of galaxies. The second key point is the detection of a coherent rotation of the halo GC system of M31. Looking at the map, one can notice that the GCs in the top left region have systematically higher velocities than those in the bottom right. This has important implications regarding galaxy formation models.

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