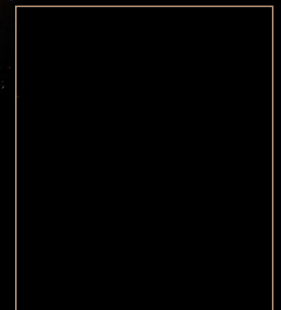
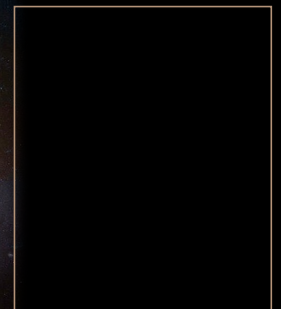
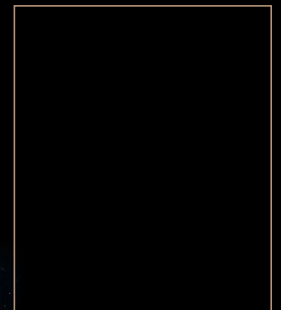
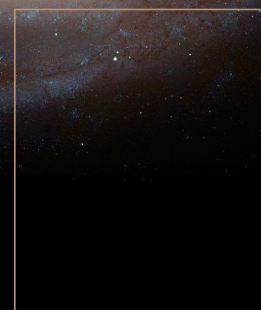
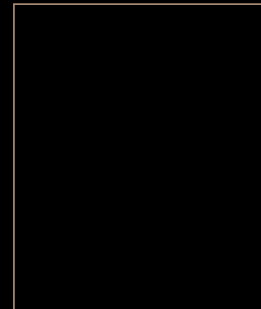
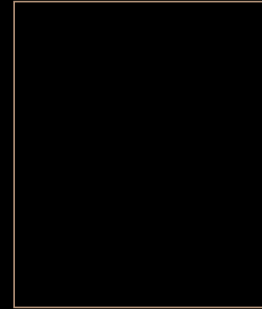
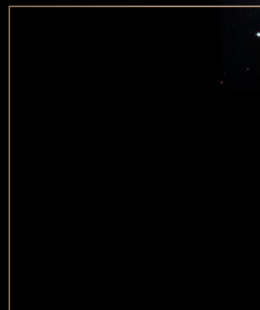

Nearby Galaxy Archaeology in the Era of Roman and JWST Revealing the Merger Histories of Nearby Galaxies

Adam Smercina
University of Washington



Merger History: What do we need to measure?

Combined insight
from theory +
observations from
ground & space

Impact on Central

Stellar Halo

Biggest merger
dominates!

Time of Merger

Properties of
Progenitor

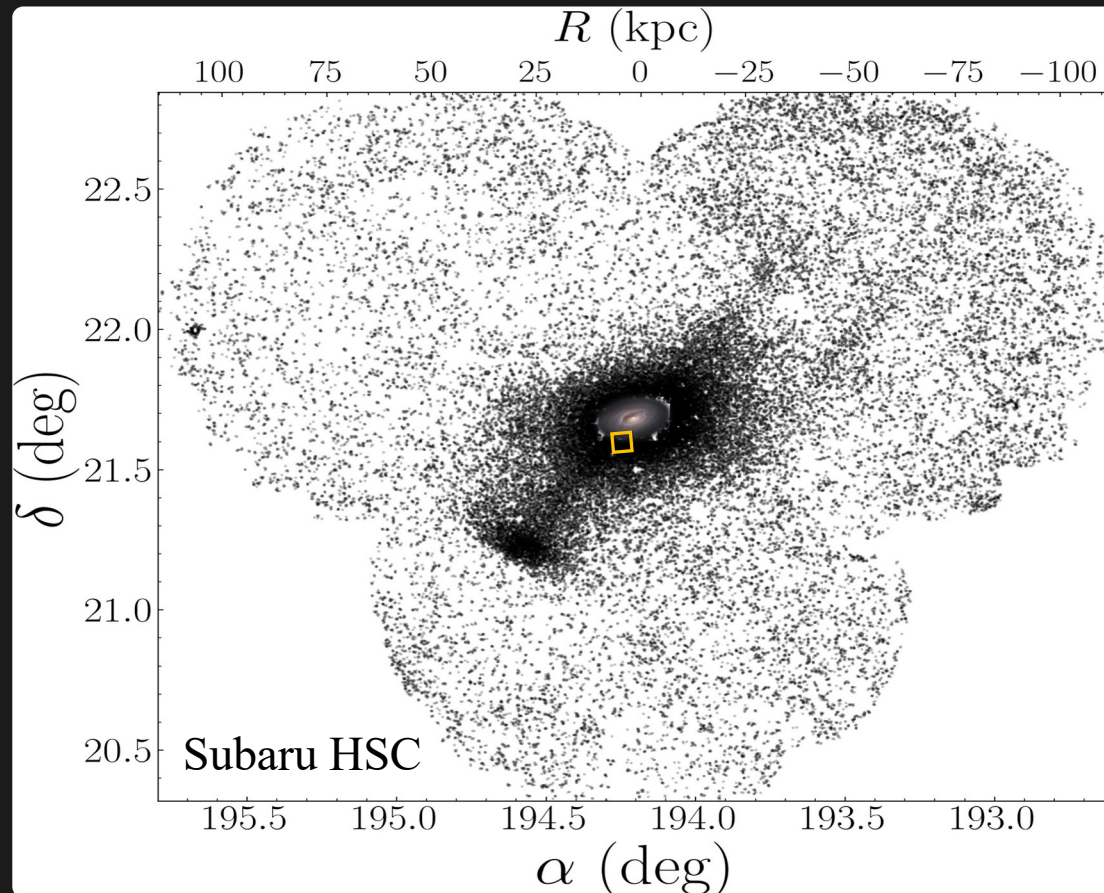
FIRE (Sanderson+2020)



Stellar Halos from the Ground: The “Evil Eye” galaxy, M64

Ancient stellar halo populations traced by resolved Red Giant Branch stars.

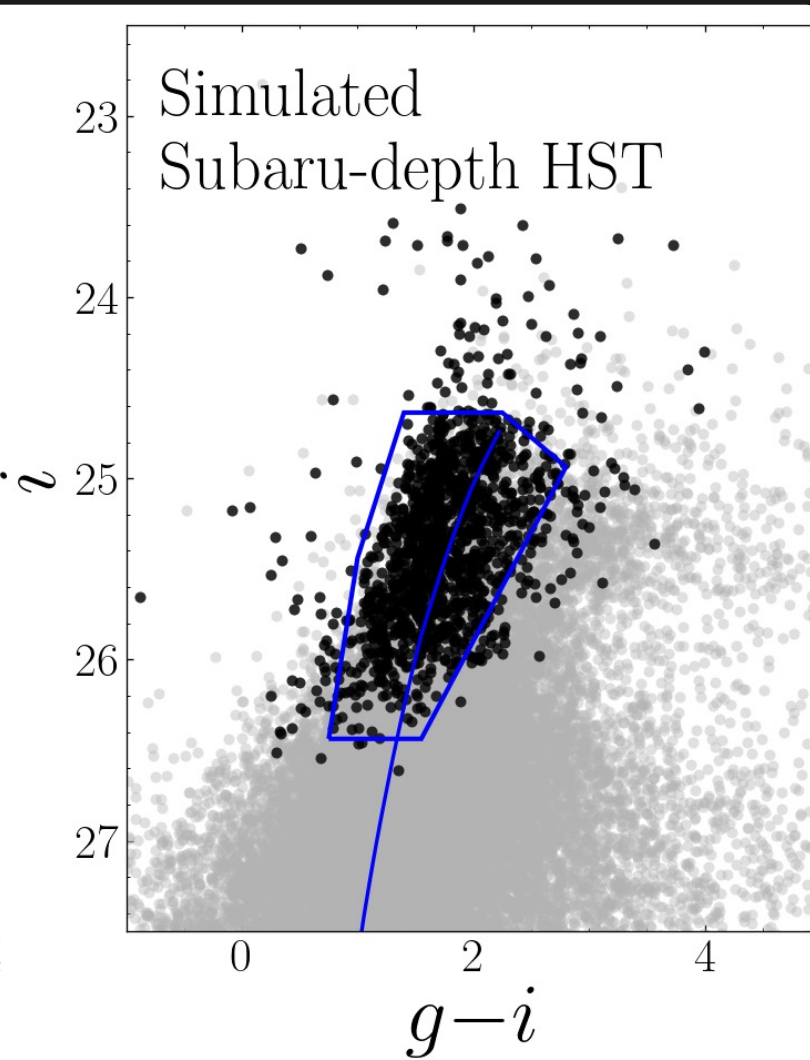
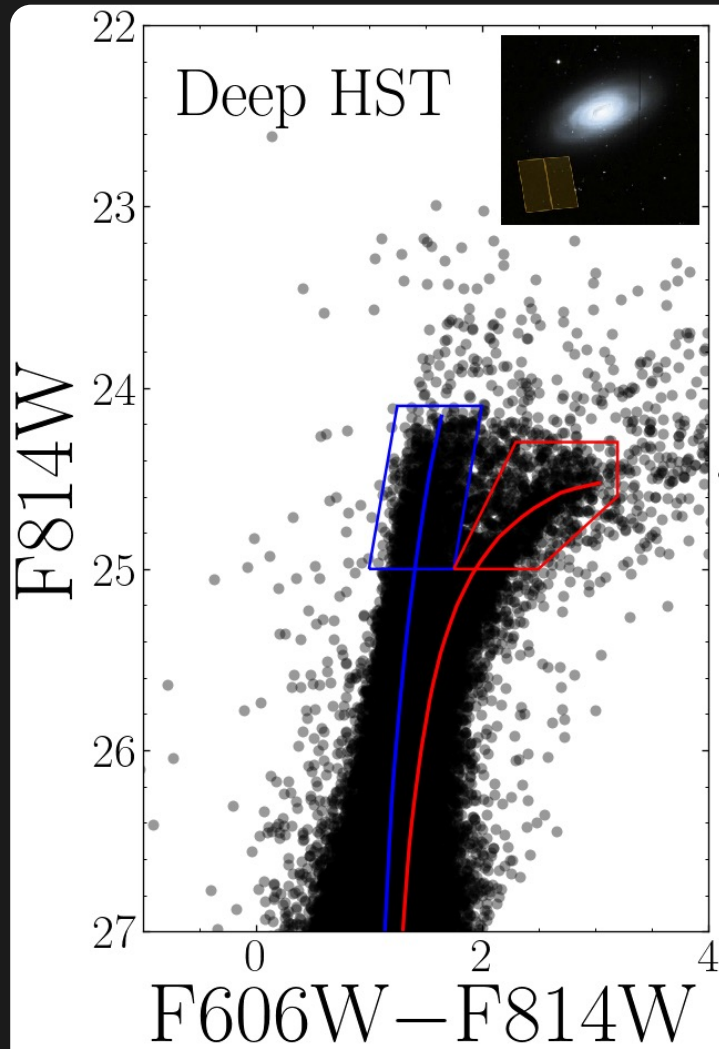
Smercina et al. 2023



Single HST field for calibration

Lee et al. 2020





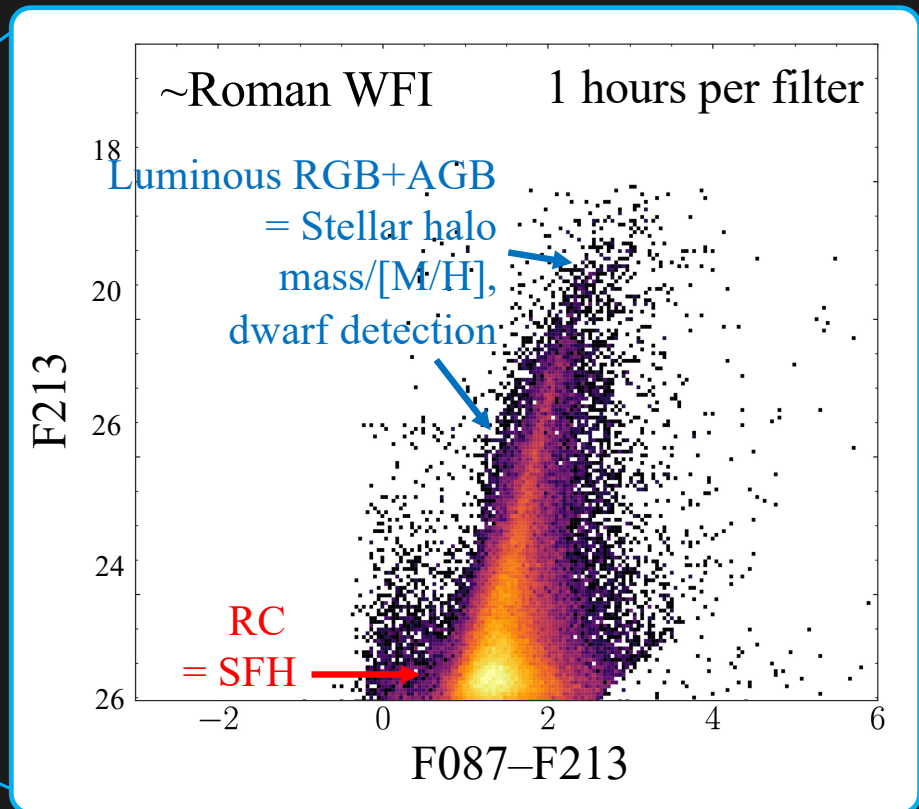
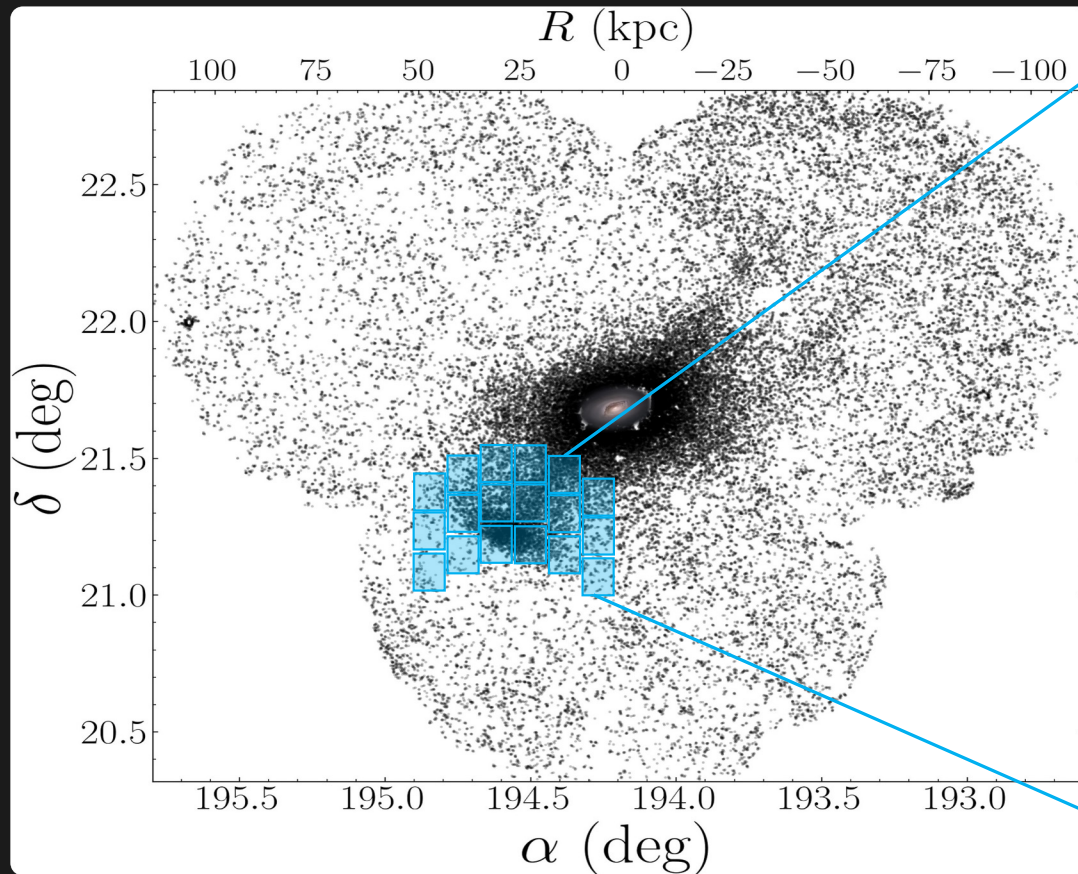
Separating different pops (i.e. accreted halo and disk) is difficult from the ground

Metallicity only inferred crudely

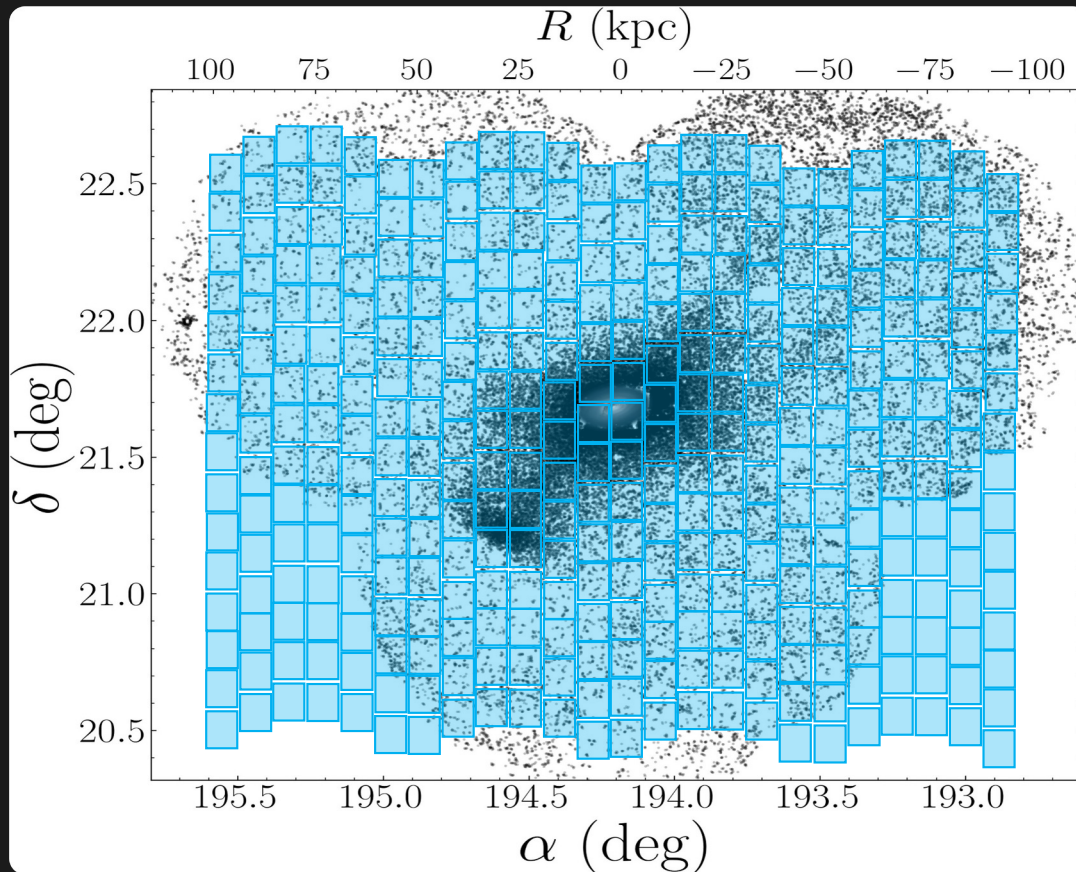
Space-based imaging gives much more robust mass and metallicity



Surveying Stellar Halos with Roman: Nearby Galaxies (~ 4 Mpc)



Surveying Stellar Halos with Roman: Nearby Galaxies (~ 4 Mpc)



Example Survey

20 Roman fields

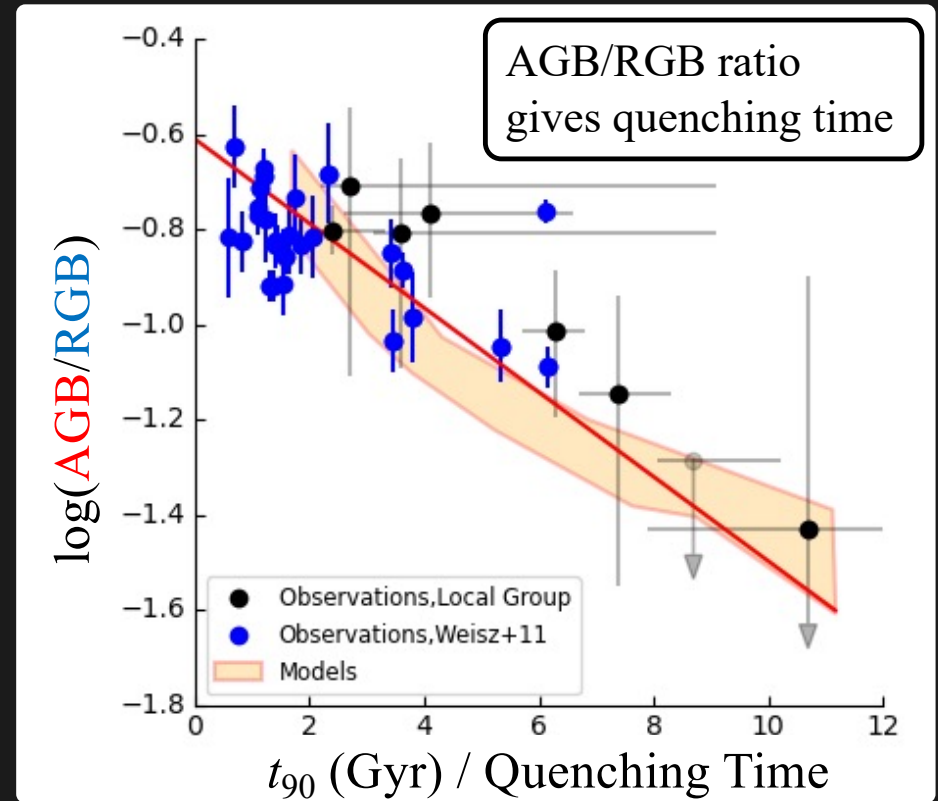
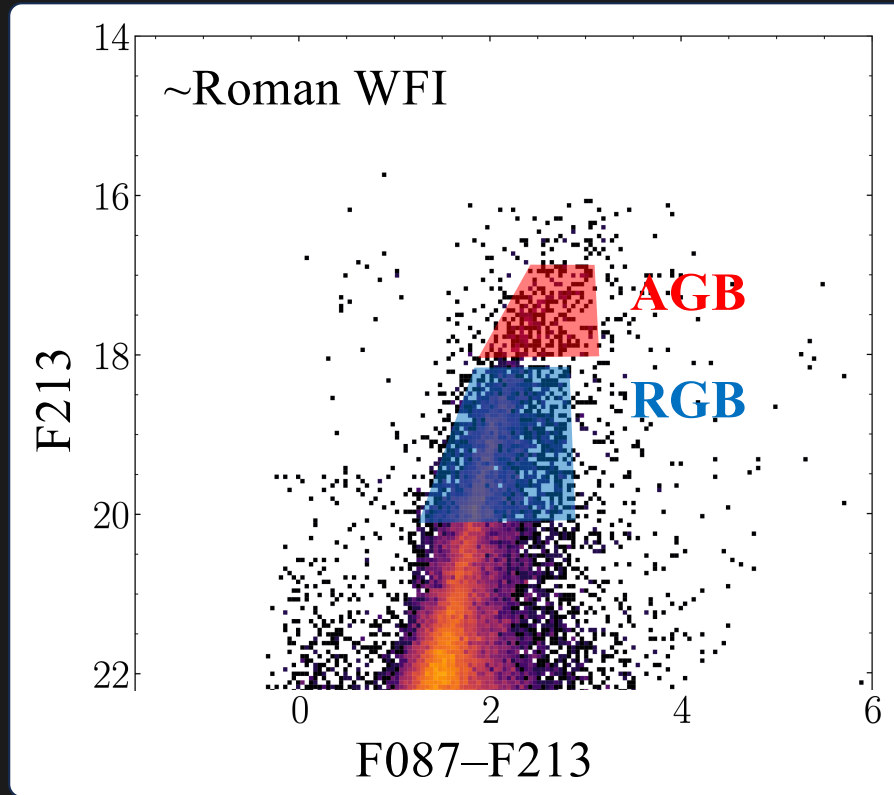
2 filters

~ 1 hour per filter per field = RC depth

Deep stellar populations (incl. detailed SFHs) of halos and inner satellite galaxy populations out to ~ 4 Mpc



Surveying Stellar Halos with Roman: Further Out (10+ Mpc)

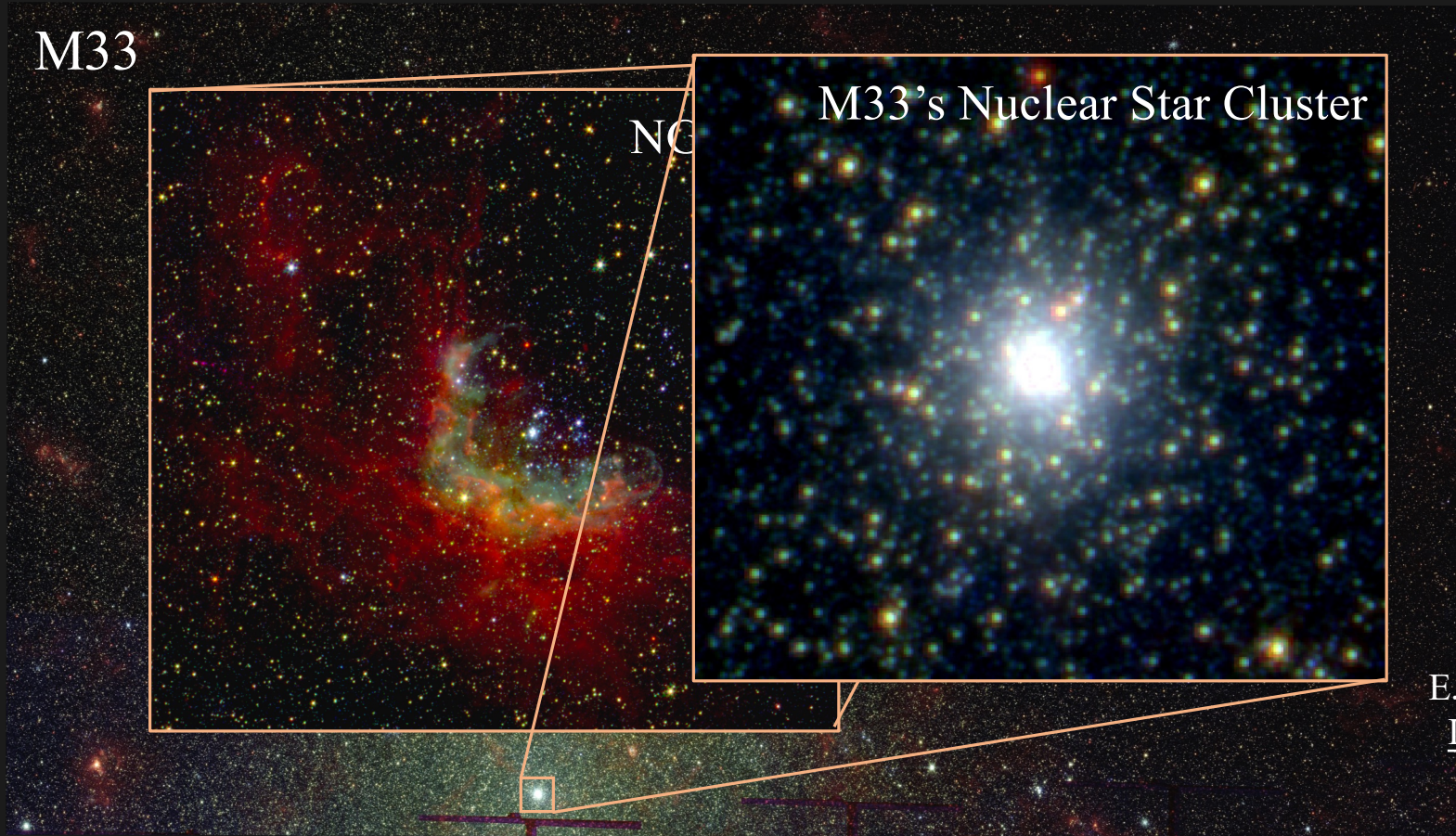


Harmsen et al. 2023 (in review)

JWST is a Game-Changer for Deep Resolved Stellar Populations

F090W
F200W
F335M

M33



M33's Nuclear Star Cluster

Cycle 1 PI:
E. Rosolowsky
Image Credit:
A. Smercina
T. Williams



STScI SPACE TELESCOPE
SCIENCE INSTITUTE

Roman Science Meeting

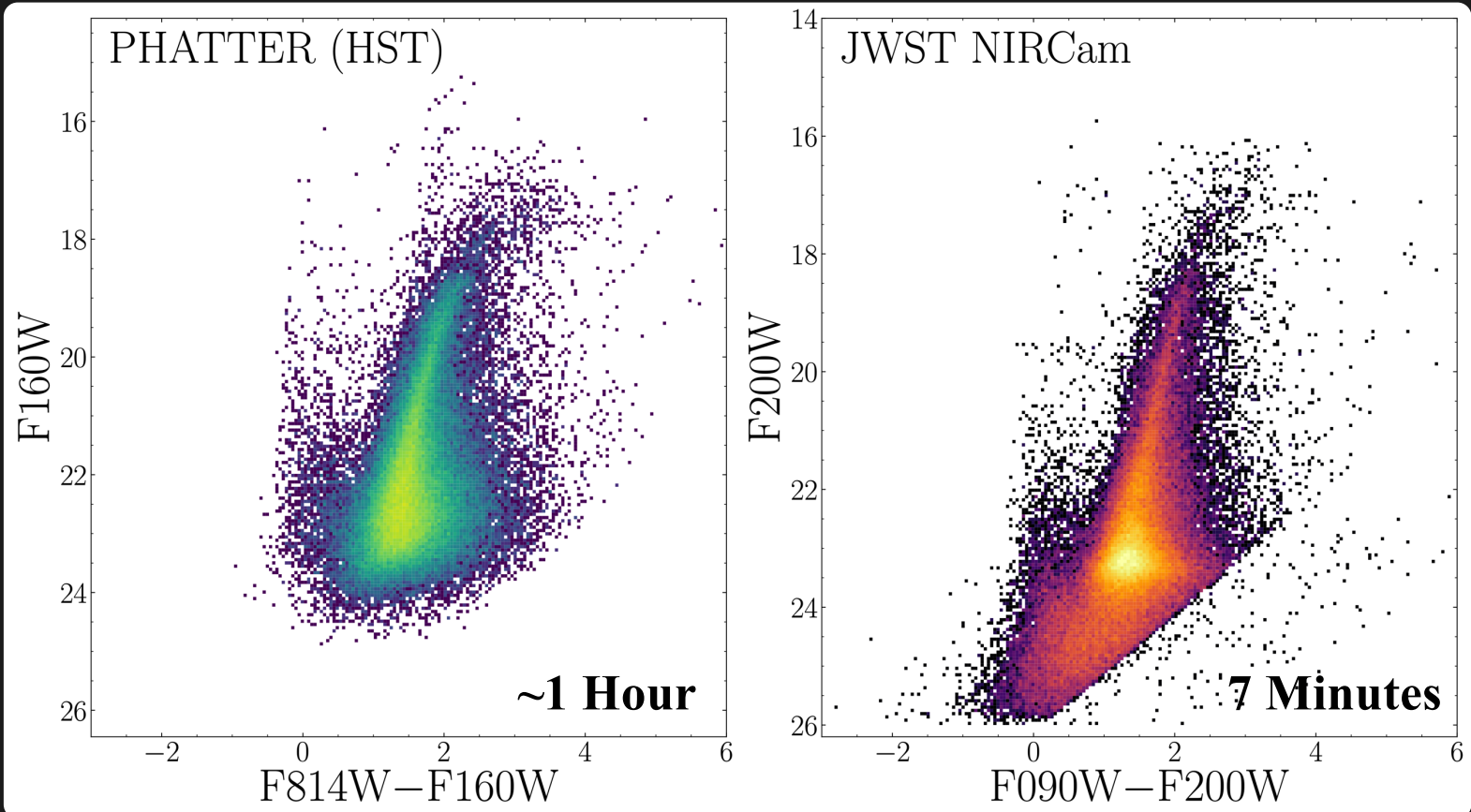
Nearby Galaxy Archaeology – 06/22/2023

Adam Smercina

JWST: An Efficient and Complementary Anchor for Roman

Resolution and sensitivity gives easy access to detailed SFHs throughout the Local Volume ($D \sim 10$ Mpc).

Anchor for Roman, particularly in more distant galaxies, where have AGB/RGB, but direct SFHs are inefficient.

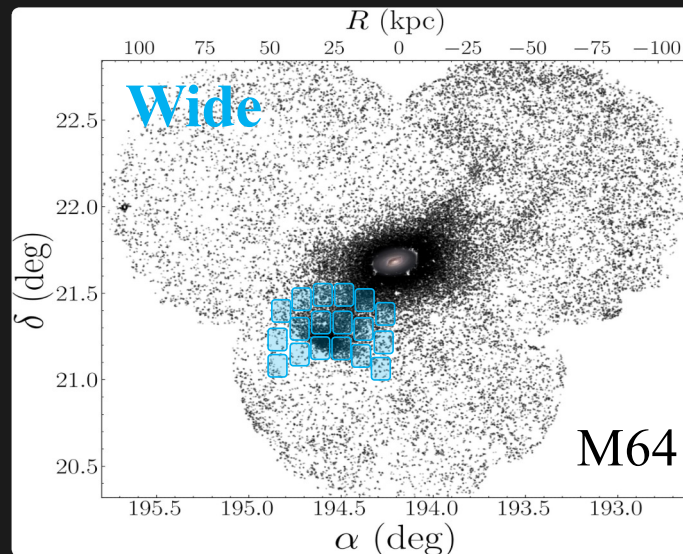


A new era of FOV (**Roman**) AND sensitivity (**JWST**) from space

Detailed SFHs of stellar halos + satellites for nearest galaxies (~4 Mpc)

Stellar halo progenitor properties (mass, metallicity) throughout LV

Merger times throughout LV (10+ Mpc)



“Anchor” for shallower Roman studies



Deep SFHs of stellar halos, satellites, and central disks throughout LV (10+ Mpc)

Roman+JWST is unprecedented opportunity to understand entire evolutionary histories of galaxies in the Local universe

