[GC-09] The Star Formation History of Low Surface Brightness Galaxies

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The star formation histories of low surface brightness galaxies are interesting but poorly constrained. These objects tend to be rather blue, contradicting the initial impression that they may simply be faded remnants of higher surface brightness galaxies whose star formation has finished. Other scenarios span a broad range: a young mean age, less dust, a lower metallicity, perhaps even a variable IMF. Distinguishing between these scenarios requires sufficient information to build stellar population synthesis models which, if not unique, at least exclude certain possibilities.

The total stellar mass (M ∗) of a galaxy is most closely traced with the K s -band light. Considering that this mass must form over a Hubble time, this in effect gives a measure of the time averaged star formation rate (< M > [approximate] M ∗ H 0). Ha emission traces the location of star formation, and also provides a fairly robust quantitative measure of its current rate (M ∗ . We have obtained near-infrared broadband photometry and Ha photometry of a large sample of low surface brightness galaxies to measure the current and the time-averaged star formation rate in order to constrain their star formation histories.

The current star formation rates of LSBGs generally are higher than their past star formation rate, suggesting that the mean age of their stellar population is relatively young. This may stem from either a late epoch of formation or a sluggish evolution. In the latter case, the star formation efficiency may be an increasing function of time, perhaps due in part to the slow build up of metals and dust. Nevertheless, star formation remains sporadic and is generally not well organized across the disk.

We find a strong correlation between the ratio of current to past average star formation rate and the gas mass fraction. Galaxies with large reservoirs of gas have relatively high current SFRs. There is a conspicuous absence of high gas mass fraction, low SFR galaxies, suggesting that the observed trend is not driven by bursts of star formation with short duty cycles.