Radial Age Gradients in z~0.6 Post-Starburst Galaxies

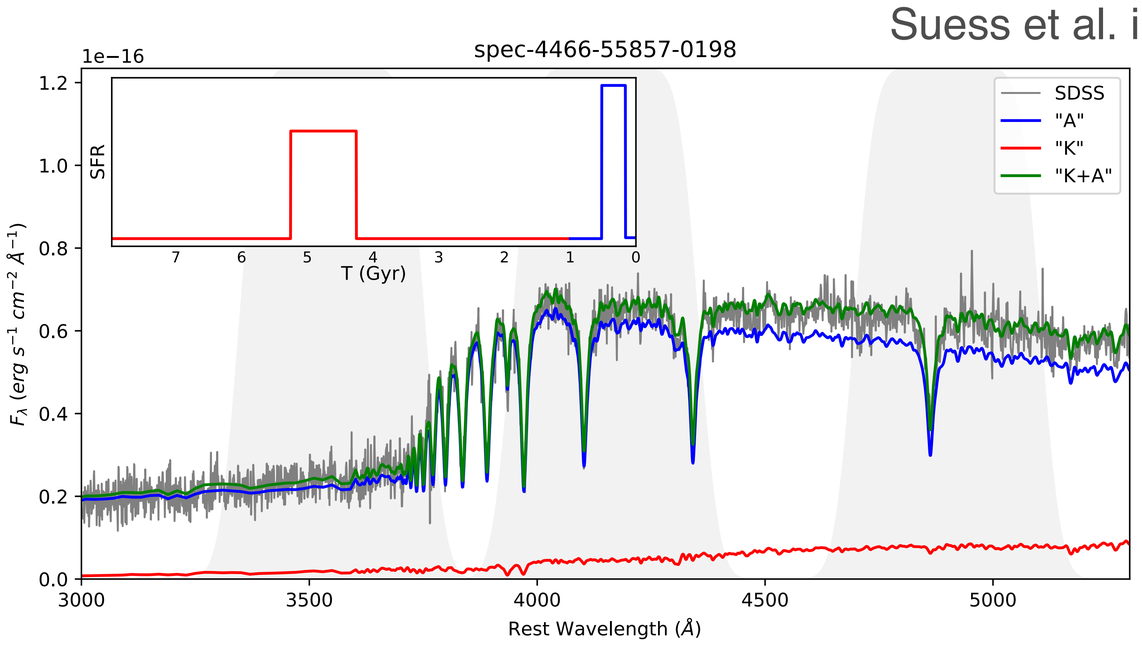
David Setton, Rachel Bezanson, Robert Feldmann, Jenny Greene, Mariska Kriek, Desika Narayanan, Justin Spiker, and Wren Suess

davidsetton@pitt.edu

Aspen Winter 2020

SQuIGGLE Target Selection and SFH Modeling

Suess et al. in prep



A sample galaxy SQuIGGLE galaxy with rest frame selection filters and the best fit two component SFH.

PSBs can be modeled with a composite K+A population

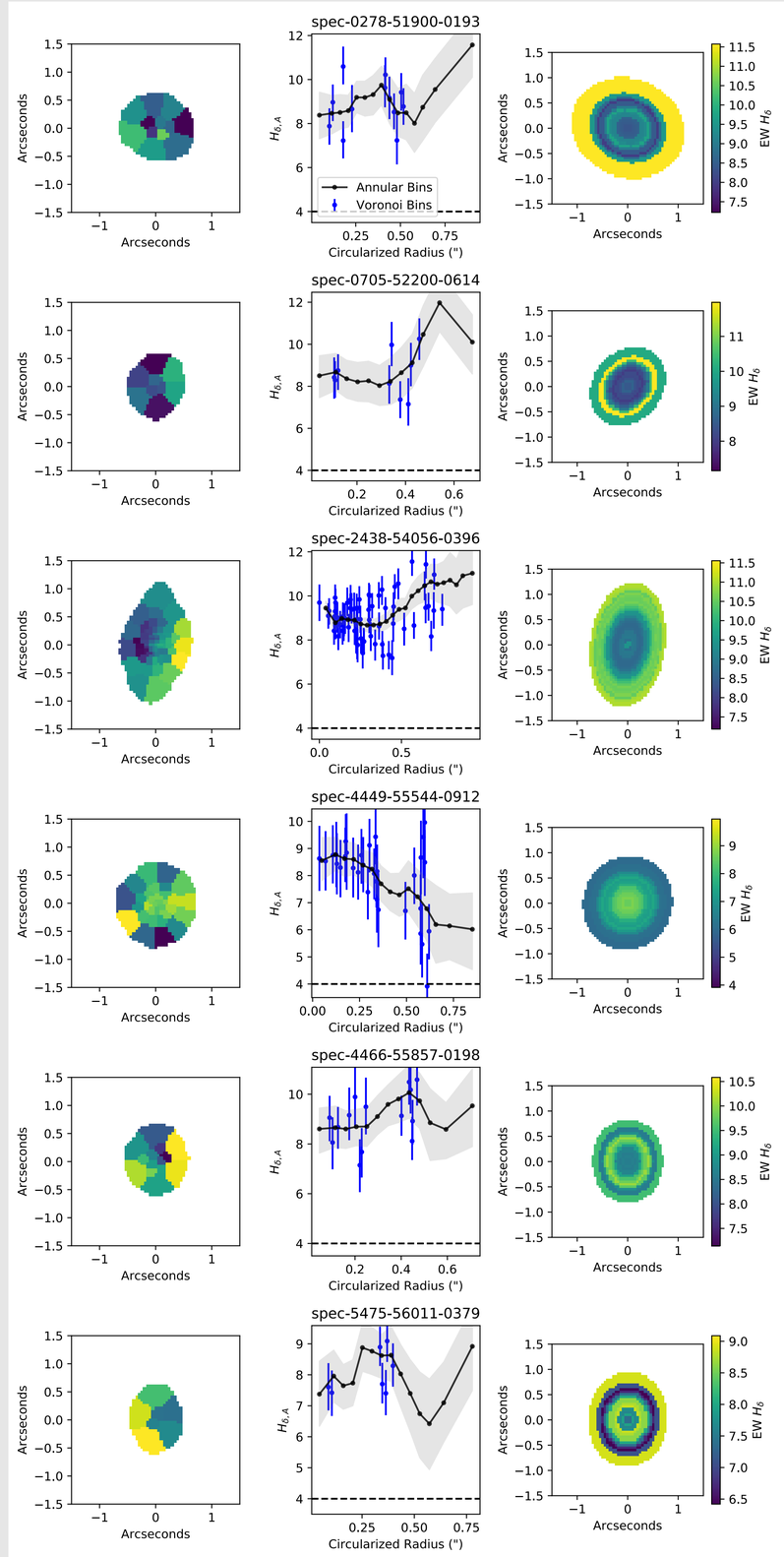
The K/A ratio and the time since quenching influence the spectral shape

We Observe Flat H_δ Profiles

Continuum spectroscopy with GMOS allows us to spatially resolve H_δ absorption in both bins and isophotal annuli

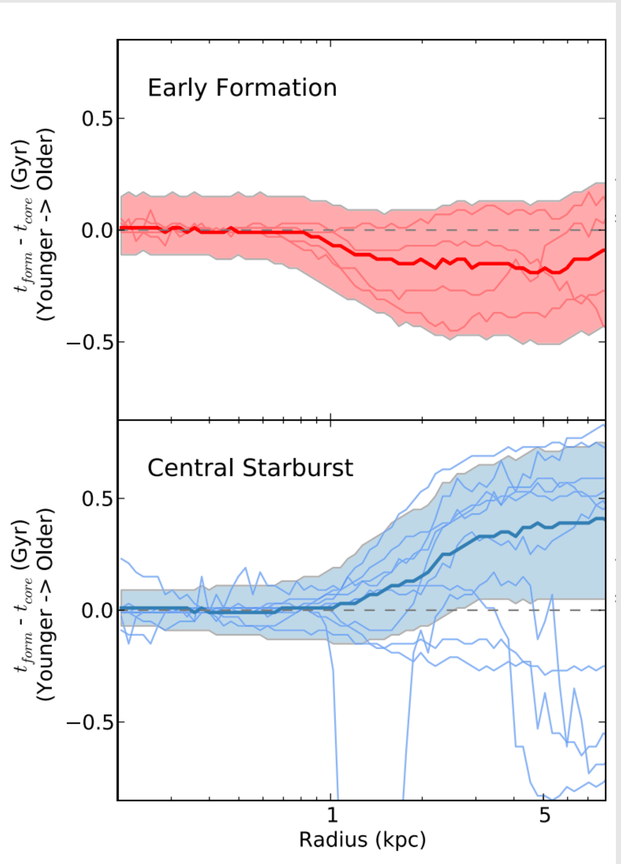
In both measures, **all galaxies have EW H_δ > 4 Angstroms at all radii**, signifying dominant A-populations

Spatially Resolved H_δ Maps



Derived t_{quench} measurements show flat age profiles

Setton et al. in prep



Wellons et al (2015) radial age profiles show that for central starbursts, central stellar populations should be the youngest

In contrast to simulations of central starbursts, **our galaxies do not show gradients in their radial age.**

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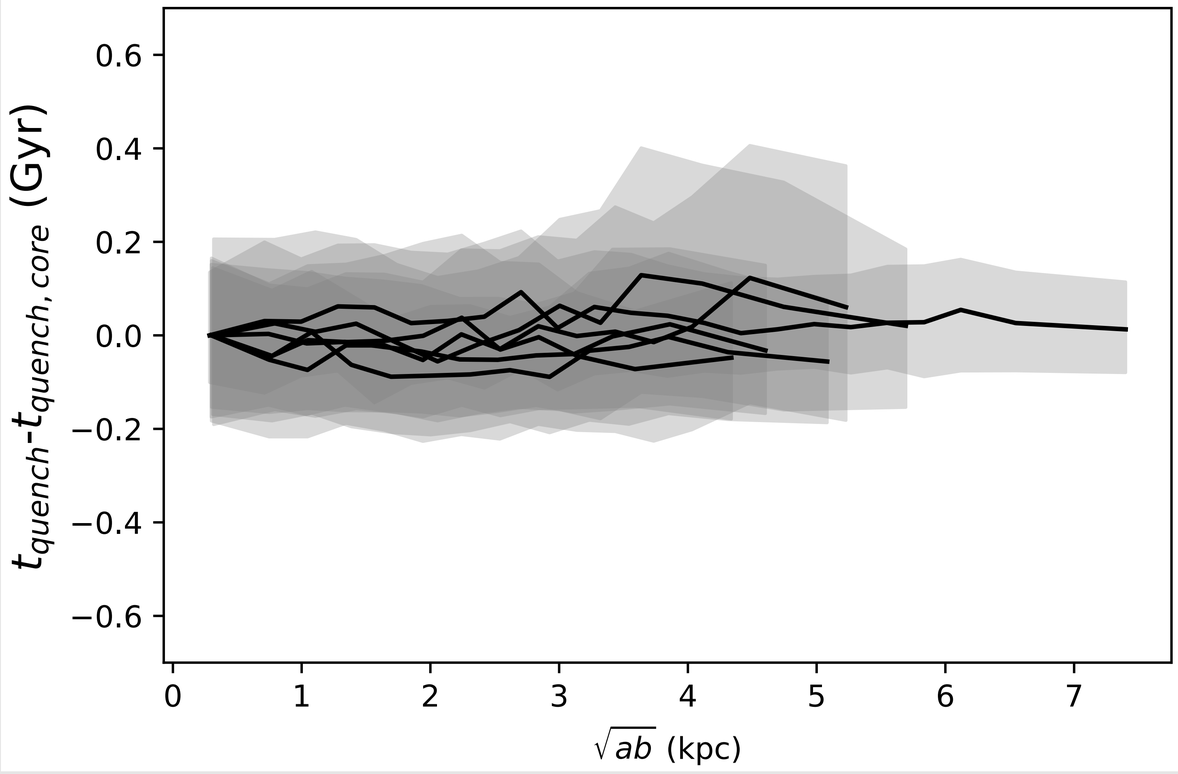
Time since quenching (normalized to the central measurement) fit to our H_δ measurements by varying K/A and t_{quench}.



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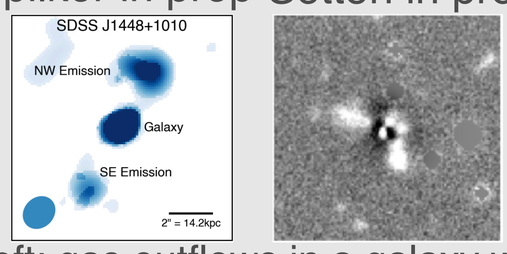
The SQuIGGLE (Studying Quenching in Intermediate-Redshift Galaxies: Gas, Angular Momentum, and Evolution) Survey is a multi-wavelength study of post-starburst galaxies (PSBs) at z~0.6. See talks by Jenny Greene, Justin Spilker, and Wren Suess.

Spilker in prep Setton in prep



Left: gas outflows in a galaxy with optical AGN signatures. Right: residuals after a Sersic model is subtracted from HSC imaging.

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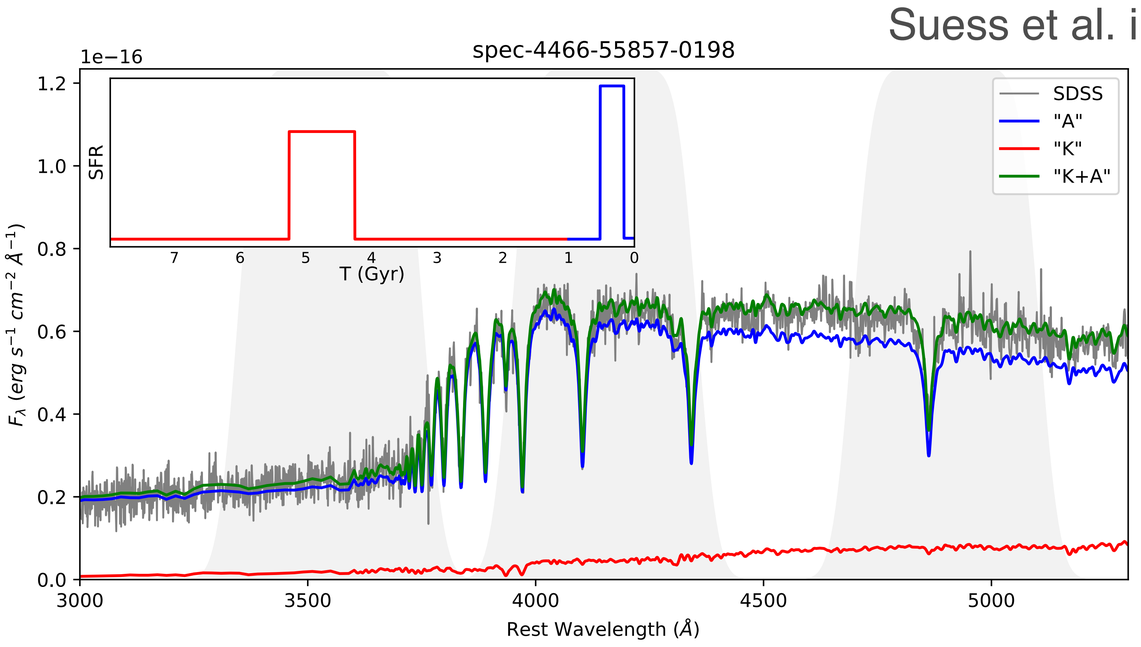

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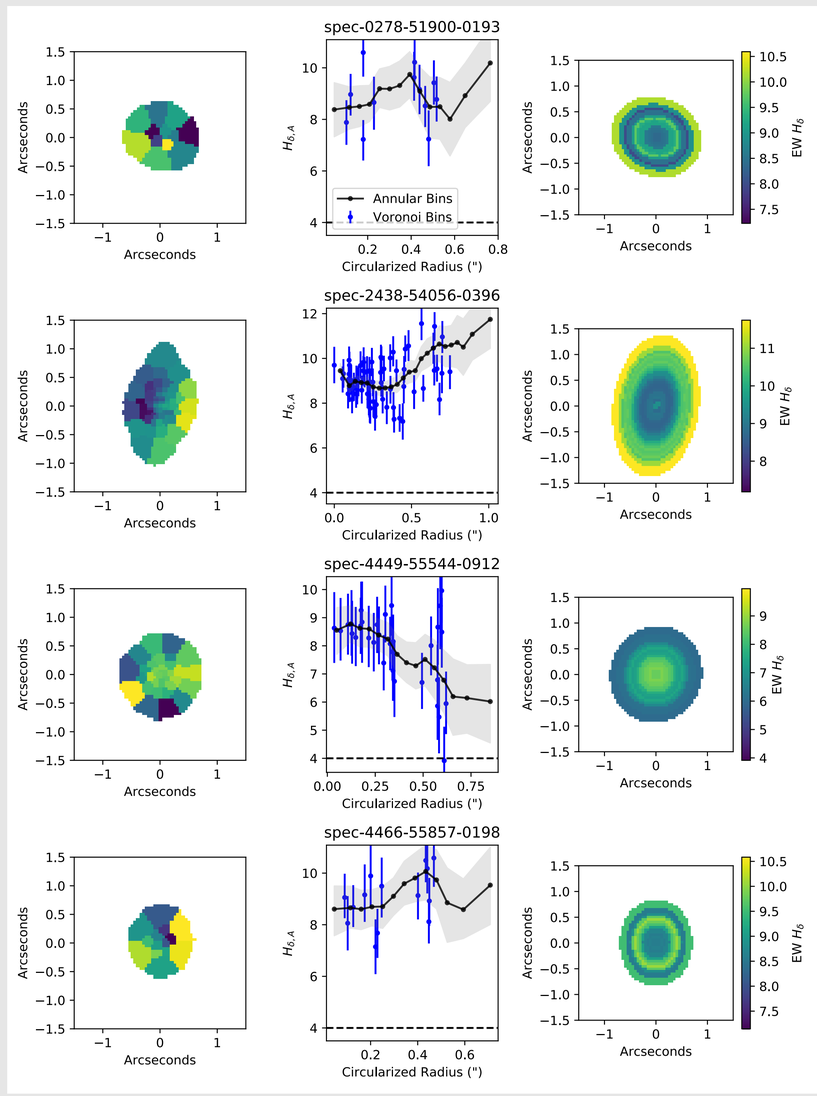
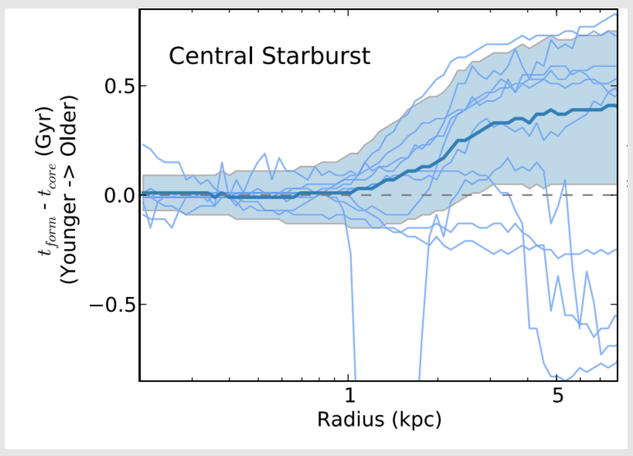


A subsample of our galaxies showing our GMOS observations of the equivalent width of the H_δ absorption feature. (Left) Voronoi binned measurements of H_δ (Center) Radial profiles that show both Voronoi and annular measurements (Right): H_δ measured in annular isophotes.

All galaxies have EW H_δ > 4 Angstroms at all radii, signifying dominant A-star populations

Our Sample of PSBs Quenched Uniformly

Different methods of quenching such as outside-in (compaction) or inside out (central starburst) will result in different radial age profiles.



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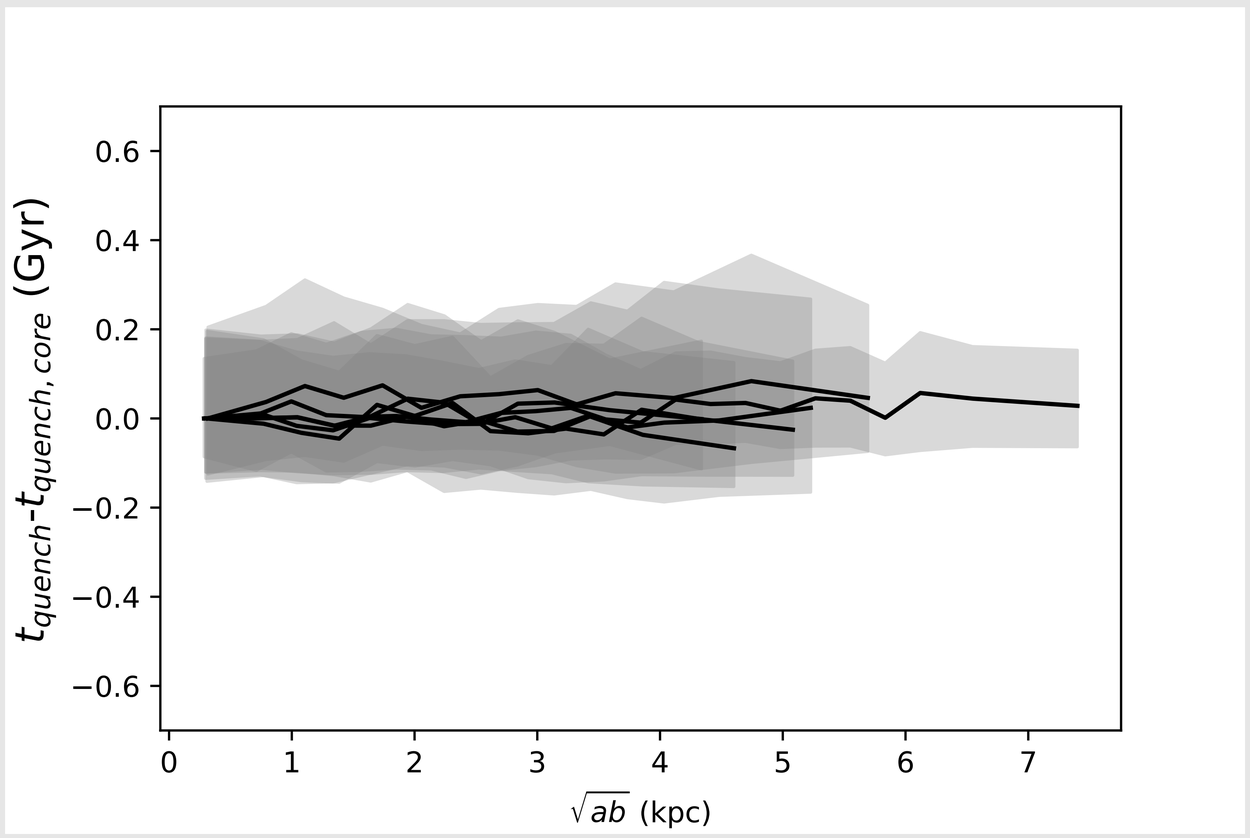

Time since quenching (normalized to the central measurement) fit to our H_δ measurements by varying K/A and time since quenching. All galaxy profiles are consistent with having quenched at all radii within ~0.2 Gyr.

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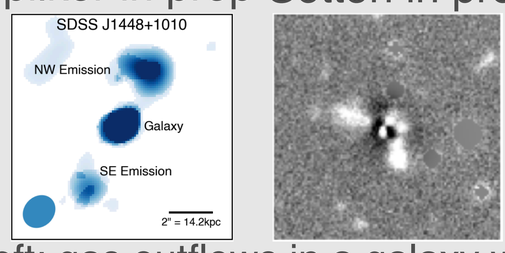

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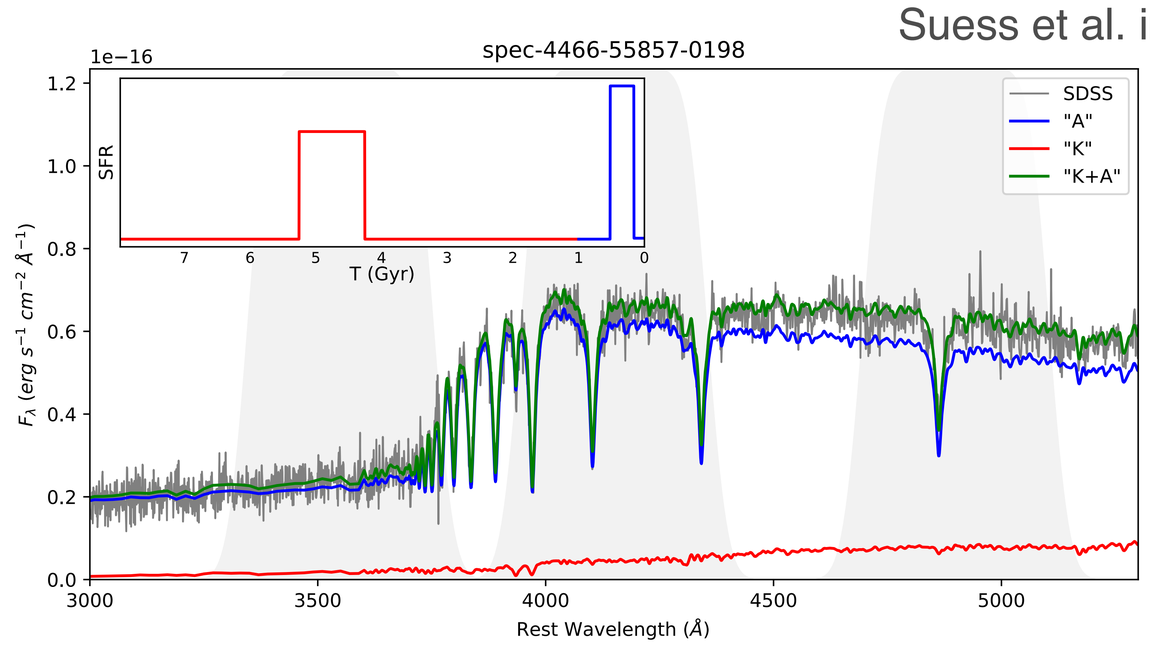

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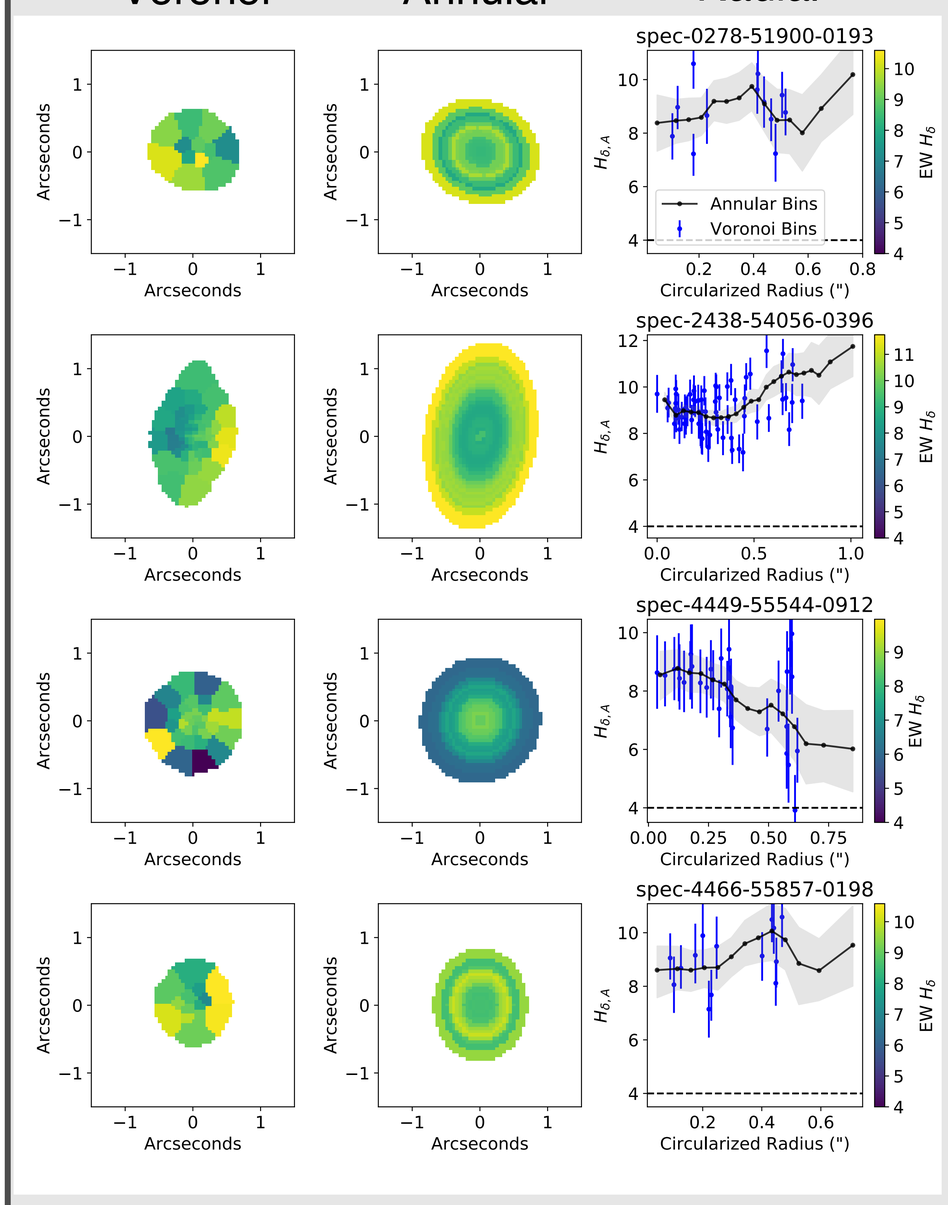

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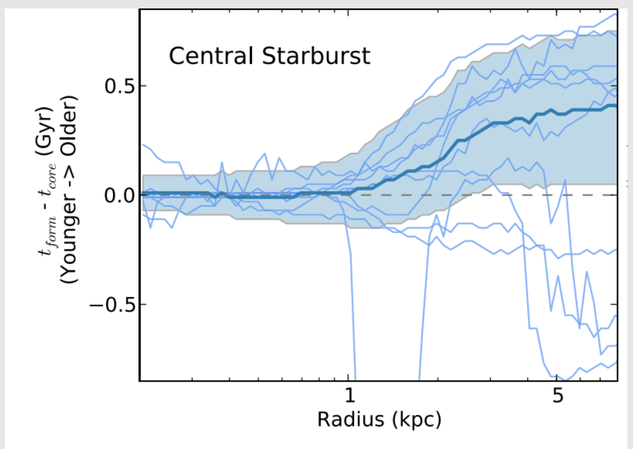

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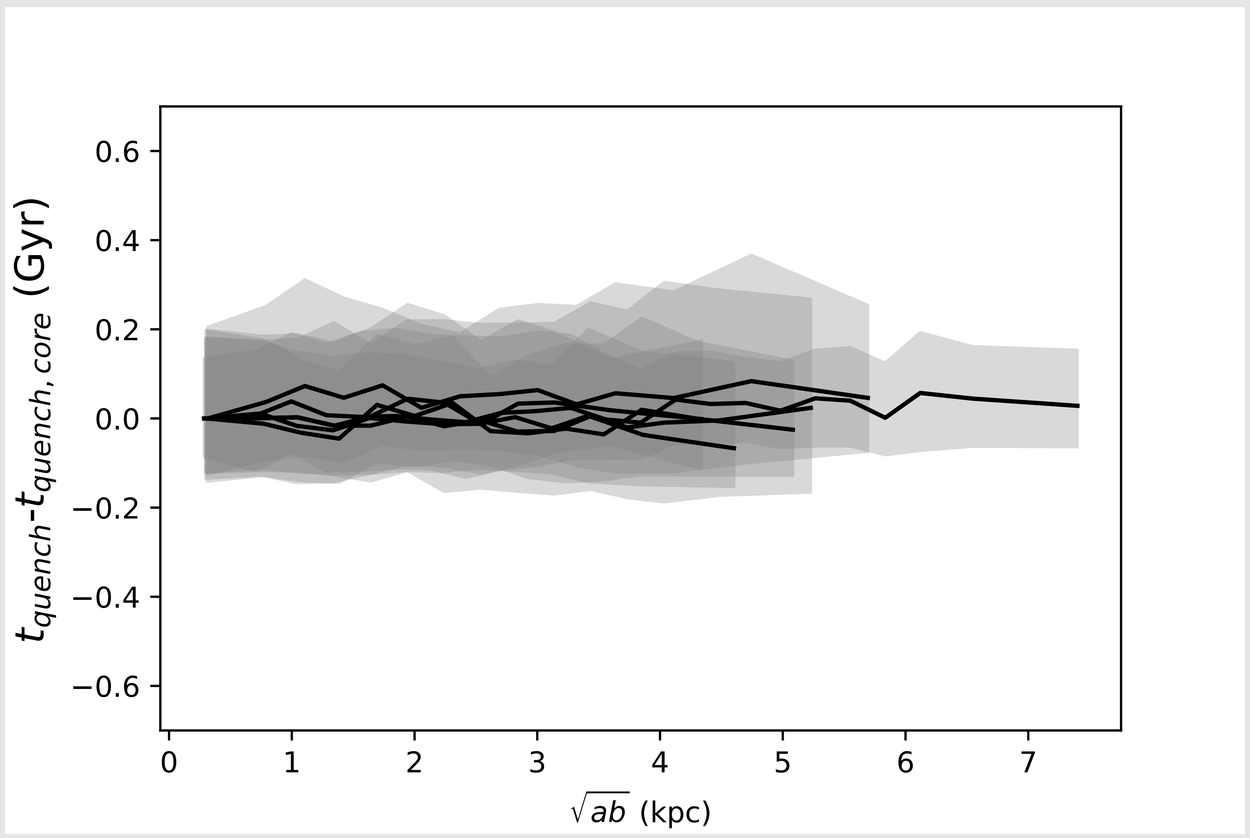

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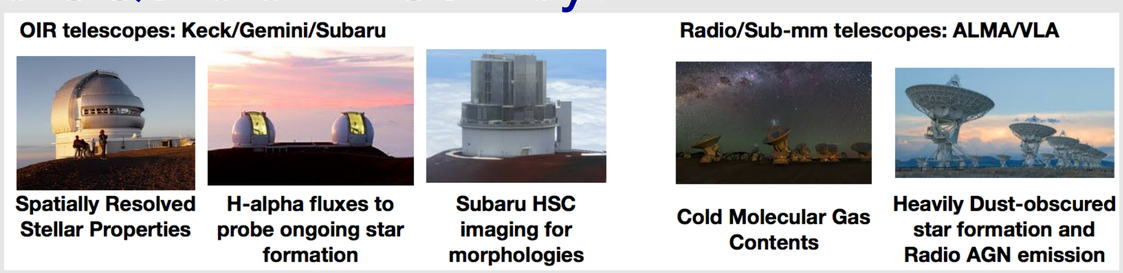

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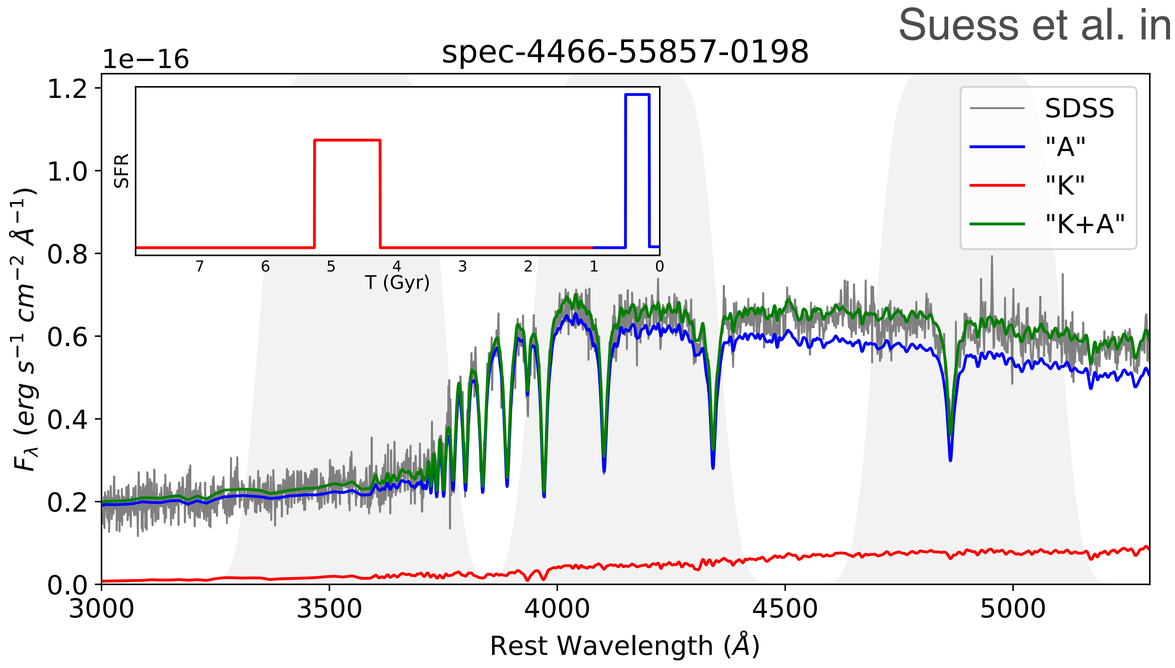

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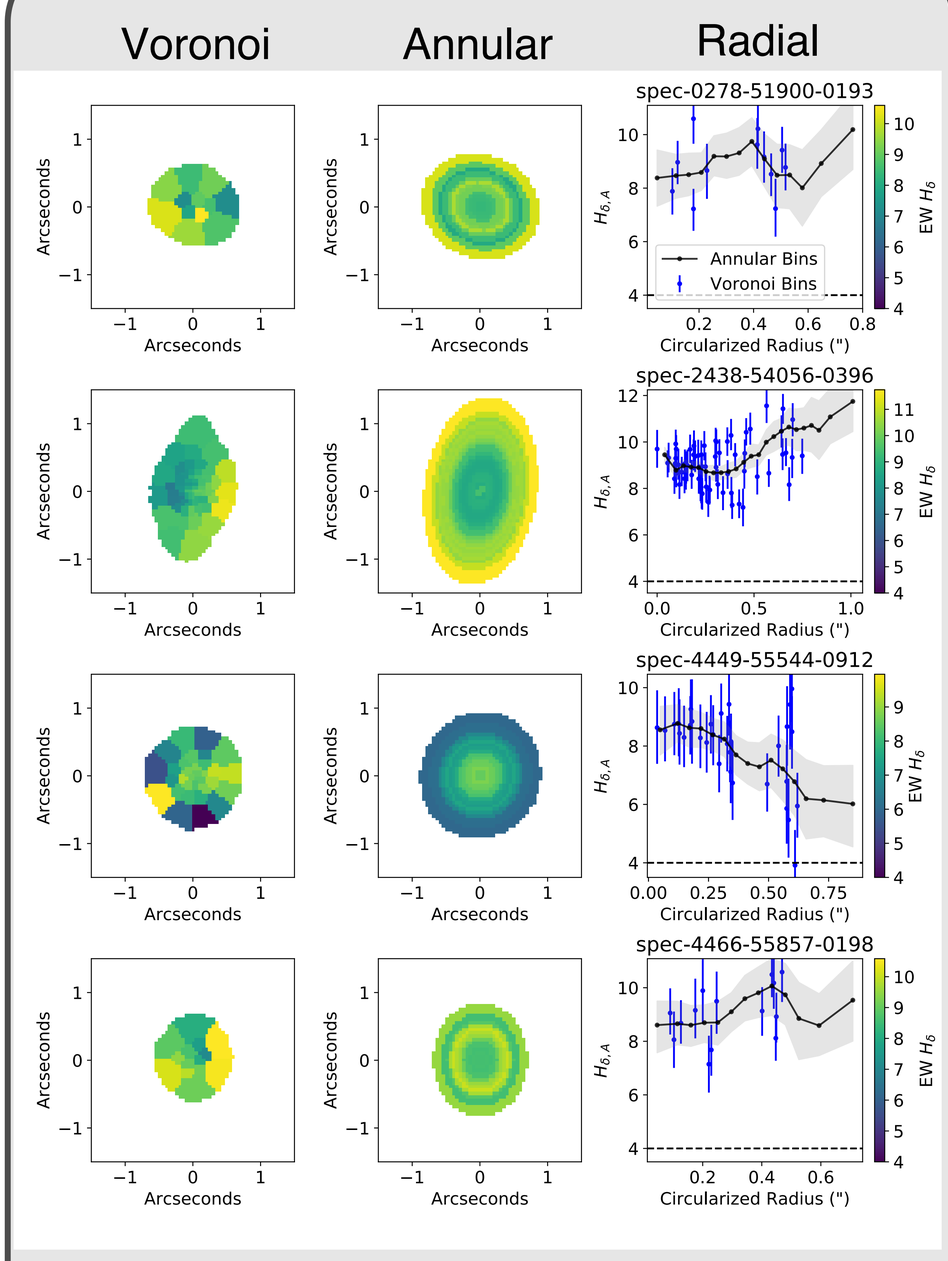

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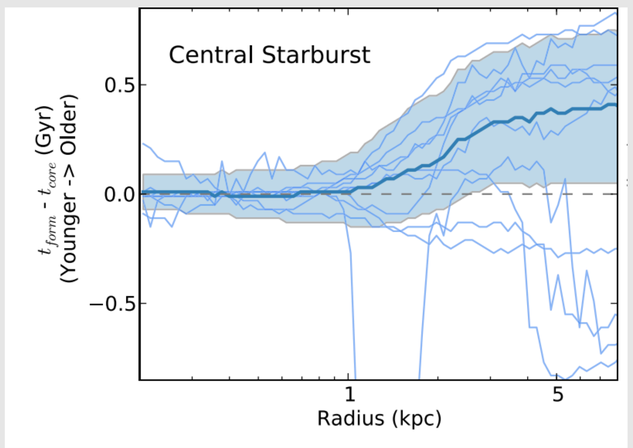

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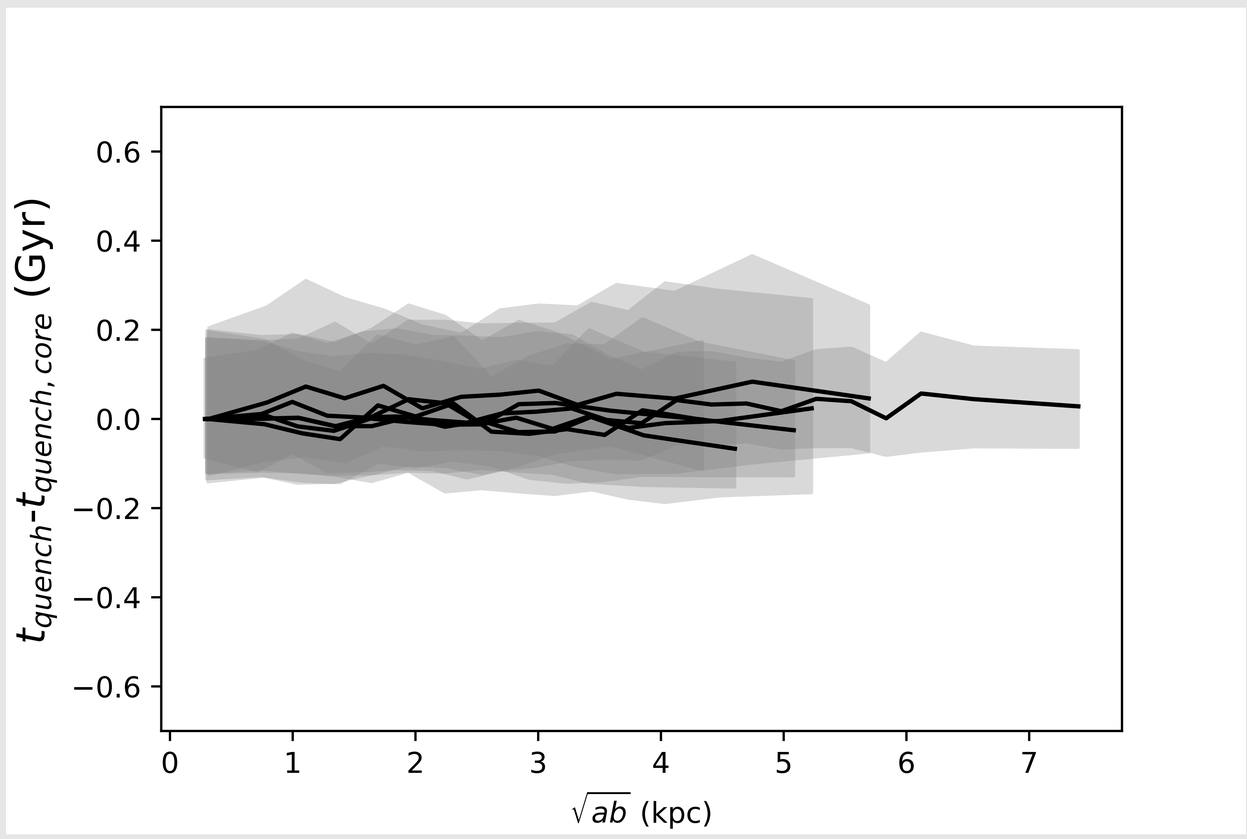

Time since quenching (normalized to the central measurement) fit to our H_δ measurements by varying K/A and time since quenching. All galaxy profiles are consistent with having quenched at all radii within ~0.2 Gyr. 5/6 age profiles are also flat with K/A fixed to the best fit value.

Flat Radial Age Gradients in Massive z~0.6 PSBs

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OIR telescopes: Keck/Gemini/Subaru

Radio/Sub-mm telescopes: ALMA/VLA

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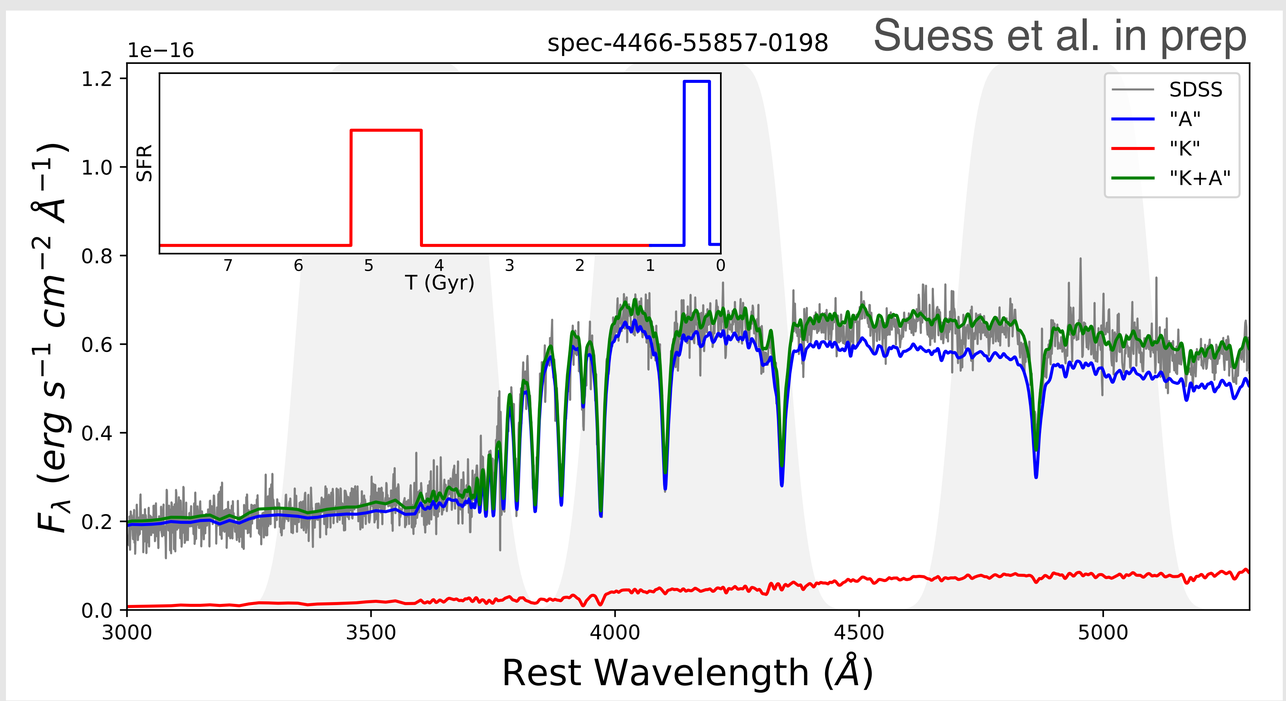

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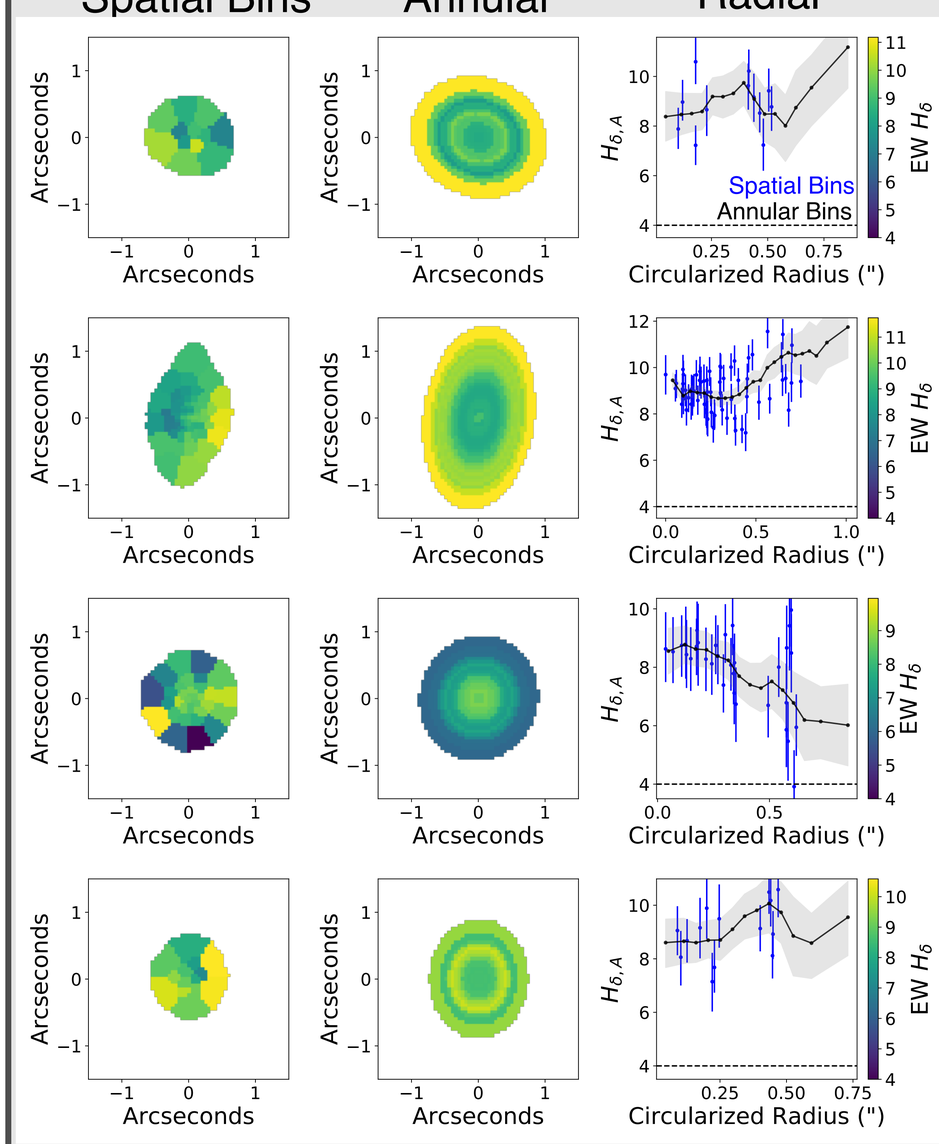


A subsample of GMOS IFU observed SQuIGGLE galaxies in EW H_δ.

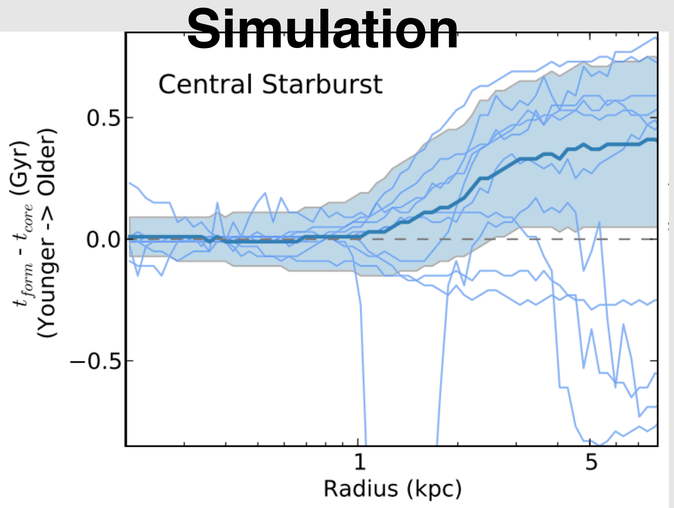
All galaxies have EW H_δ > 4 Å at all radii, signifying dominant A-star populations

Our Sample of PSBs Quenched Uniformly

Setton et al. in prep

Different methods of quenching, such as compaction or central starburst, will result in negative, positive, or flat age gradients.

Example from Illustris Simulation



Wellons et al (2015) radial age profiles from Illustris Simulations

In contrast to simulations of central starbursts, **our galaxies do not show gradients in their radial age.**

If these galaxies are resolved, this indicates that **whatever mechanism they quenched by must shut down star formation simultaneously at all radii.**

Time since quenching (normalized to the central measurement) fit to our H_δ measurements by varying K/A and time since quenching.

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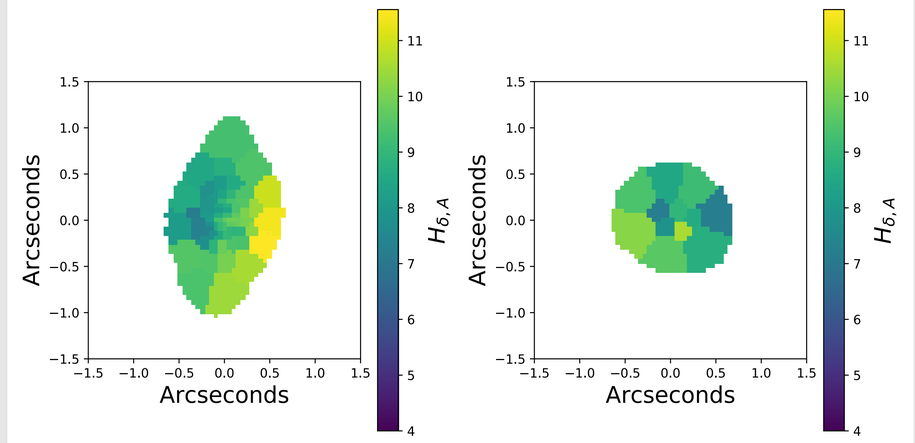
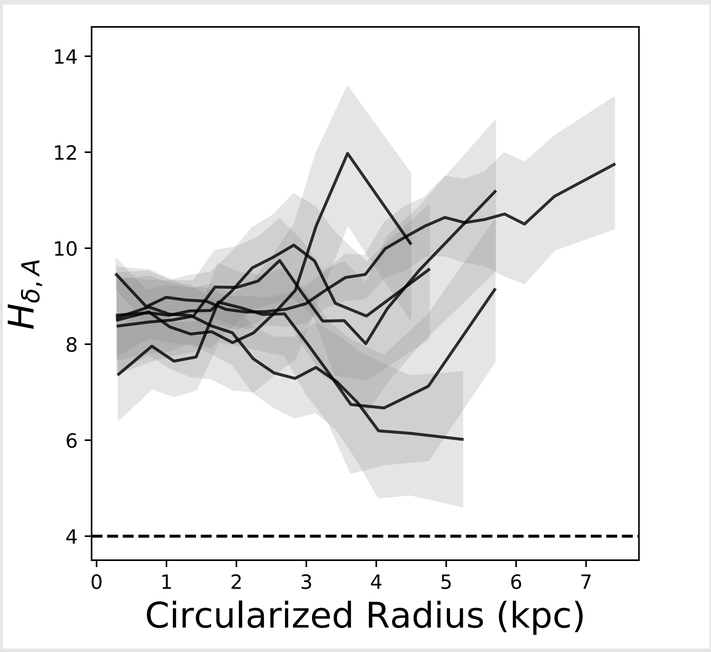


A subsample our 6 SQuIGGLE galaxies with GMOS IFU follow up in H_δ.

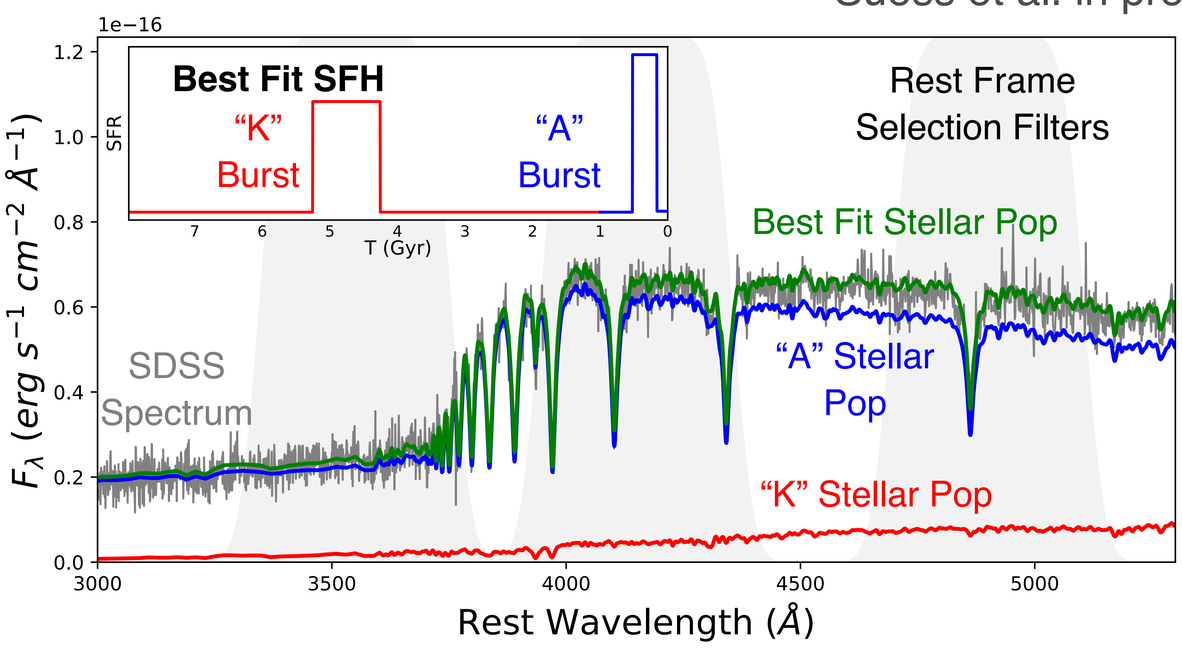


Annular profiles in the EW H_δ for our full sample

All our galaxies have EW H_δ > 4 Å at all radii, signifying dominant A-star populations.

SQuIGGLE Target Selection and SFH Modeling

Suess et al. in prep



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PSBs can be modeled with a composite K+A population.

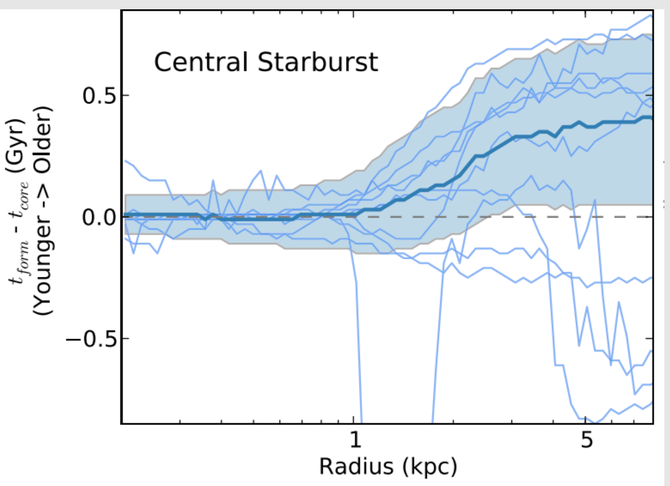
The K/A ratio and the time since quenching influence the strength of age sensitive features like H_δ.

Massive PSBs Quench at All Radii Simultaneously

Setton et al. in prep

Different methods of quenching (e.g. compaction, central starburst) will result in negative, positive, or flat age gradients.

Ex: Illustris Simulation



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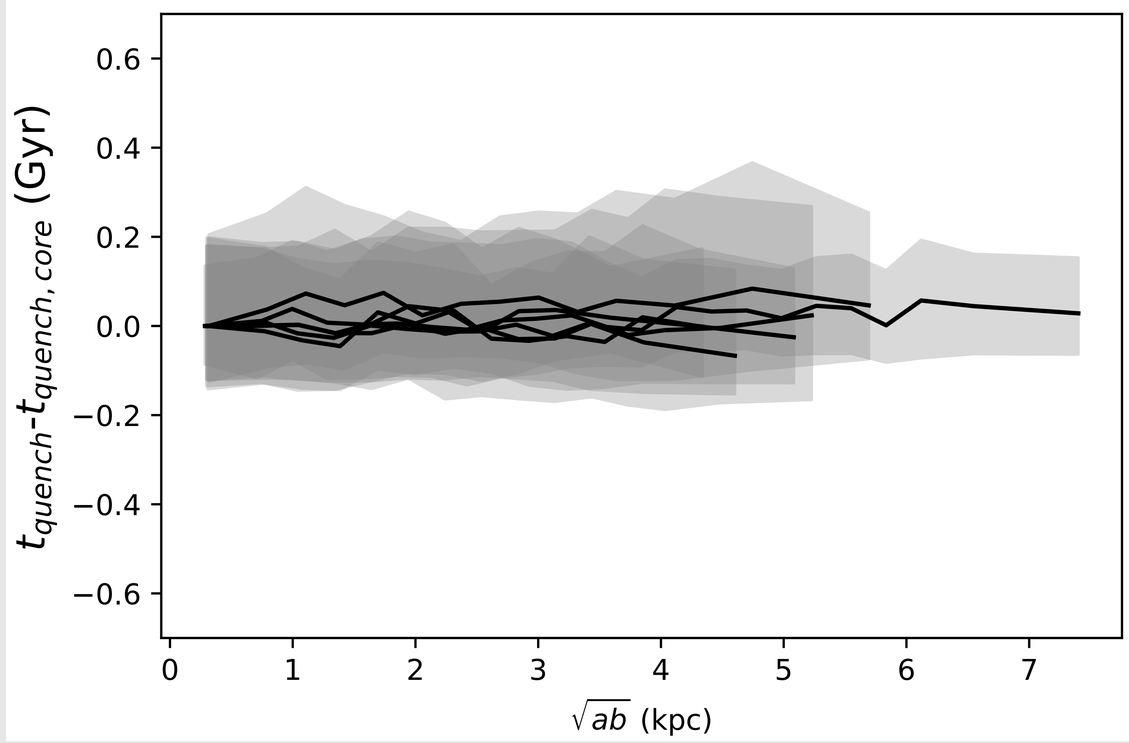
Our Model Age Profiles



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