

# TAKING THE RED SEQUENCE OFFLINE

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## THE RED SEQUENCE IS NOT A LINE COLOR RESIDUALS REFLECT THE DISTRIBUTION OF STELLAR AGES

### Motivation

The red sequence has a scatter, even with precision photometry. With CLASH, we can probe the origin of this scatter across three orders of magnitude of galaxy size.

### Sample

We focus on four CLASH clusters, all at  $z \sim 0.35$ . Selecting only cluster galaxies from spectroscopic and photometric redshifts, we create a stacked cluster red sequence population observed at a fixed epoch.

### Techniques

In optical-IR color-color space, tracks of constant metallicity and tracks of constant age are roughly orthogonal (shown in Figure A). The position of galaxies on this grid gives a rough measure of their age and metallicity.

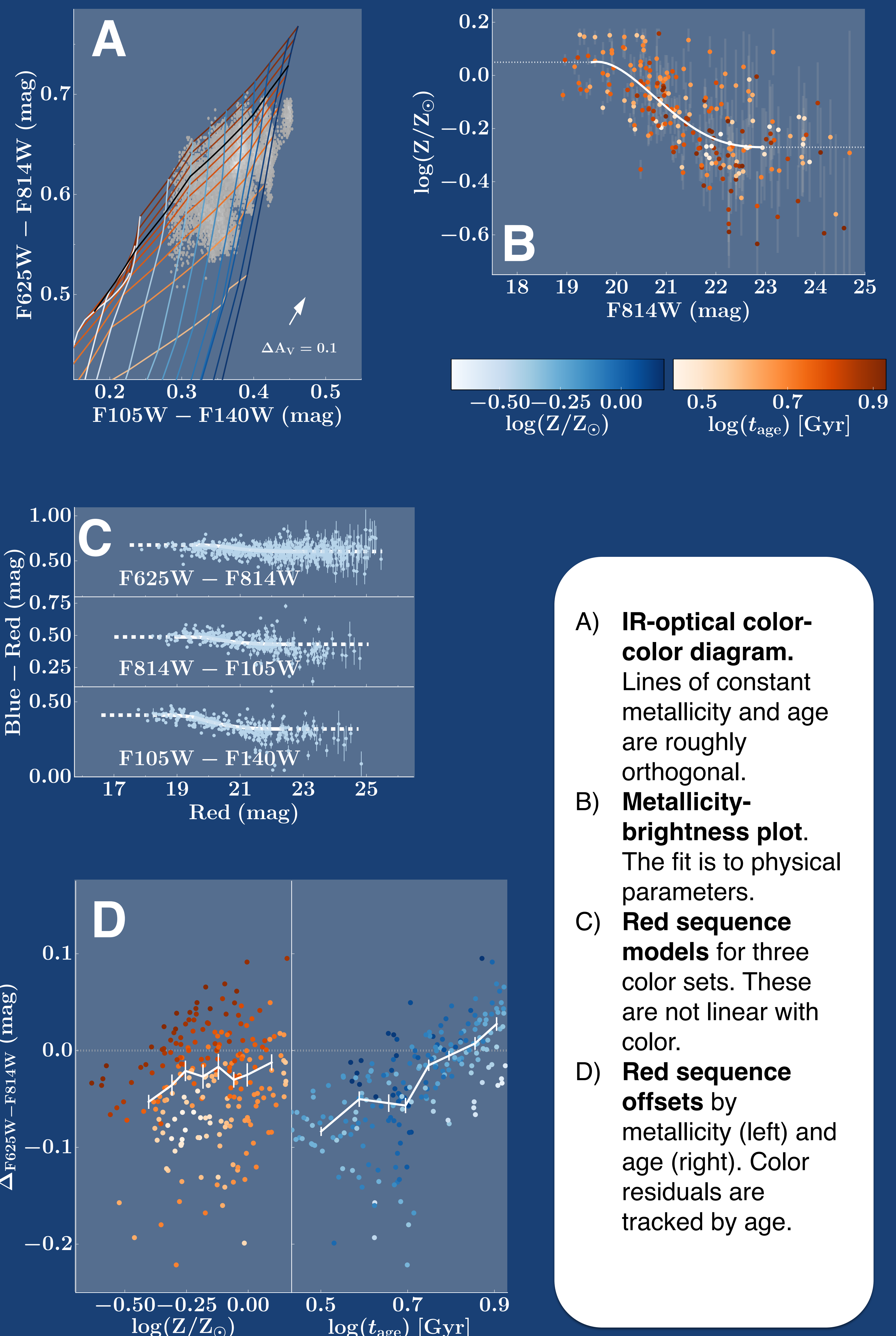
We then fit our red sequence in metallicity-brightness space (Figure B). While currently crude, this is a fit to the underlying physical relation, not to the projection of that relation in color-magnitude space.

### The New Red Sequence

Shown in Figure C is the projection of this metallicity-brightness relation at a fixed age in three color bands — with simple stellar population modeling, the underlying relation can be projected into any observed color set at any redshift.

### Scatter

Offsets from the model red sequence are shown in Figure D, and colored by age (red) and metallicity (blue). Driving the scatter is an age spread; adjusting the colors of all galaxies along lines of constant metallicity to a fixed age reduces the scatter to the level of the photometric uncertainties.



For further information, see  
Connor et al. 2019a, ApJ, 875, 16

"ON THE ORIGIN OF THE SCATTER IN THE RED SEQUENCE:  
AN ANALYSIS OF FOUR CLASH CLUSTERS"

