Testing Density Wave Theory with Stellar Populations around Spiral Arms in M81

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We study the relative differences in the star formation histories (SFHs) of several regions around the spiral arms of M81 to test whether the grand-design spiral arms of M81 support density wave theory. To measure the spatially resolved SFHs of each region, we model the observed color-magnitude diagrams (CMDs) constructed by *Hubble Space Telescope* (HST) F435W and F606W optical data. Since systematic angular offsets among tracers at the different stages of star formation (SF) are predicted if the SF in spiral arms are strongly correlated with stationary density waves, a systematic time delay in the SFHs of different arm regions would be expected as well. However, we detect no such time delay in the SFHs. Thus no clear evidence for supporting the density wave theory is found in this study.