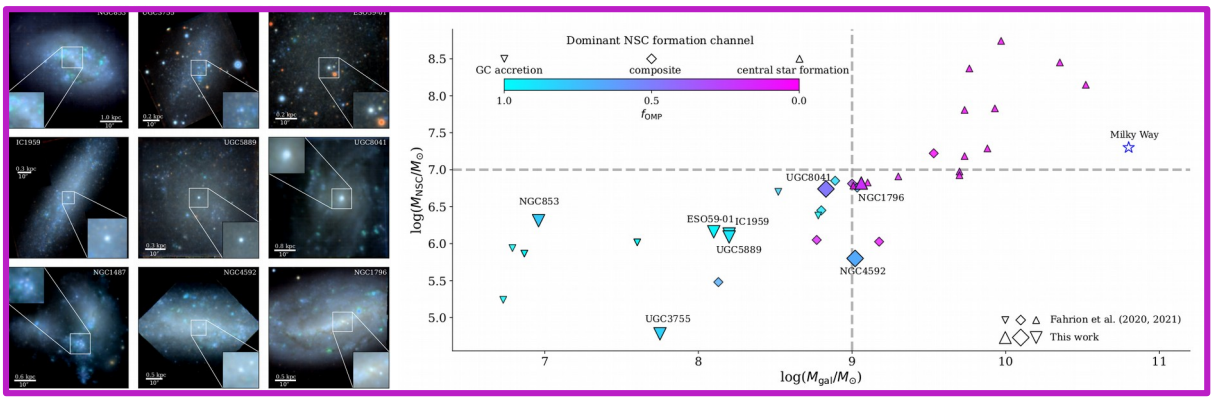
Title: Nuclear star cluster formation in dwarf galaxies
Supervision: Prof. Francine Marleau
Contact: francine.marleau@uibk.ac.at



Description:
The compact stellar structures observed at the dynamical center of many galaxies, known as nuclear star clusters (NSCs), are the highest stellar density objects in the Universe with effective radii of only a few parsecs and typical masses on the order of 10^5 to 10^8 solar masses. Recent studies of galaxies in the dense environment of clusters show that while low-mass NSCs in dwarf galaxies form predominantly out of the merger of globular clusters (GCs), high-mass NSCs in massive galaxies have assembled most of their mass through central enriched star formation. However, studies of NSCs in the dense environment of clusters may not provide a complete picture of their formation and evolution. There is growing evidence that the nucleated fraction in dwarf galaxies depends on the environment of the host; at a given stellar mass, the nucleated fraction decreases towards lower local density environments. One possible explanation for this environmental difference could be the effect of tidal perturbations on the dwarfs. Numerical simulations show that dwarfs located in the outskirts of clusters experience tidal disruption that extends GC orbits and lengthens the dynamical friction timescales, making the formation of nuclei difficult. While in the core cluster, the tidal perturbations compress and protect the dwarf integrity, leading to the formation of nuclei by the migration and merging of the GCs.

For this project, the properties of NSCs in a sample of newly identified dwarf galaxies will be determined using recently obtained data from the Hubble Space Telescope and the Very Large Telescope. The analysis and interpretation of the results will then be discussed in the context of the proposed formation pathways for the NSCs in these low-mass galaxies.