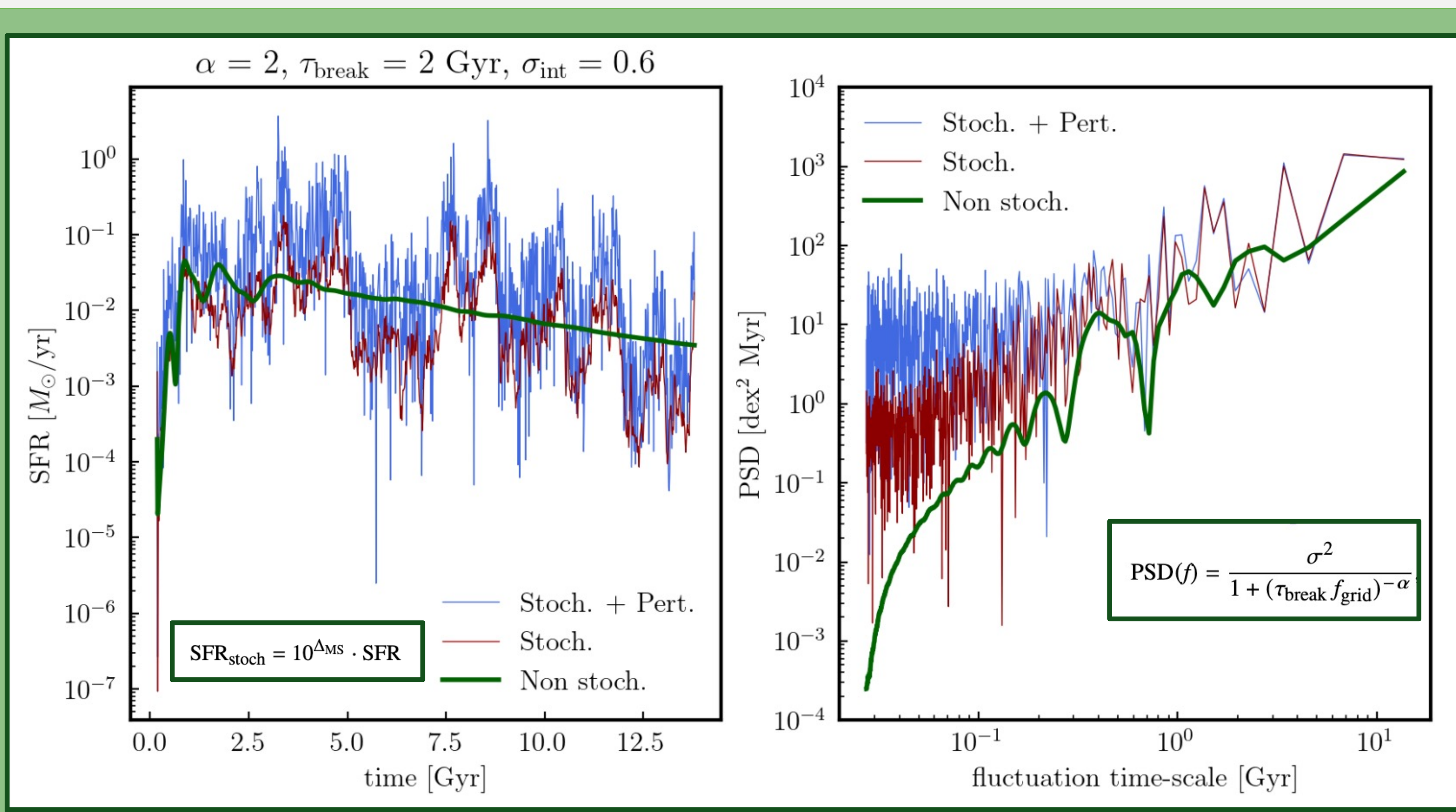
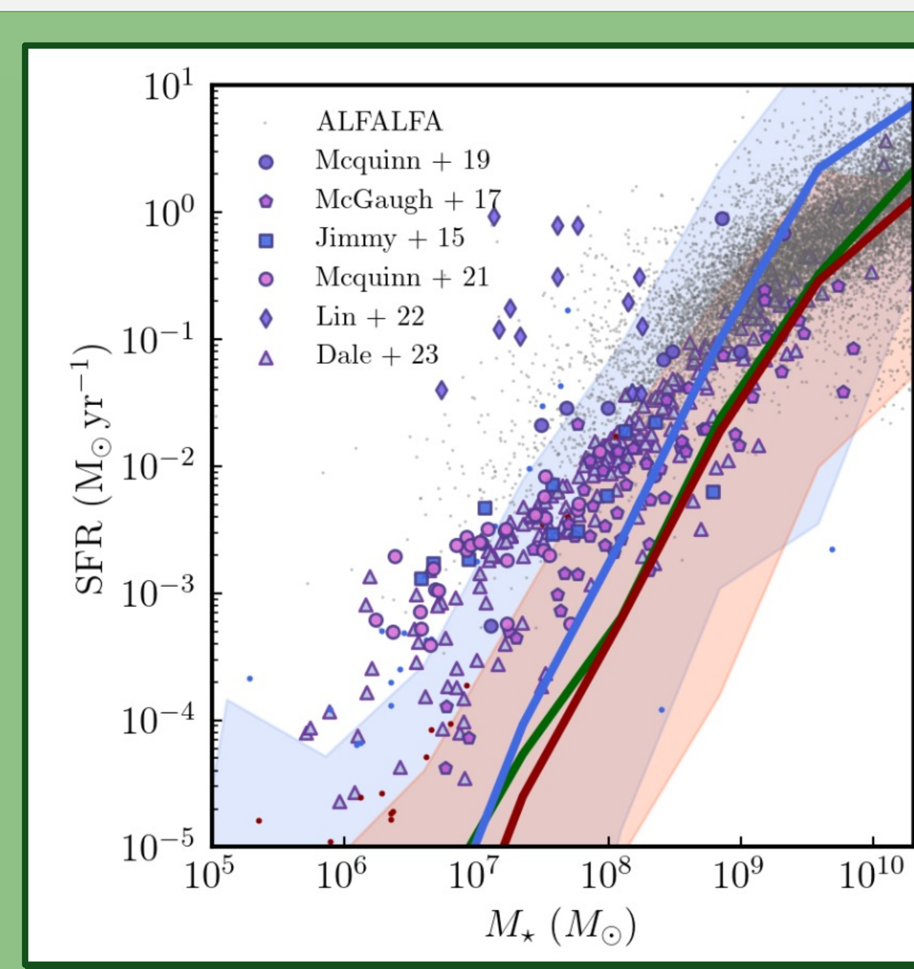
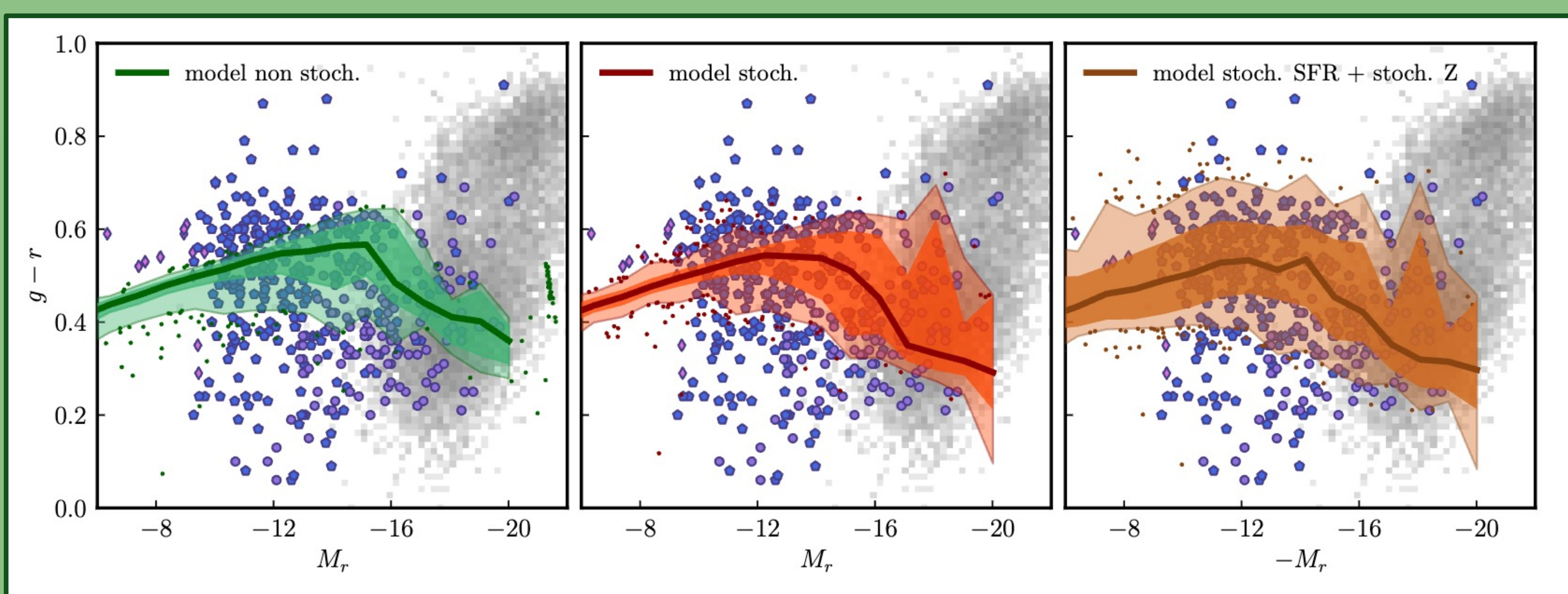


SFH (left) and the corresponding **power spectral density** (PSD, right) for a sample galaxy. Stochastic star formation (red) adds more power on short time-scale fluctuations compared to non-stochastic star formation (green). To match the level of stochasticity in extreme starbursting galaxies, we perturb the stochastic star formation with additional short-term fluctuations (blue).



SFMS for observation samples and our model galaxies. The three model lines have the same color code as the figure on the left. Our model agrees with observations quite well, except for extreme starbursts like those in Lin et al. 2023 require an even **higher level of stochasticity**



Color – magnitude diagram for model galaxies in non-stochastic (left), stochastic (middle), and stochastic SFR + stochastic metallicity runs (right) compared to observations such as MegaCam survey (diamond), SAGA (circle), and ELVES (pentagon). Bursty star formation **increases the scatter in color to the observed level only for bright dwarf galaxies**; scatter in color could also be due to **stochasticity in metallicity**, but the level of stochasticity required leads to an over-estimate of scatter in the metallicity – mass relation

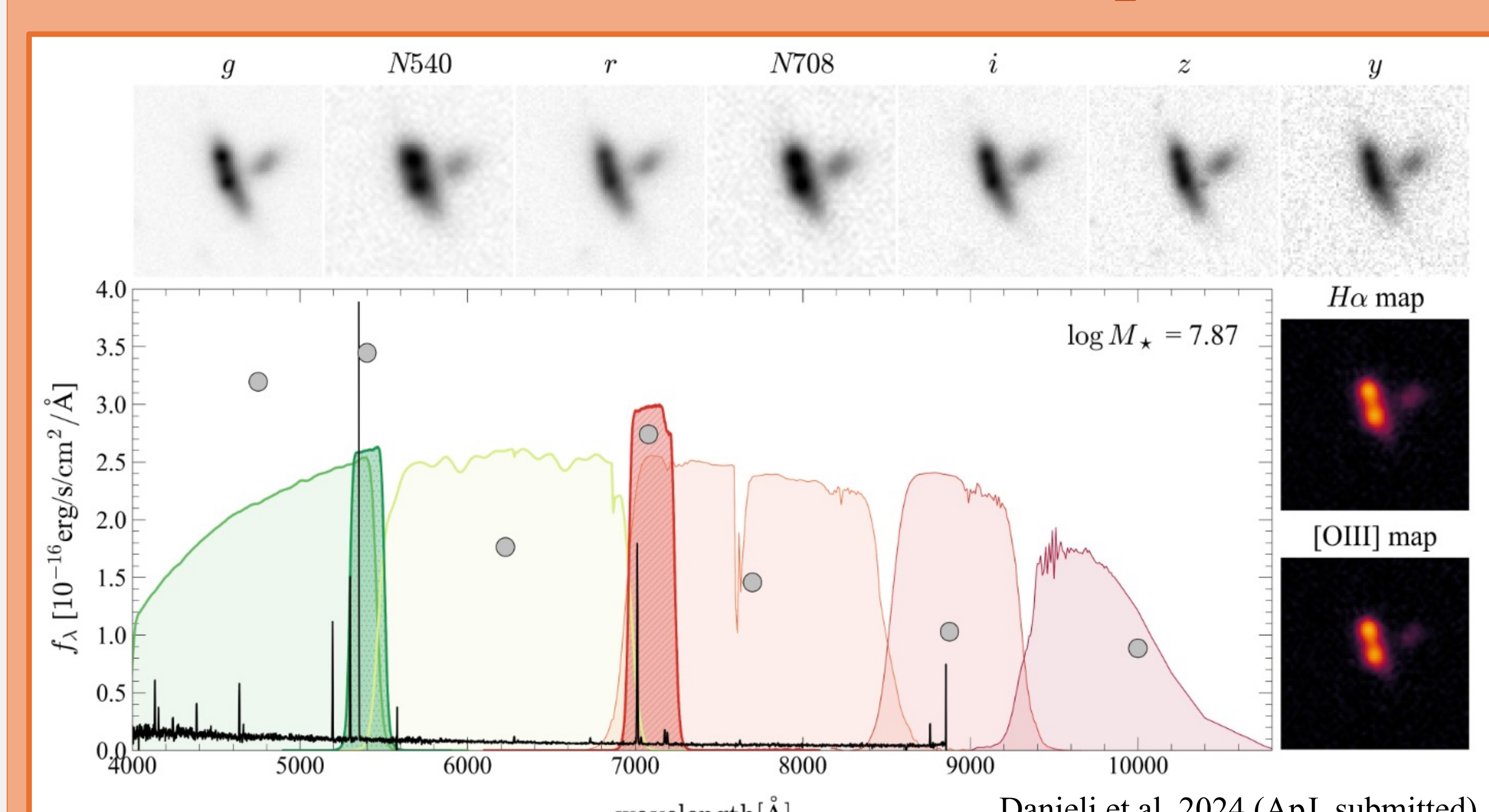
GRUMPY – semi-analytic model for stochastic star formation in dwarf galaxies (Pan & Kravtsov 2023)

Yue Pan (Princeton)

GRUMPY: I use GRUMPY to investigate the influence of stochastic star formation rates (SFRs) on several scaling relations such as SFR – stellar mass, stellar mass – gas mass, and stellar mass – metallicity. Our model shows that increased SFR stochasticity aligns the scatter in these relations with that observed in nearby dwarf galaxies. Particularly, **brighter dwarf galaxies $M_V < -12$ exhibit increased scatter in the color--magnitude distribution (CMD) to levels seen in observations, although fainter galaxies still show less scatter due to their predominantly old stellar populations and declining SFRs over the past 10 Gyrs**. We also investigate the possibility that **scatter in CMD could be linked to metallicity variations**, though this leads to an overestimated scatter in the metallicity – mass relation.

Merian: Merian is an **optical imaging survey** designed to study the properties of **star-forming dwarf galaxies** with a completeness limit of 10^8 solar mass. With ~5000 MW analogs at redshifts $0.06 < z < 0.1$, we will study their satellites' stellar mass functions, radial distributions, and structures. This observational dataset will also be used to examine the frequency of LMC/SMC analogs around MW-like hosts and assess whether such configurations are common or unique among similar mass galaxies. Here, I show **preliminary results using 827 hosts with stellar mass $10^{10.5}$ – $10^{10.9}$ and $0.07 < z < 0.09$.**

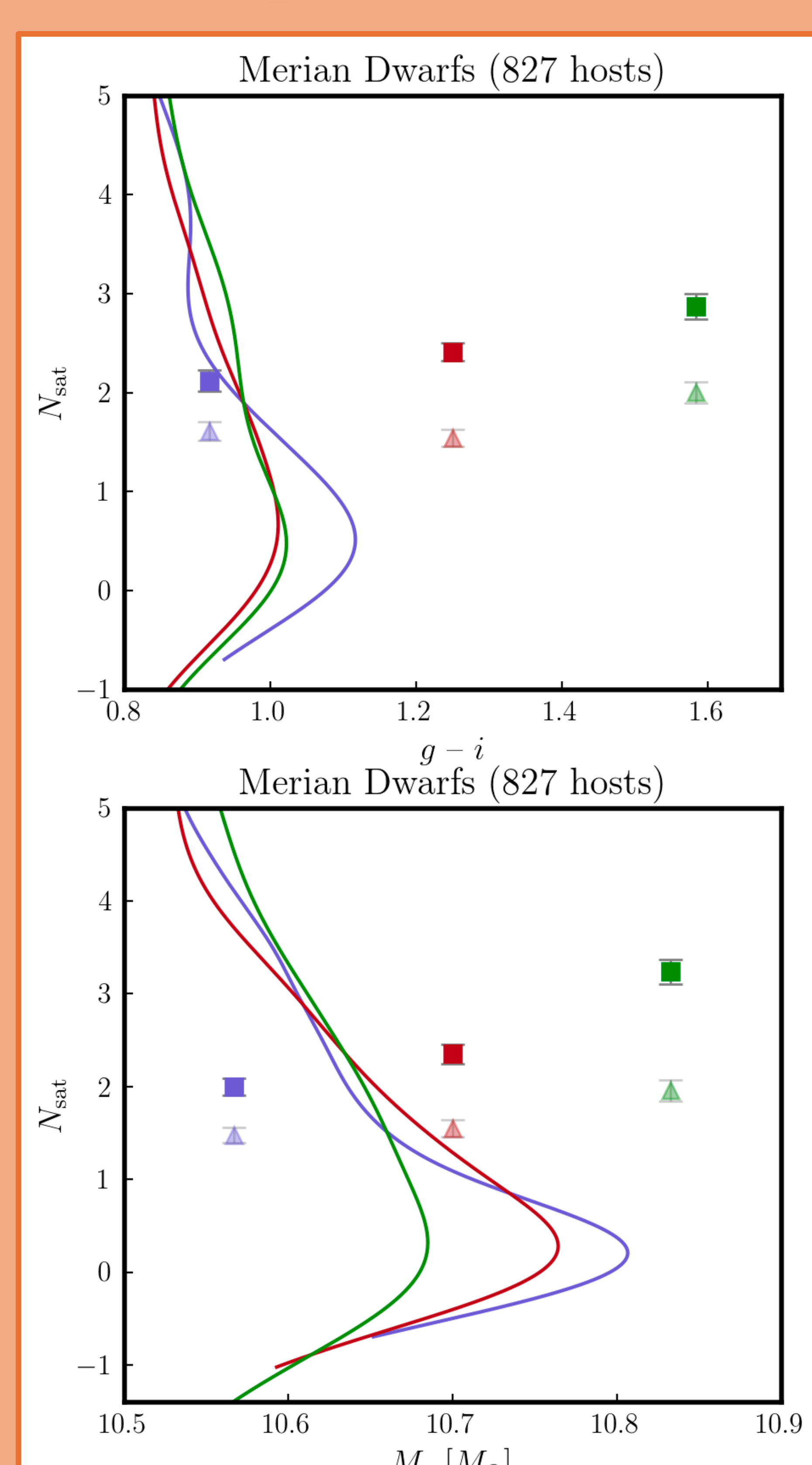
Merian – Wide-field imaging survey of dwarf galaxies at 0.06 < z < 0.1 [preliminary results]



An illustration of the two medium-band Merian filters (N708, N540) with the five HSC broad bands (grizy) in Danieli et al. 2024 (ApJ, submitted). Top panels show an example dwarf galaxy in the seven bands and the Ha and OIII maps made from Mintz et al. 2024 (ApJ, submitted).

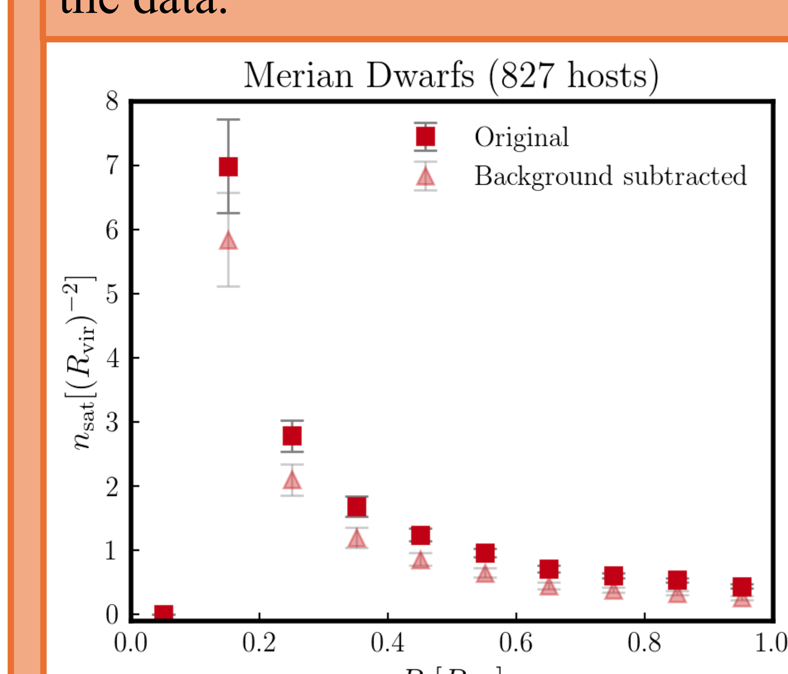
The Merian survey provides an unprecedent dataset for studying bright star-forming dwarf galaxies. In my project, I focus on satellite galaxies around MW analogs. My preliminary host sample has **827 MW analogs** selected with **stellar mass between $10^{10.5}$ and $10^{10.9}$ and $0.07 < z < 0.09$**. In the full survey, we have ~ 5000 MW analogs in our redshift range.

For each host, I select satellite candidates based on magnitude ($m_i < 23$), color ($0 < g – r < 1$), angular size (> 0.5''), dwarf galaxy size-mass relation from Carlsten et al. 2022, and a probability that the source's photometric redshift is in-band. We derive this probability based on EAZY's output which contains the PDF of the photo-z for each source.



In our preliminary sample of 827 hosts within the stellar mass range $10^{10.5}$ – $10^{10.9}$, we find a **higher Nsat for hosts with higher stellar mass and redder colors** (left two panels).

The average **radial profile** (below) is consistent with previous studies, and we are currently working on fitting a NFW or Einasto profile to the data.



DGSCS 2024: "Dwarf Galaxies, Star Clusters, and Streams in the LSST Era" Workshop Chicago, July 8 – 11, 2024