DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Our Galaxy, the Milky Way, is formed of billions of stars, interstellar gas and dust, and dark matter. Due to the enormous size of the whole system (more than 100,000 light years across) we are unable to see it from a distance. Moreover, the location of our Sun does not help us. Together with other stars of the same age (a few billion years) the Sun is located inside a disk full of interstellar dust that severely hampers our observations. Despite a huge progress over the last two centuries, we still do not know how the Galaxy looks like in details and how it looked like in its early stages. We suppose that the primordial, roughly spherical structure was formed from small fragments. About 11 billion years ago the disk emerged, in which next generations of stars were born, including the Sun. We can learn on the early stages of the Milky Way evolution by investigating the distribution and properties of its oldest objects. These objects are pulsating variable stars of RR Lyrae type. They are at least 10 billion years old. Since RR Lyrae stars are bright and relatively easy to find thanks to characteristic regular brightness variations, they are widely used by astronomers as distance indicators up to distances of a few million light-years. These variables can be found everywhere in the Galaxy: in the central bulge, Galactic halo, and Galactic disk. Up to now, nearly 40,000 RR Lyrae stars have been discovered in the inner regions of the Galactic bulge, mostly thanks to long-term high-quality photometric observations in optical wavelengths by the OGLE survey. In recent years, about 15,000 variables have been detected in the Galactic halo by various wide-field surveys. Currently, OGLE monitors so far unexplored outer bulge regions and the whole Milky Way stripe visible from Las Campanas Observatory, Chile where the OGLE telescope is located.

The aim of the proposed project is to obtain the most complete map of Galactic RR Lyrae type stars that will help us to understand the global distribution of ancient populations. First of all, we plan to fill the gap between variables from the bulge and variables from the halo. It seems that properties of the old populations in the two regions are different by shape and chemical composition. New data will allow us to trace the changes over different galactocentric distances. It is extremely interesting to search for any substructures in the distribution of RR Lyrae stars. In the last 25 years many streams and overabundances have been detected in the halo. These are remnants of tidally disrupted dwarf galaxies by the gravity of the Milky Way. No doubt there must be substructures in the direction of the Galactic disk. It would be very exciting to discover a massive satellite dwarf there. Recent models of the Milky Way formation, that include dark matter as the main ingredient, show a deficit of observed dwarf galaxies and too few massive satellites in and around the Milky Way. The new collection of RR Lyrae stars will also help us to indicate directions in the Galactic disk in which large amount of dust resides. We will be able to look for places where the dust absorbs the light in a non-standard way.