From HST Patchwork to Roman Panoramas:
Mapping Globular Cluster Systems as Environmental Tracers in Dense Galaxy Clusters

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HST observations reveal that globular-cluster systems in the Coma core retain signatures of environmental processing, but extracting those signals requires stitching together 26 heterogeneous ACS pointings. Roman can transform this into a contiguous, cluster-scale experiment.

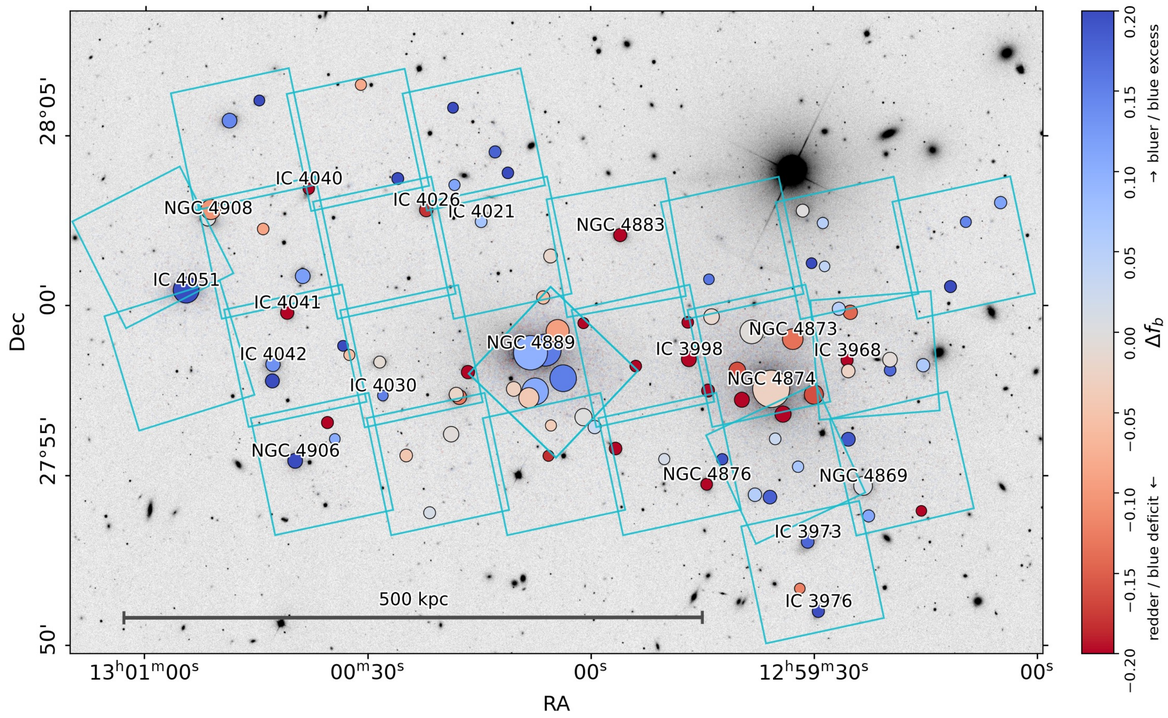
The Coma Cluster provides a nearby laboratory for environmental processing in a rich cluster core. Yet even at ~100 Mpc, wide-area HST imaging requires a mosaic of many individual pointings.

Combining these data requires corrections for heterogeneous depth, incomplete spatial coverage, footprint edges, local backgrounds, and completeness.

We construct a catalog of compact stellar systems in the Coma core, including globular-cluster candidates and bright ultracompact dwarfs.

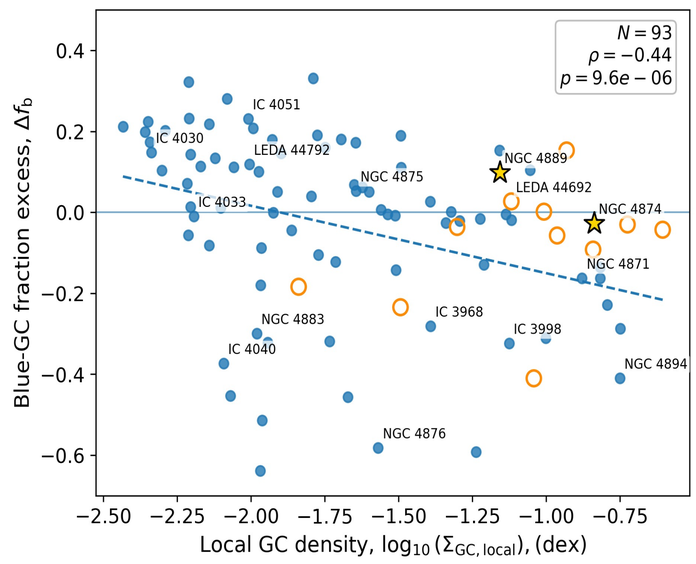
For each galaxy, we measure background-corrected GC-system properties while accounting for image depth, coverage, and local contaminating populations.

The blue-GC fraction excess varies systematically across the Coma core: Galaxies embedded in denser local compact stellar system environments tend to show lower blue-GC fractions than expected for their luminosity.

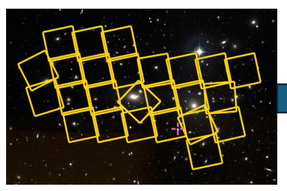


26 HST/ACS pointings span only ~1 Mpc in R.A. (at Coma distance of 100 Mpc)

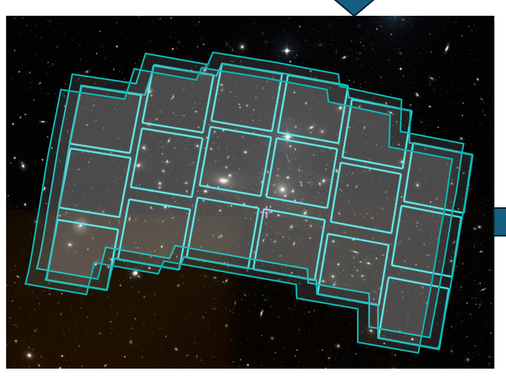
Local structure matters more than cluster-centric radius. The result instead points to a multi-scale environment shaped by local overdensities and the overlapping influence of the two central giant galaxies, NGC 4874 and NGC 4889.



WHAT ROMAN CHANGES:
Roman replaces a fragmented HST mosaic with a small number of homogeneous, dithered wide-field tiles.

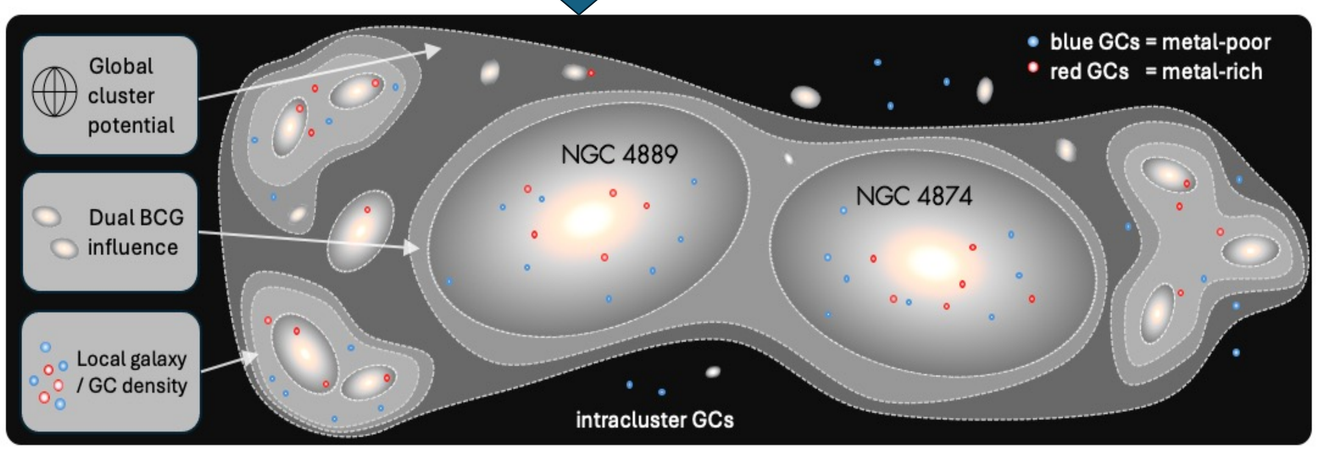


HST patchwork – 26 ACS pointings
- Multi-epoch heterogeneous depth
- Footprint edges and gaps
- Local-background corrections
- Incomplete cluster-scale sampling



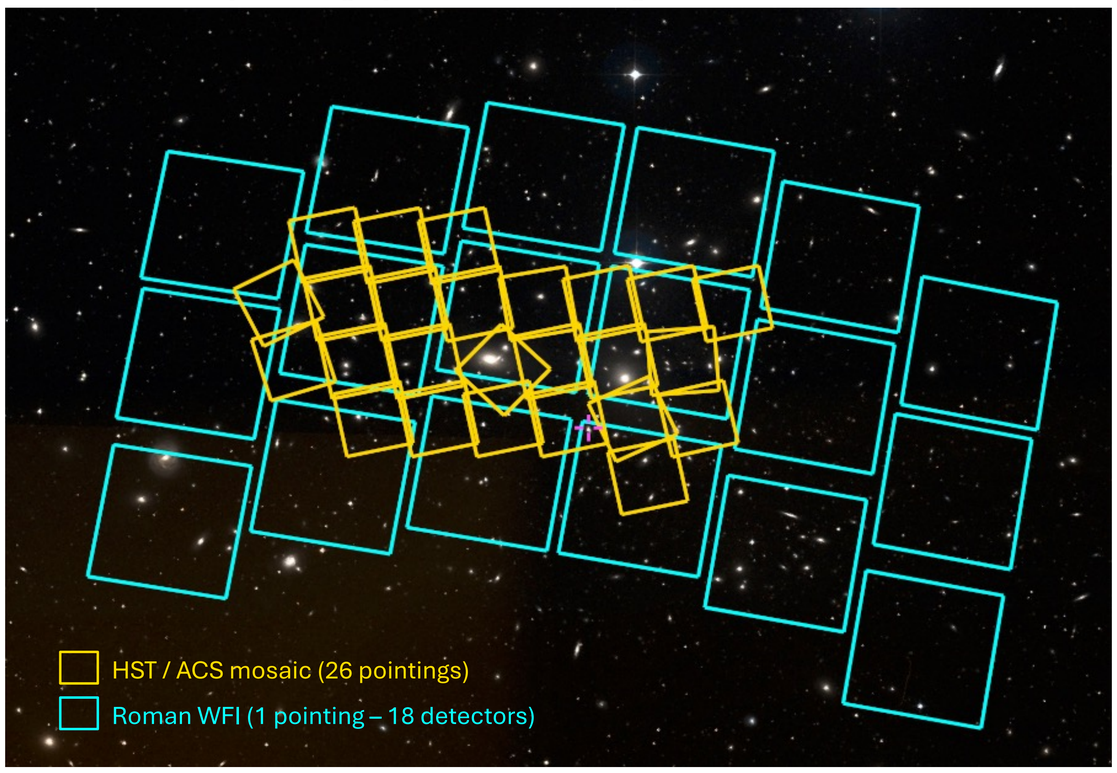
Roman dithered tile – One WFI field
- 18 detector focal plane
- Detector gaps filled across visits
- More uniform depth and calibration
- Coherent survey geometry

Science enabled - Cluster CSS mapping
- Continuous GC/UCD density fields
- Robust local-background estimates
- Blue/red GC population gradients
- Tests of stripping into intracluster space



Map where globular clusters leave galaxies — and where they end up. Roman enables contiguous measurements of blue and red GC populations across local density peaks, dual-BCG environments, and the larger cluster potential.

One Roman WFI pointing spans the existing 26-field HST/ACS Coma Mosaic



Field-of-view comparison in the Coma core. The existing HST/ACS study combines 26 heterogeneous pointings (gold). A single Roman Wide Field Instrument pointing, shown as its 18-detector footprint (cyan), spans the same cluster-core scale. Roman's wide field enables cluster-scale compact-stellar-system studies with far fewer pointings and a substantially more coherent observing geometry.

Conclusions

1. Blue GC populations retain signatures of Coma's local environment.
2. Local CSS density and dual-BCG structure matter more than radius alone.
3. Roman makes cluster-scale tests of GC stripping, and intracluster assembly practical.

References:
Pomeroy et al. (2026) A Kind of Blue: Signatures of Environmental Processing in Globular Cluster System Blue-fractions in the Coma Cluster – Under Review.
Boch et al. 2020. ipyaladin: Enabling Aladin Lite in Jupyter Notebooks, 2020ASPC..522..117B

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