



Contribution ID: 68

Type: **Talk**

Multiple Stellar Populations Speculations on Cluster Migration and Gas Re-Accretion

Monday, 19 August 2024 10:55 (20 minutes)

The formation of multiple populations of stars in globular clusters and their further evolution is still the subject of much debate and awaiting resolution. Many scenarios have been proposed to explain their formation. One of the most commonly proposed is the AGB scenario, in which chemically reprocessed gas from the envelopes of AGB stars mixes back with primary gas flowing into the center of the cluster.

Based on this scenario, about two hundred MOCCA code simulations of cluster evolution have been carried out, considering additional physical processes mainly related to the external environment in which globular clusters live. These processes are related to taking into account: the time shift of the formation of the second population of stars, their different concentrations, initial mass functions, deviations from virial equilibrium, migration of globular clusters and the influence of dynamical charring on the orbit of clusters. Analysis of the simulation results showed that the observed parameters of multiple stellar populations and the global parameters of clusters associated with the Milky Way are well reproduced, in particular, it seems that the lack of visible multiple populations for young star clusters can be explained. I will summarize the conclusion resulting from these simulations in the form of a speculative scenario.

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Session Classification: Formation of dense stellar systems across cosmic time

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