Hubble Space Telescope

Cycle 15 AR Proposal

Novel Analysis of Stellar Populations and Constraints on Galaxy Evolution

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Scientific Category: UNRESOLVED STELLAR POPULATIONS

Scientific Keywords: GALAXY FORMATION AND EVOLUTION, LOCAL GROUP GALAXIES, RESOLVED STELLAR POPULATIONS

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Legacy: Yes

Abstract

We propose to utilize HST archival data to develop a new method for the reconstruction of star formation histories of galaxies at all redshifts. In particular, using ground-based and HST archival data we will develop a method that is based on the distribution of pixel values rather than stellar photometry. This new conceptual appropach accesses data below an image's limiting magnitude and does not introduce many of the uncertainties inherrent in crowded-field photometry. Both will lead to significantly tighter constraints on the ancient star formation history. Comparing the results of this technique applied to the ground-based images with the results of the standard method on HST color-magnitude diagrams will validate (or not) the specific algorithms we develop. Once we have developed a succcessful technique it can be applied to HST data of galaxies in the nearby universe (for example, HST images of M 33 are comparable to our ground-based images of the LMC). By varying the angular pixel scale in the analysis we will be able to produce internally self-consistent analyses of star formation histories at all redshifts. For the nearby universe this technique maximizes the information extracted from the existing imaging - for the distant universe in enables direct comparison to the local star formation histories. We will make the algorithm(s) public, as we have done with our more classical star formation reconstruction code, StarFISH.

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