GLOBAL Assembly- Building up the Milky Way Halo in the era of multiple stellar populations

In the Galactic halo the footprints of early hierarchical processes can be easily recognized, with some still observable events, such as the merging between the Sagittarius galaxy and the Milky Way. With the discovery of multiple stellar populations in globular clusters (GCs), we are entering a new era in the study of the halo. We now know that typical Milky Way GCs host different stellar populations, with some of them resembling the Sagittarius nuclear GC M54, and Omega Centauri, proposed to be the survived nucleus of a dwarf galaxy.
Recent photometric effort has revealed that the "populations pattern" in GCs is even more complex than previously believed, with the observation of minor populations for which we still do not have information of their nature, i.e. of their chemical composition.
Many aspects about the nature of GCs are matter of a lively debate: Which is the origin of GCs? Could have some of them been former nuclei of dwarf galaxies? Which is their contribution to the halo? To answer these questions we lack a systematic and comprehensive analysis of the nature of “all” the stellar populations observed in GCs. Recently we have photometrically detected multiple stellar populations in the young GCs of the Magellanic Clouds (age of few hundreds Myrs). Are these the young counterpart of the old Milky Way GCs (10<age<13 Gyrs)? If yes, we have the unique opportunity to analyse, in the local Universe, an obscure phenomenon occurred at high redshift. To address this issue a chemical characterisation of the stellar populations observed in these young GCs is needed.
Thus, the new revolutionary photometric discoveries impose a major effort in the chemical/kinematical analysis of this phenomenon. With this project, I propose to exploit my expertise in spectroscopy in close synergy with photometric techniques to provide for the first time a full characterisation of all the observed stellar populations in GCs to reconstruct the phases of their formation and evolution.

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