# The spatially resolved star formation histories of post-starburst galaxies in SDSS-IV MaNGA

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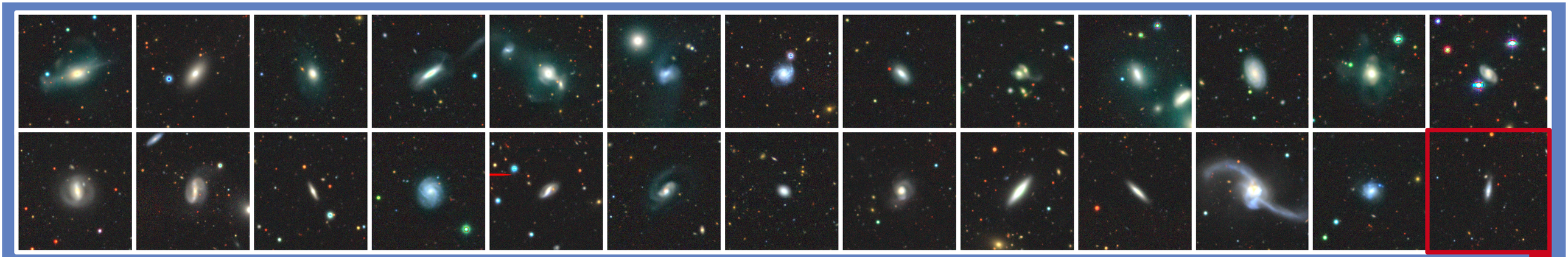
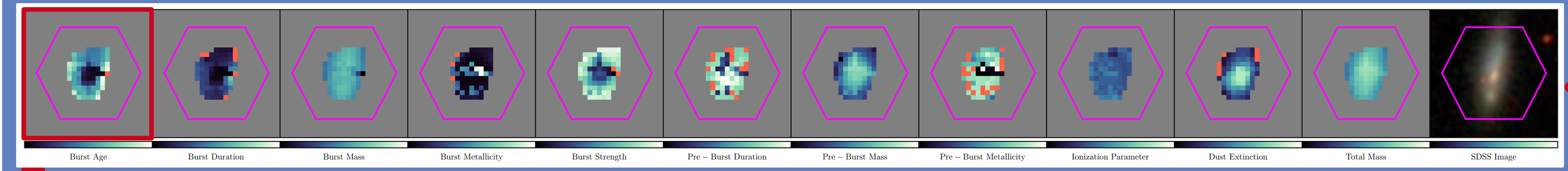
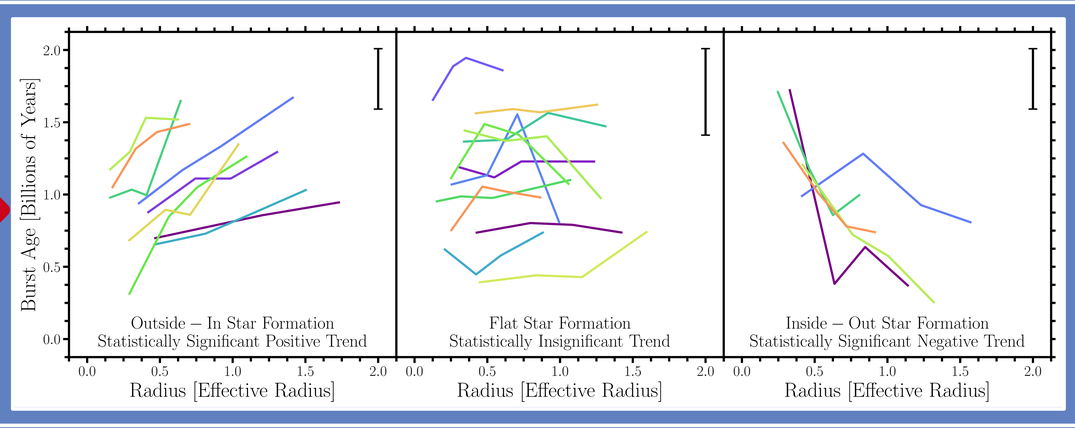


We present a detailed study of the spatially resolved star formation histories (SFHs) of 67 post-starburst ("E+A") galaxies using integral field data from the Mapping Nearby Galaxies at Apache Point Observatory (MaNGA) in the fourth-generation Sloan Digital Sky Survey (SDSS-IV). These galaxies are identified as post-starburst based on their high fraction (> 12.5%) of spaxels with strong stellar Balmer absorption lines (indicating a recent starburst) and weak nebular emission lines (indicating no ongoing star formation). This new approach selects roughly eight times as many post-starburst galaxies when compared to traditional techniques that use the integrated spectrum, but is also tuned to recover the subset of traditionally-selected galaxies. The above figure shows legacy images from the Dark Energy Spectroscopic Instrument (DESI) for 26 representative post-starburst galaxies from our sample, where each image is 2 arcmin to a side.




The two-dimensional (2D) spatial distribution of post-starburst spaxels varies widely among our galaxies whereas traditional methods find mostly centrally concentrated post-starburst regions. We apply stellar population synthesis models to fit the SFHs over the 2D maps, finding that more than half of our galaxies exhibit statistically significant one-dimensional (1D) radial trends in inferred physical parameters such as the time elapsed since the beginning of the starburst (or "burst age") and the fraction of the stellar mass produced in the starburst (or "burst fraction"). The above figure shows 2D maps for a post-starburst galaxy from our sample, where values are increasing as you move from left to right in each colorbar.




| Positive Trend Galaxies | Negative Trend Galaxies |
|---|---|
| Fewer Bars | More Bars |
| Smaller Axis Ratios | Larger Axis Ratios |
| Larger Post-Starburst Spaxel Fraction | Smaller Post-Starburst Spaxel Fraction |

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For galaxies that exhibit significant radial trends in burst age, two-thirds have positive trends (corresponding to outside-in star formation, beginning in the outskirts and proceeding inward) while one-third have negative trends (corresponding to inside-out star formation, beginning in the center and proceeding outward). These variations among radial gradients suggest different evolutionary processes are responsible for the creation of post-starburst galaxies. The above figure shows 1D radial trends with burst age for 26 representative post-starburst galaxies from our sample (the same galaxies as the ones in the first figure), where typical error bars are shown in the upper right corner of each panel.