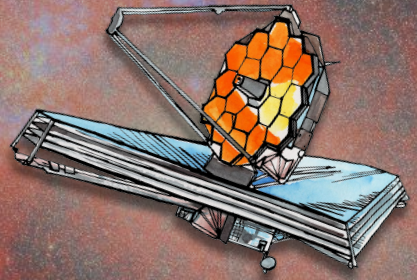
Image credits: ESA/Webb, NASA, CSA, A. Adamo, FEAST collaboration

JWST/NIRCam Close-Up of the Gravitational Dance Between Two Dwarf Galaxies



Giacomo Bortolini*

In collaboration with: Angela Adamo, Matteo Correnti, Michele Cignoni, Monica Tosi, Göran Östlin, Alex Pedrini, Helena Faustino Vieira & the FEAST collaboration

***Stockholm University,** giacomo.bortolini@astro.su.se

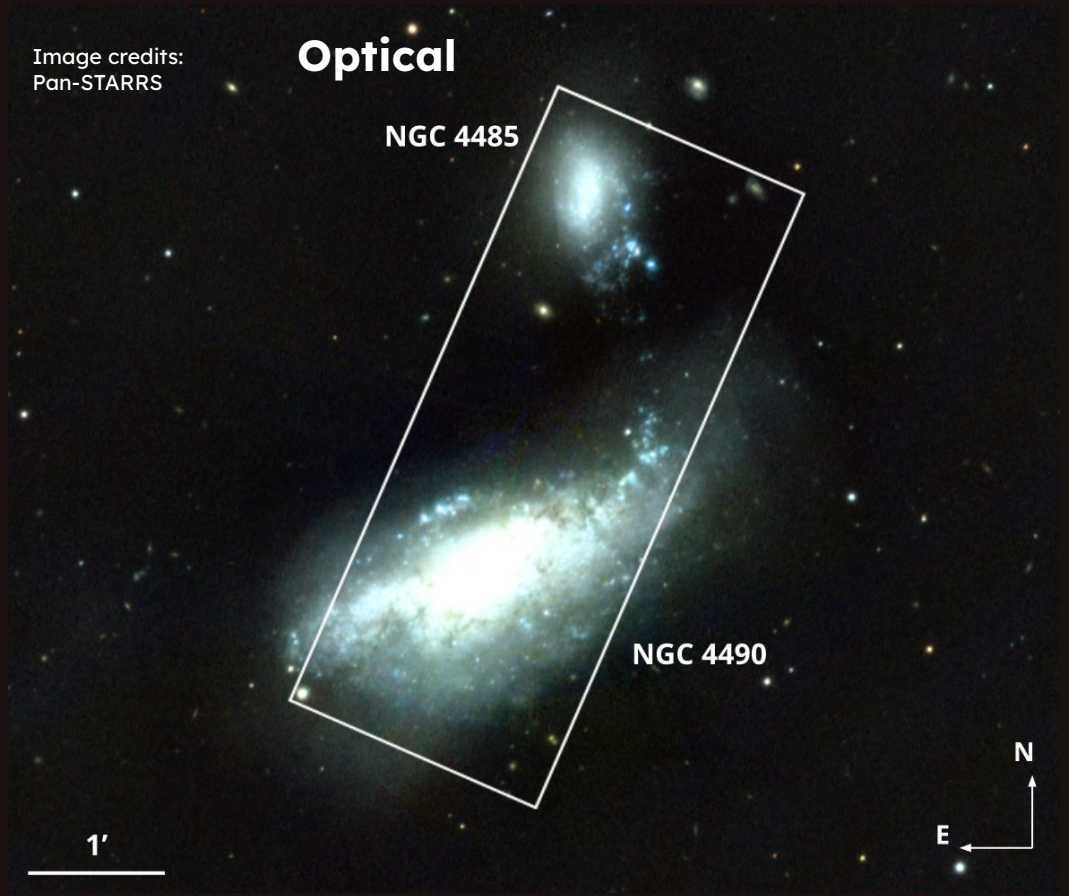
Stockholms universitet

Oskar Klein centre

FEAST

Nordic-Baltic Astronomy Days, 26-29 May 2026 Turku, Finland

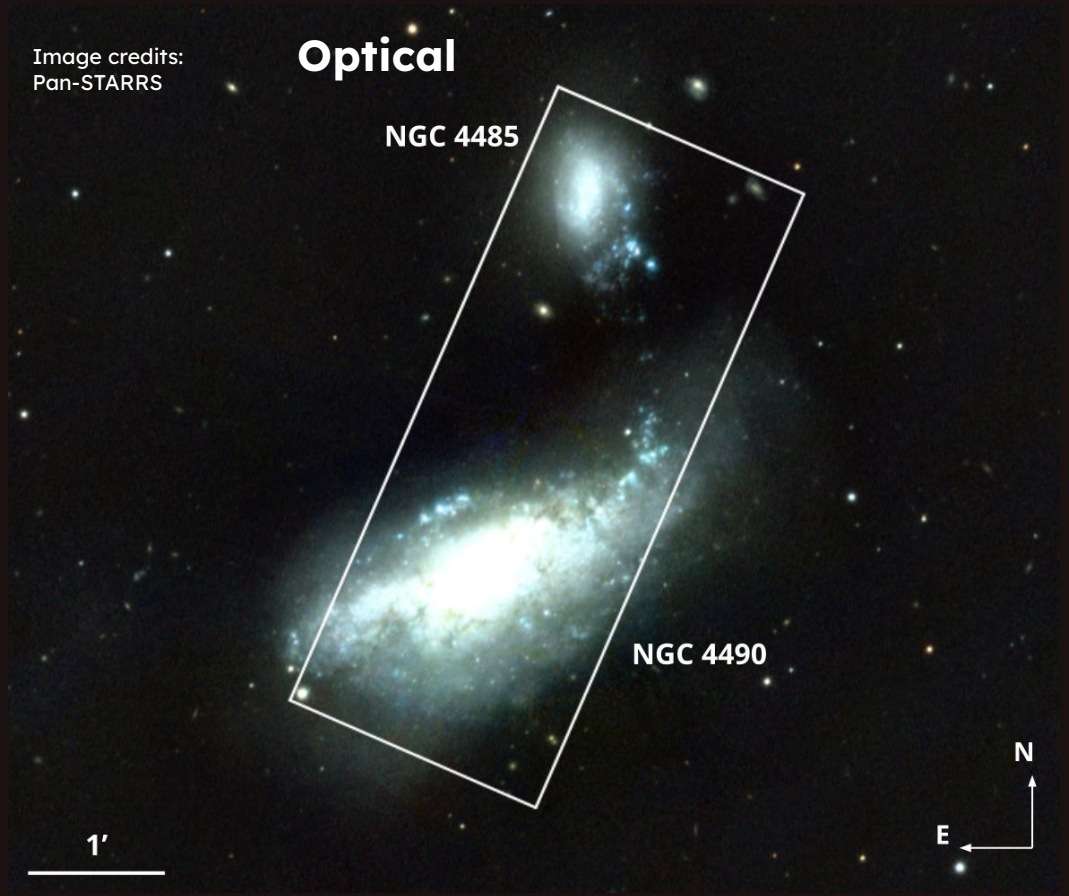
The target: NGC 4485/NGC 4490



Interacting low mass galaxies system

Bortolini et al. 2025

The target: NGC 4485/NGC 4490

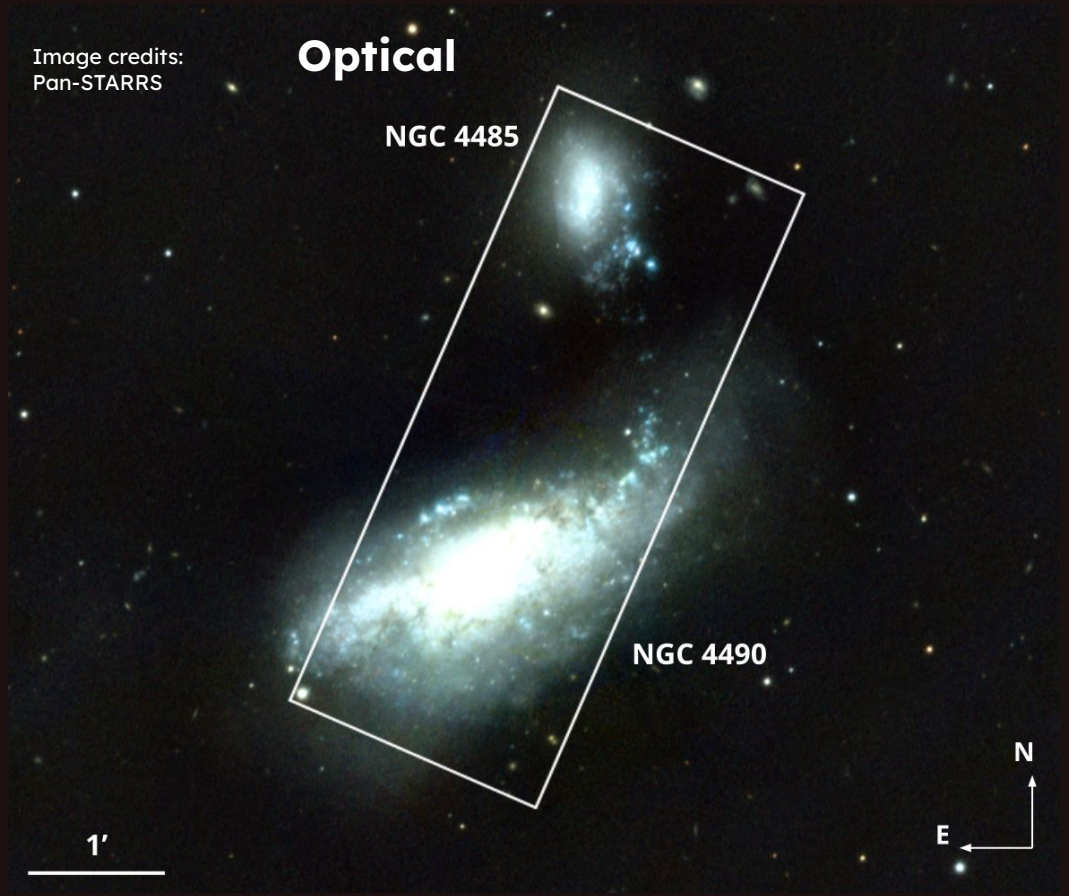


Bortolini et al. 2025

Interacting low mass galaxies system

Mass ratio = 8:1 (LMC/SMC like)

The target: NGC 4485/NGC 4490



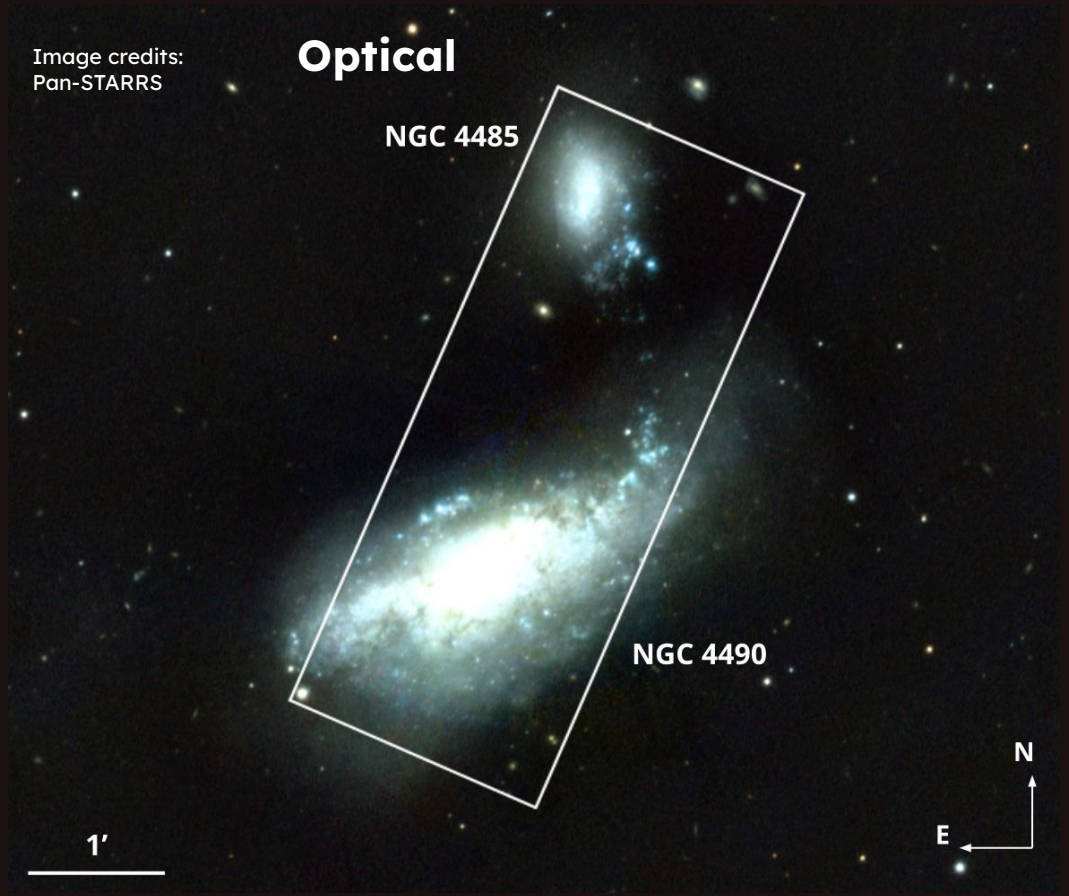
Interacting low mass galaxies system

Mass ratio = 8:1 (LMC/SMC like)

Star forming tidal bridge

Bortolini et al. 2025

The target: NGC 4485/NGC 4490



Bortolini et al. 2025

Interacting low mass galaxies system

Mass ratio = 8:1 (LMC/SMC like)

Star forming tidal bridge

Distance = 7.4 Mpc

Calzetti et al. 2015

The target: NGC 4485/NGC 4490

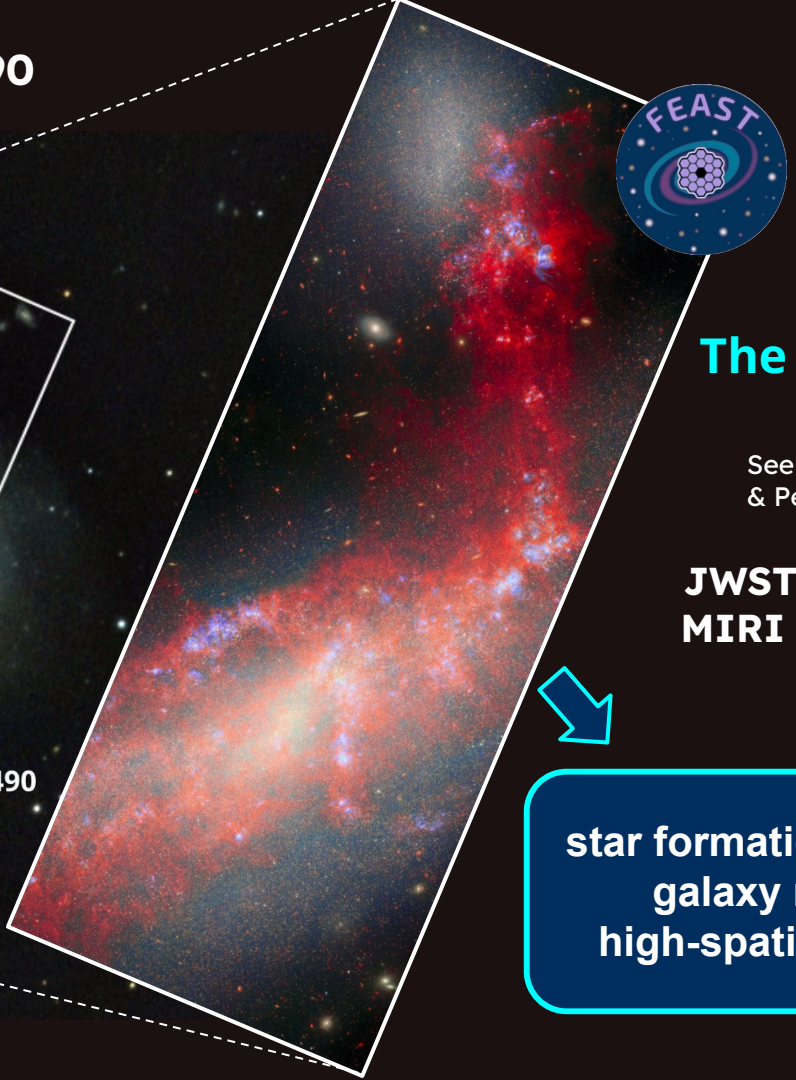
Image credits:
Pan-STARRS

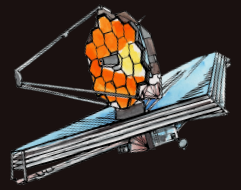
Optical

NGC 4485

NGC 4490

1′





The FEAST Survey

PI: A.Adamo

See also Faustino Vieira & Pedrini Talks

JWST NIRCam + MIRI RGB image

star formation in low mass galaxy mergers at high-spatial-resolution!

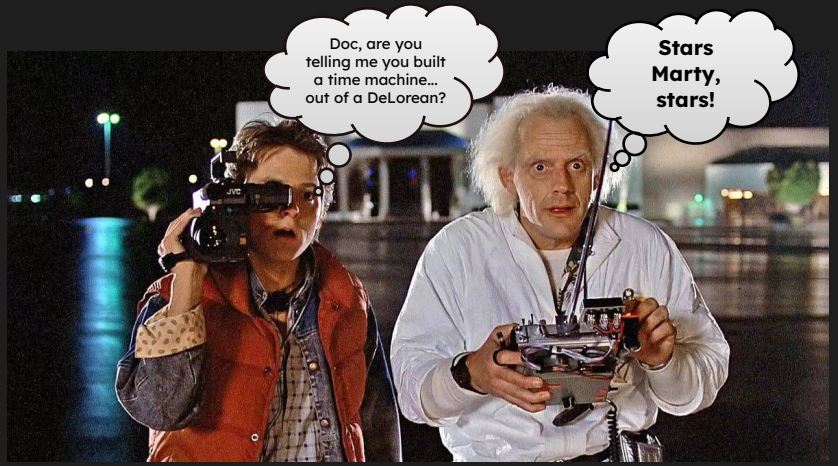
Bortolini et al. 2025

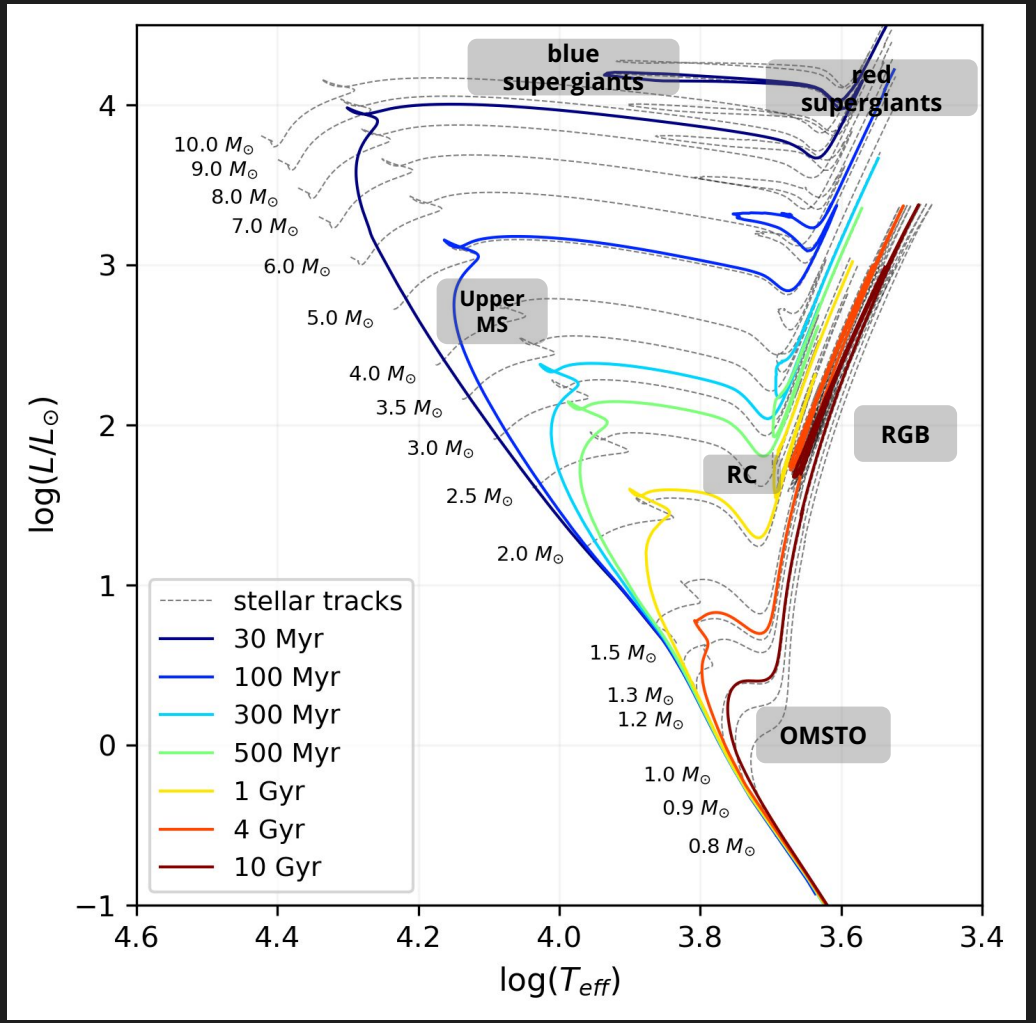
A cosmic dance of dwarf galaxies

1.15 μm, 1.87 μm, 2.0 μm, 3.35 μm, 4.44 μm, 5.6 μm, 7.7 μm

images credits: ESA/Webb, NASA, CSA, A.Adamo, FEAST collaboration

Stars are a time machine!

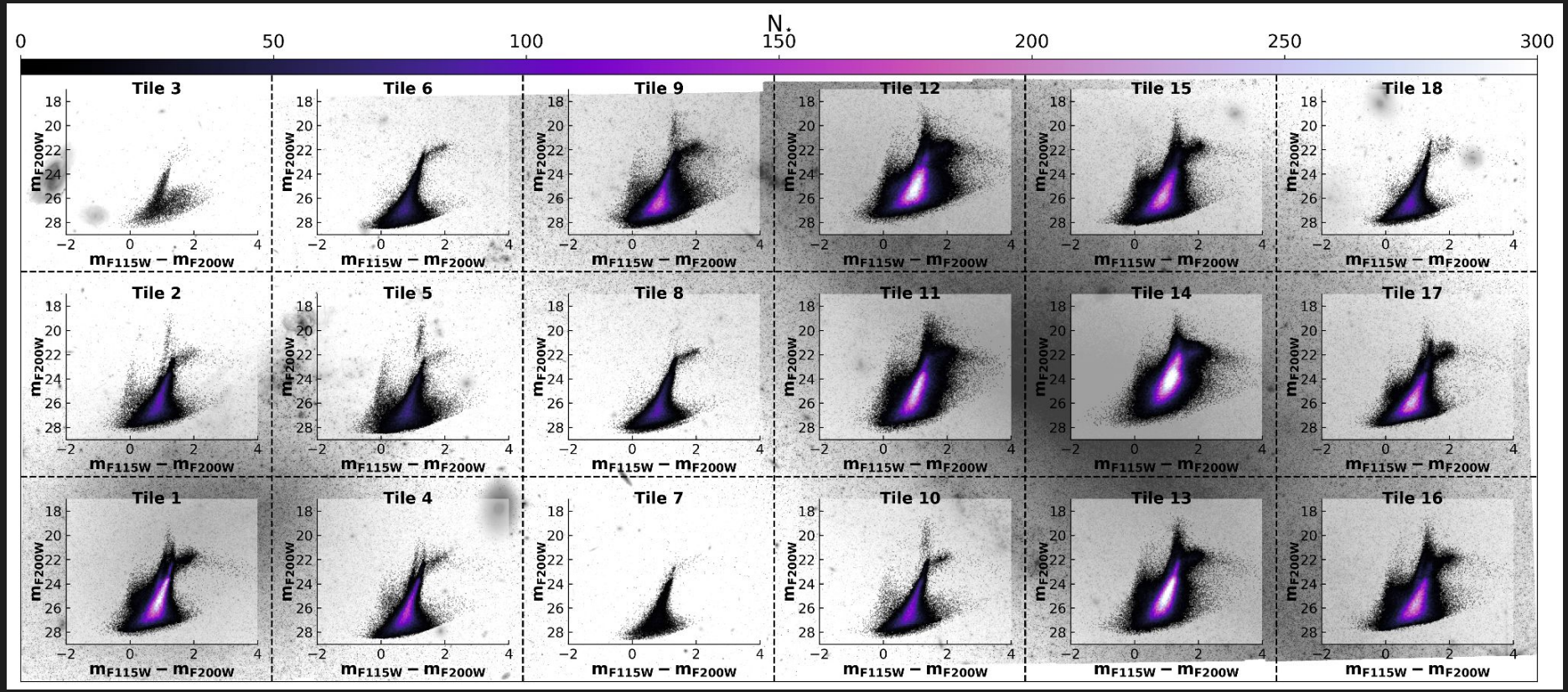




Resolved stellar populations study

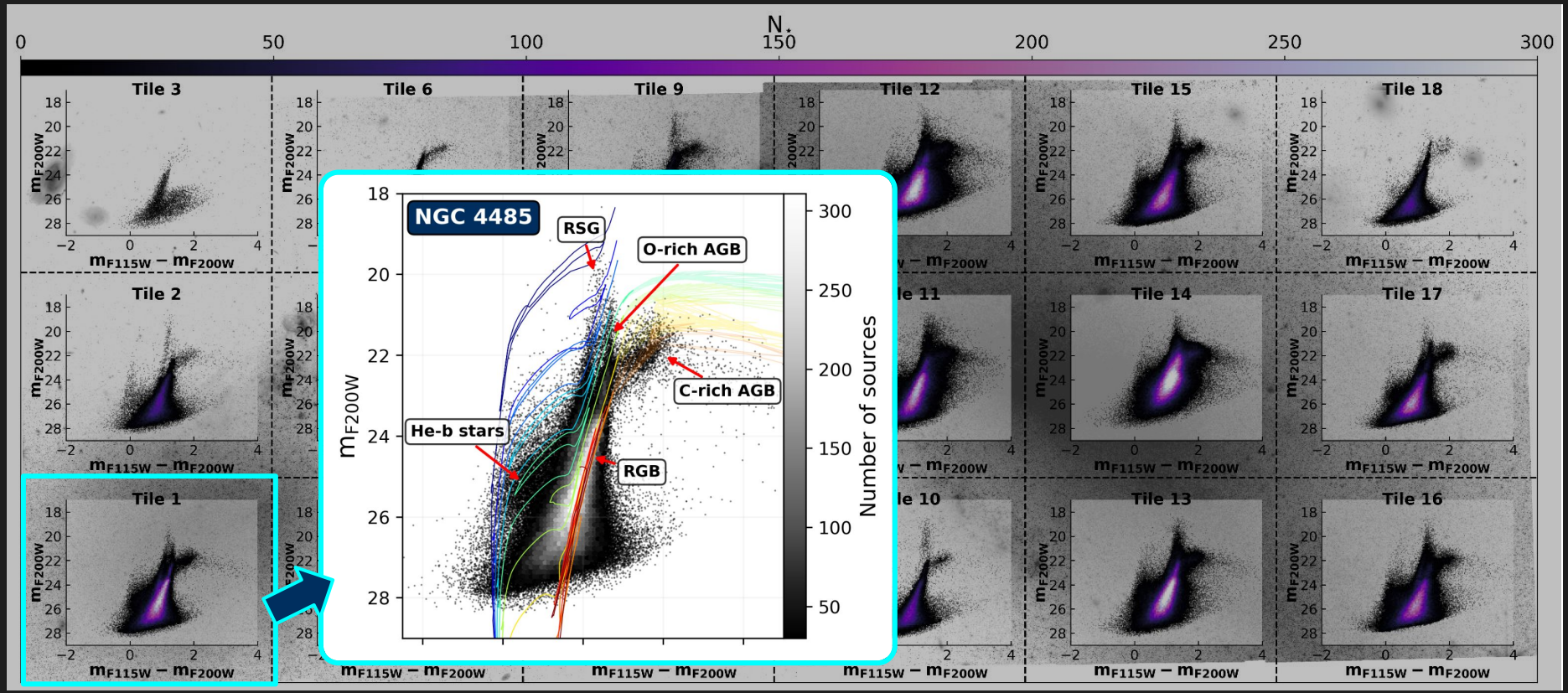
~ 2 million sources

Bortolini et al. 2025



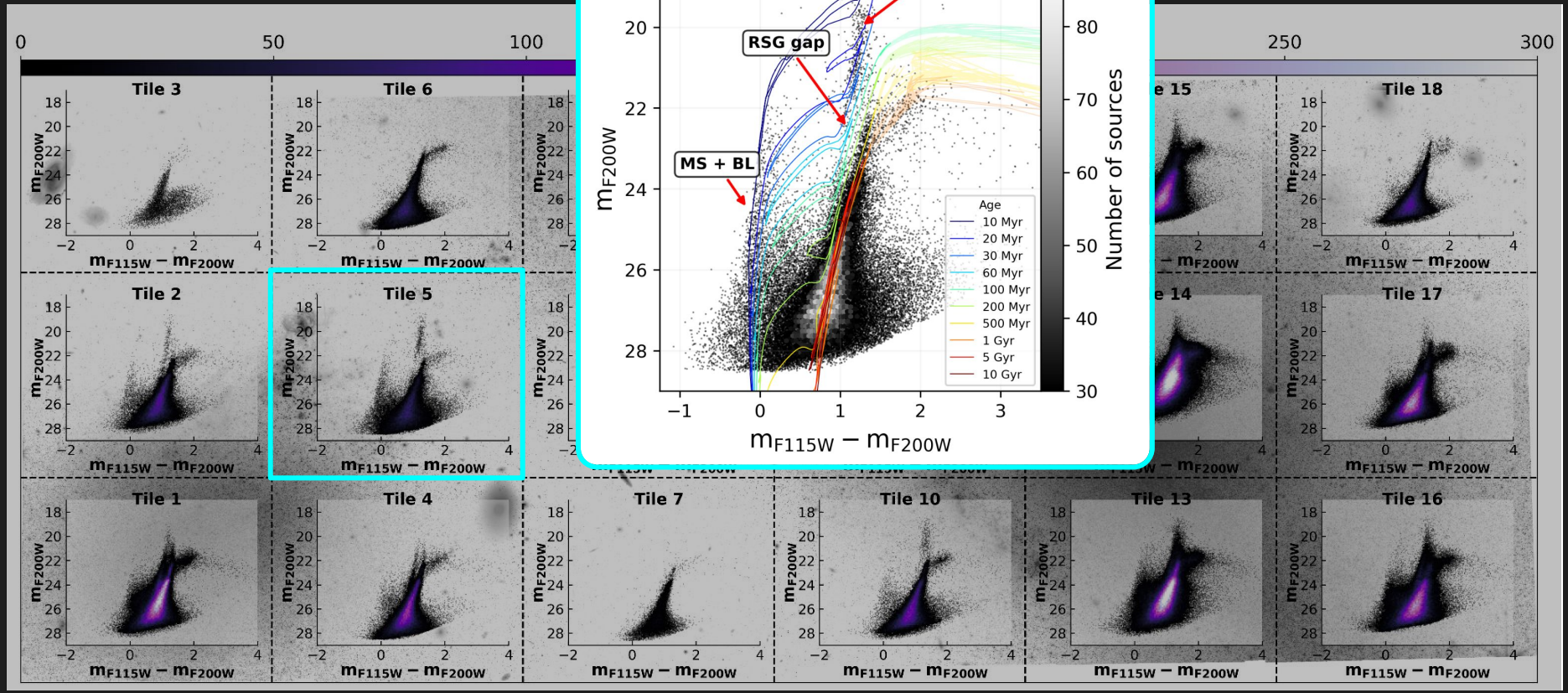
Resolved stellar populations study

Bortolini et al. 2025



Resolved stellar populations study

Bortolini et al. 2025



SFERA 2.0

(Star Formation Evolution Recovery Algorithm)

Bortolini et al. 2024a

Synthetic CMD method:

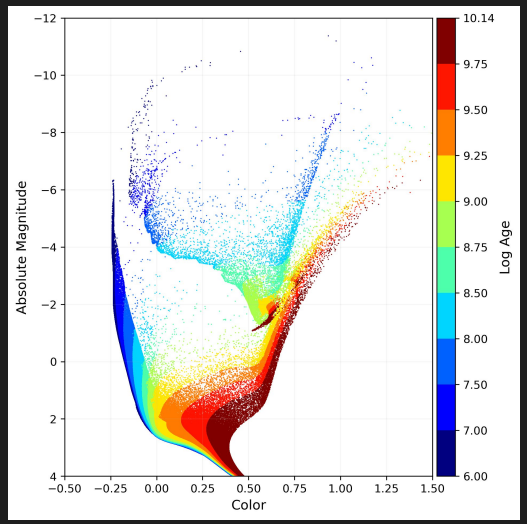
Fit the observed CMD with synthetic CMDs created from stellar isochrones

Tosi et al. 1991, Cignoni & Tosi 2010

Scan to know more!

Synthetic CMD method in a nutshell

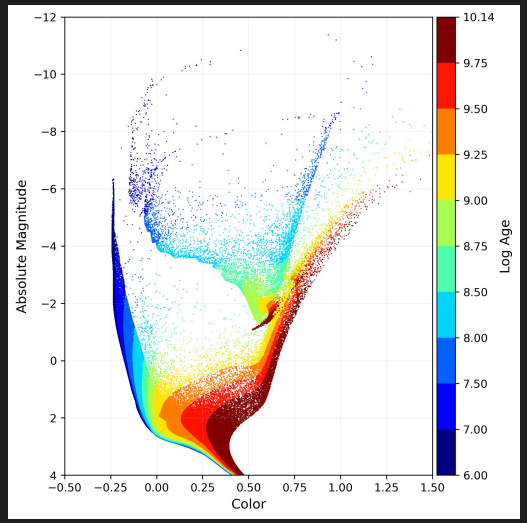
STEP 1: Building a library of synthetic CMDs



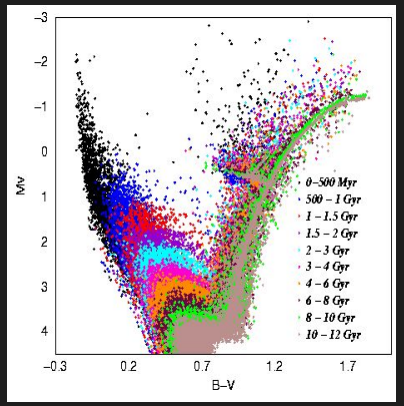
Scan to know more!

Synthetic CMD method in a nutshell

STEP 1: Building a library of synthetic CMDs



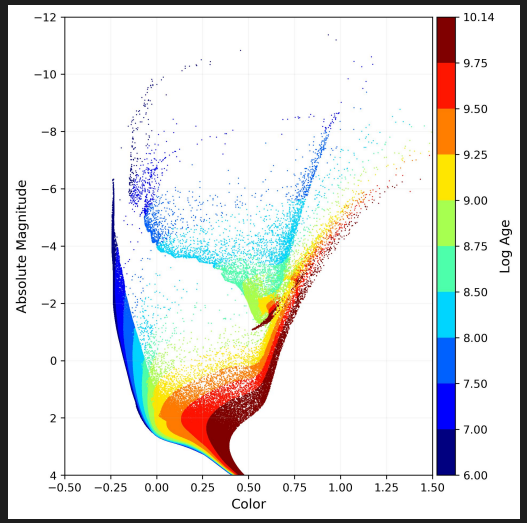
STEP 2: Simulating observational conditions



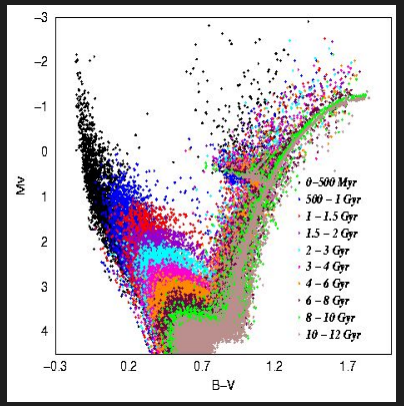
Scan to know more!

Synthetic CMD method in a nutshell

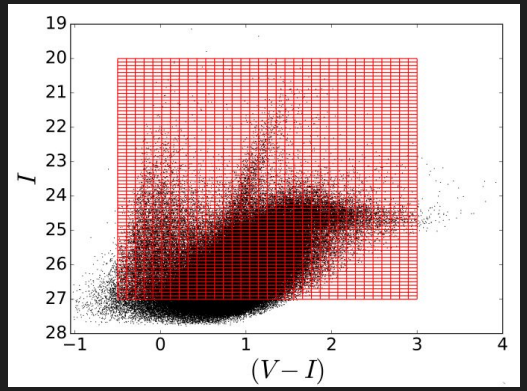
STEP 1: Building a library of synthetic CMDs



STEP 2: Simulating observational conditions



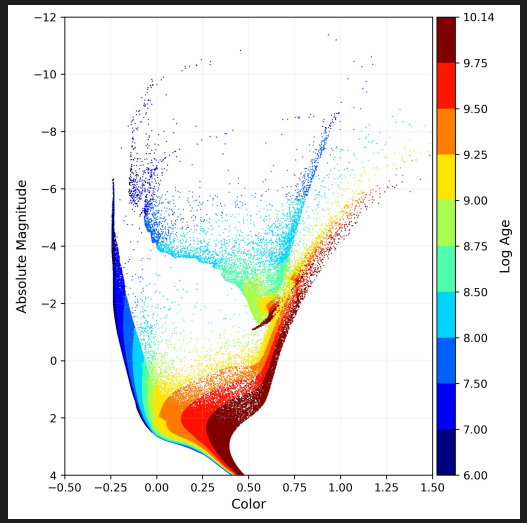
STEP 3: Binning the synthetic and observed CMDs



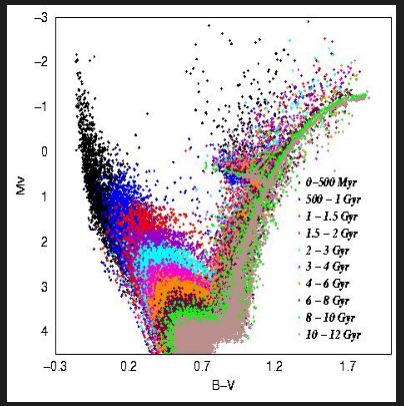
Scan to know more!

Synthetic CMD method in a nutshell

STEP 1: Building a library of synthetic CMDs



STEP 2: Simulating observational conditions



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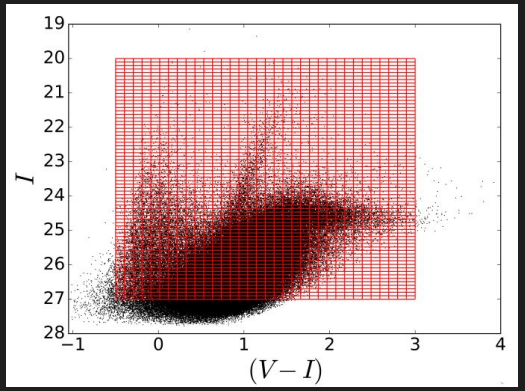
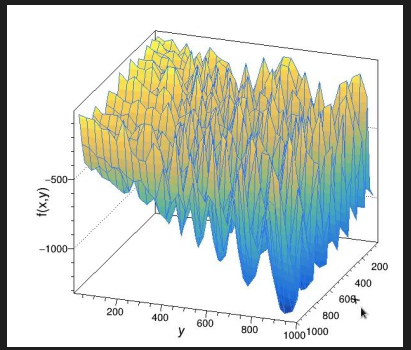


STEP 4: Searching for the best solution

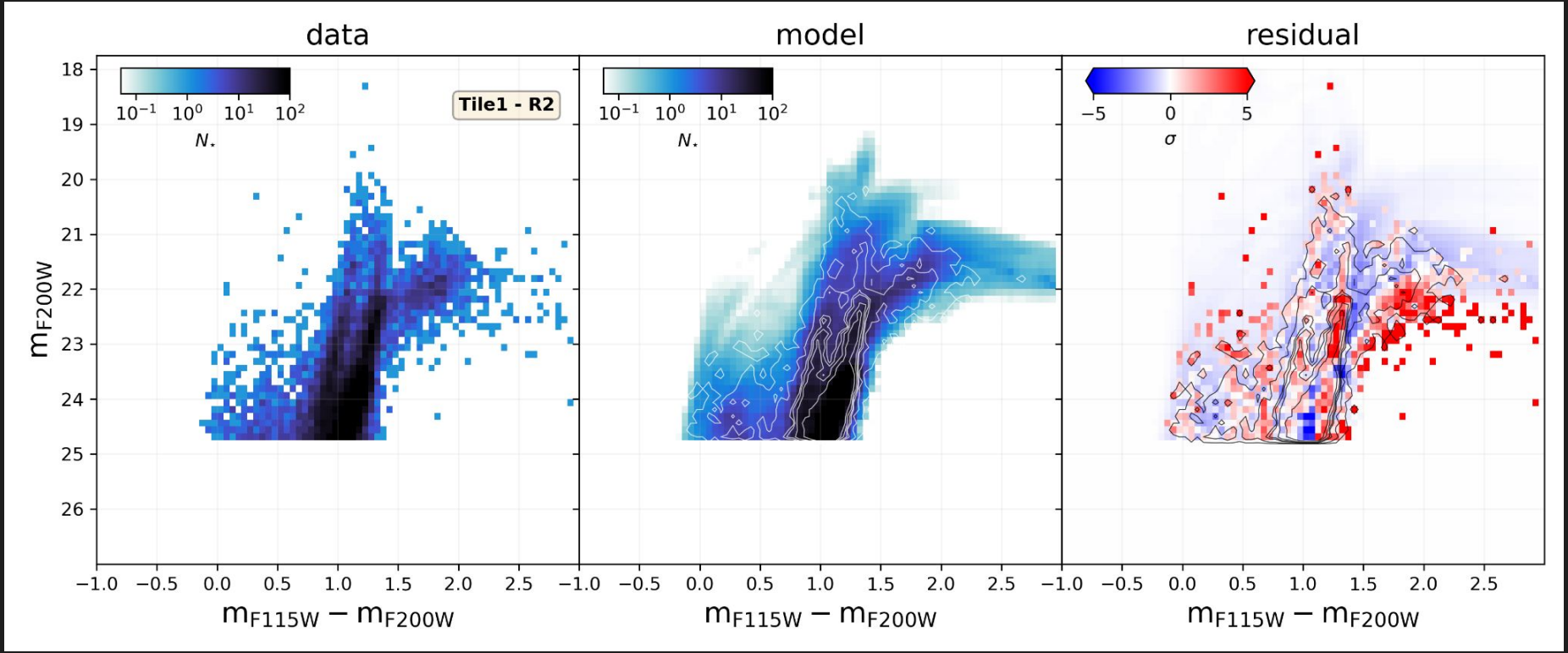


“Best” fit SFH

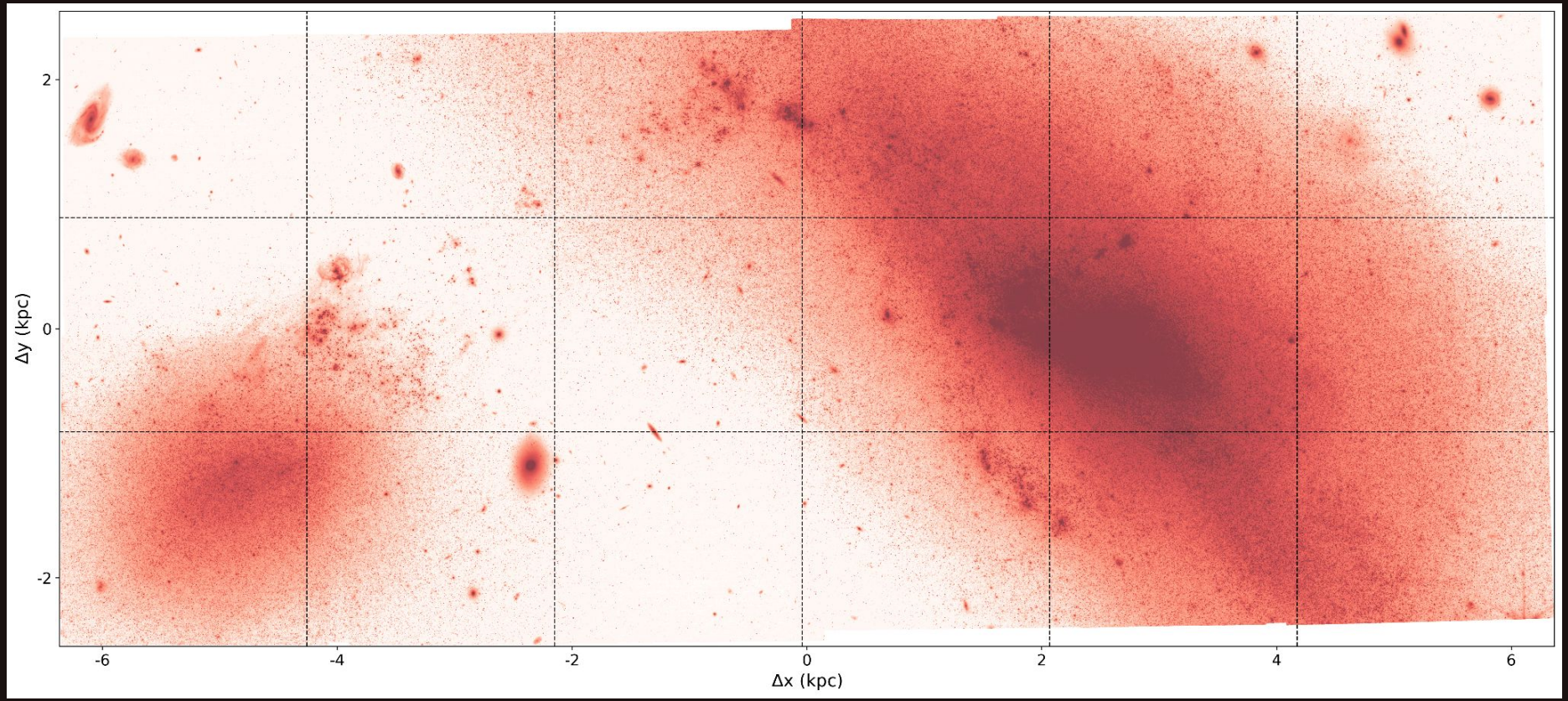
Scan to know more!

SFERA2.0

Fit the observed CMD with synthetic CMDs created from stellar evolution models

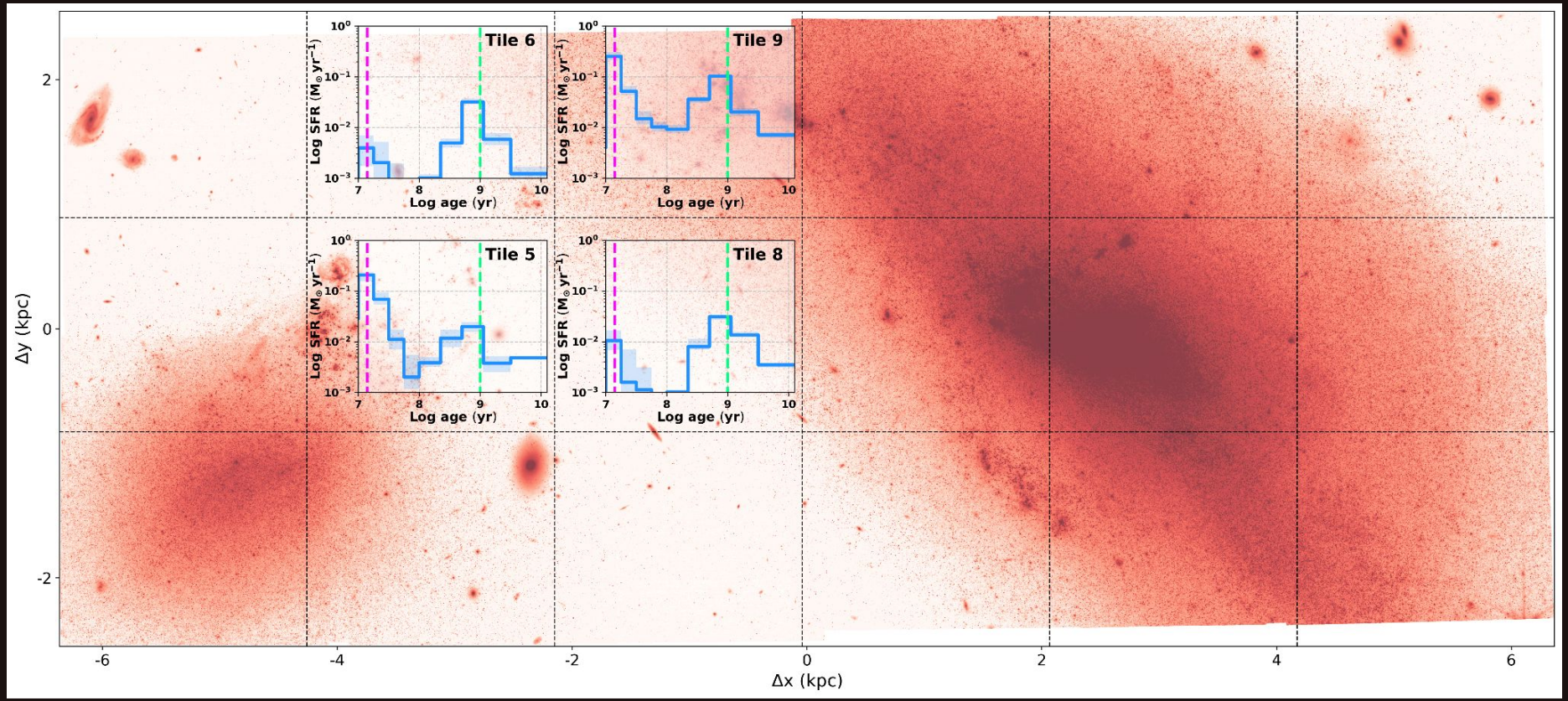


Spatially Resolved Star Formation Histories



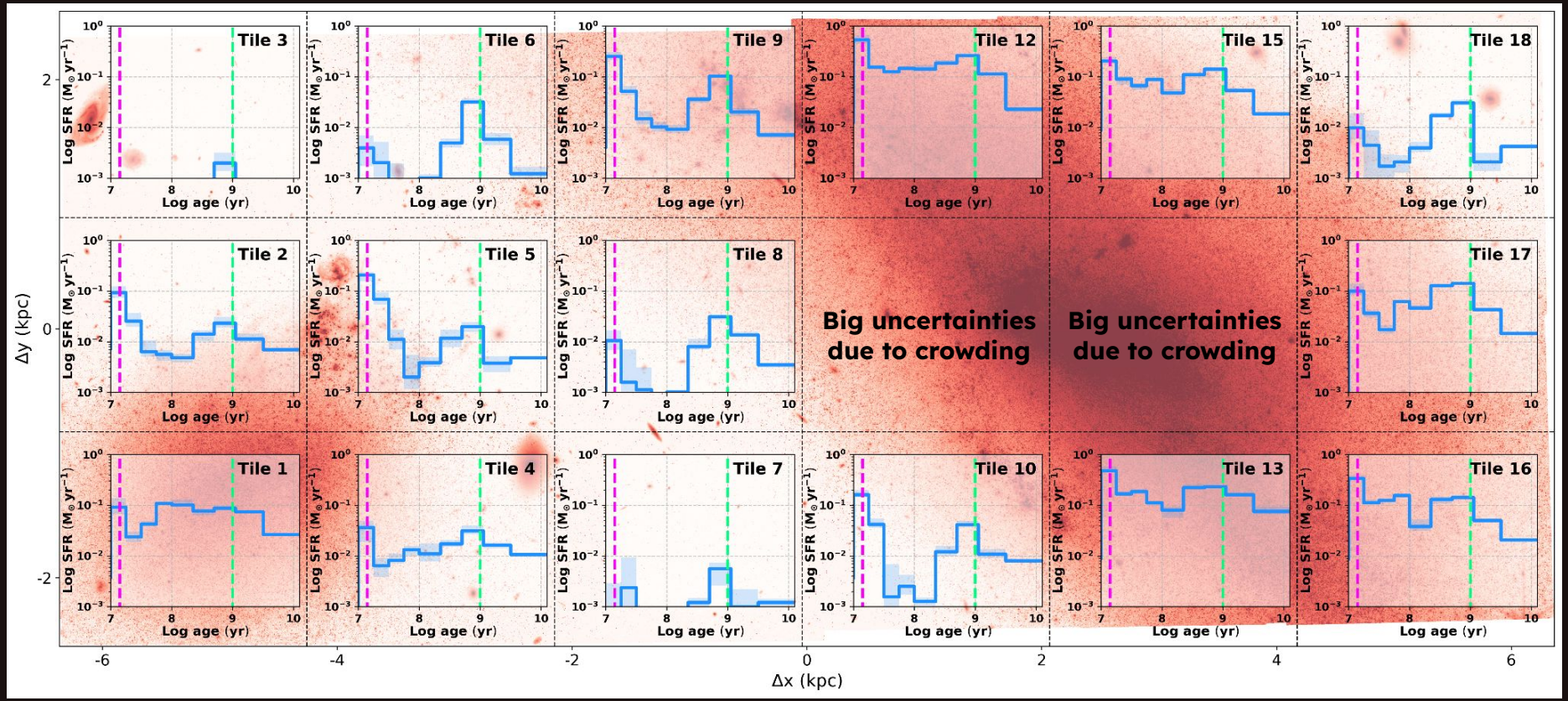
Bortolini et al. in prep

Spatially Resolved Star Formation Histories



Bortolini et al. in prep

Spatially Resolved Star Formation Histories



Bortolini et al. in prep

Summary

Resolved stellar populations provide an archaeological record that give us access to the formation history of a galaxy

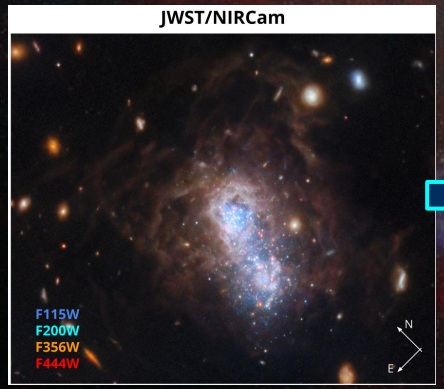
JWST infrared “eyes” opens a unique window into the star formation in a low mass, metal-poor, galaxy mergers at high-spatial-resolution!

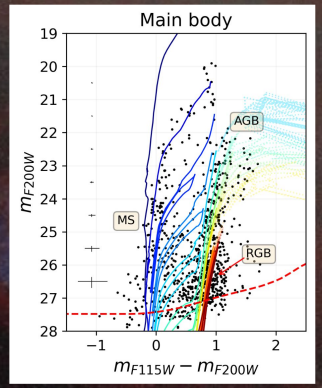
NGC 4485 & NGC 4490 are likely going through their second close encounter

Check out my publications:

Giacomo Bortolini
PhD student
Contact me:
giacomo.bortolini@astro.su.se

I Zw 18, an extremely metal poor dwarf galaxy





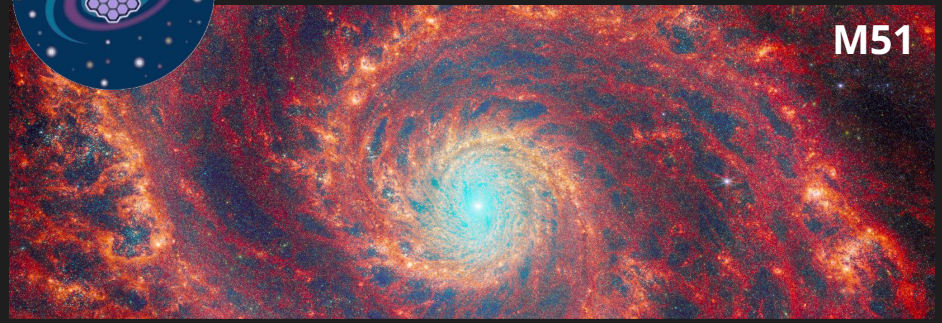
Ask me if you want to know more about it!

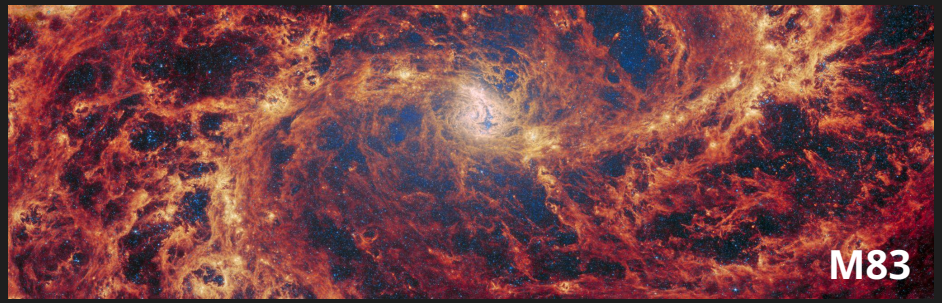
Backup slides

The FEAST sample

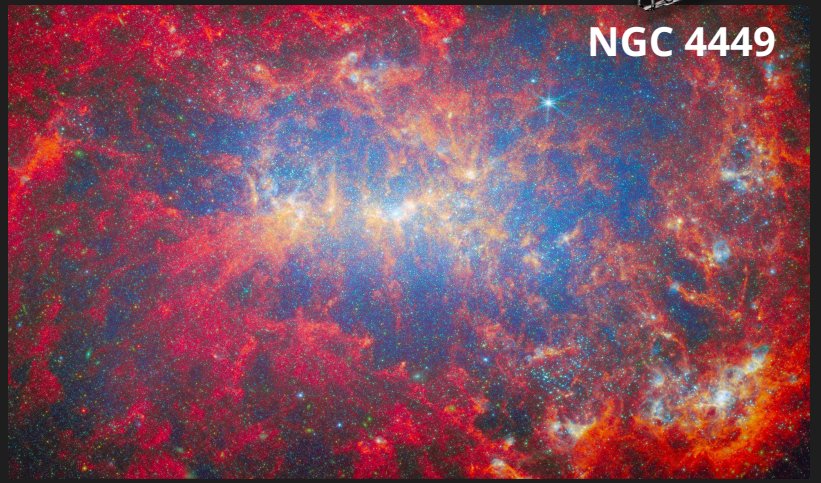
PI: A.Adamo

Spiral galaxies

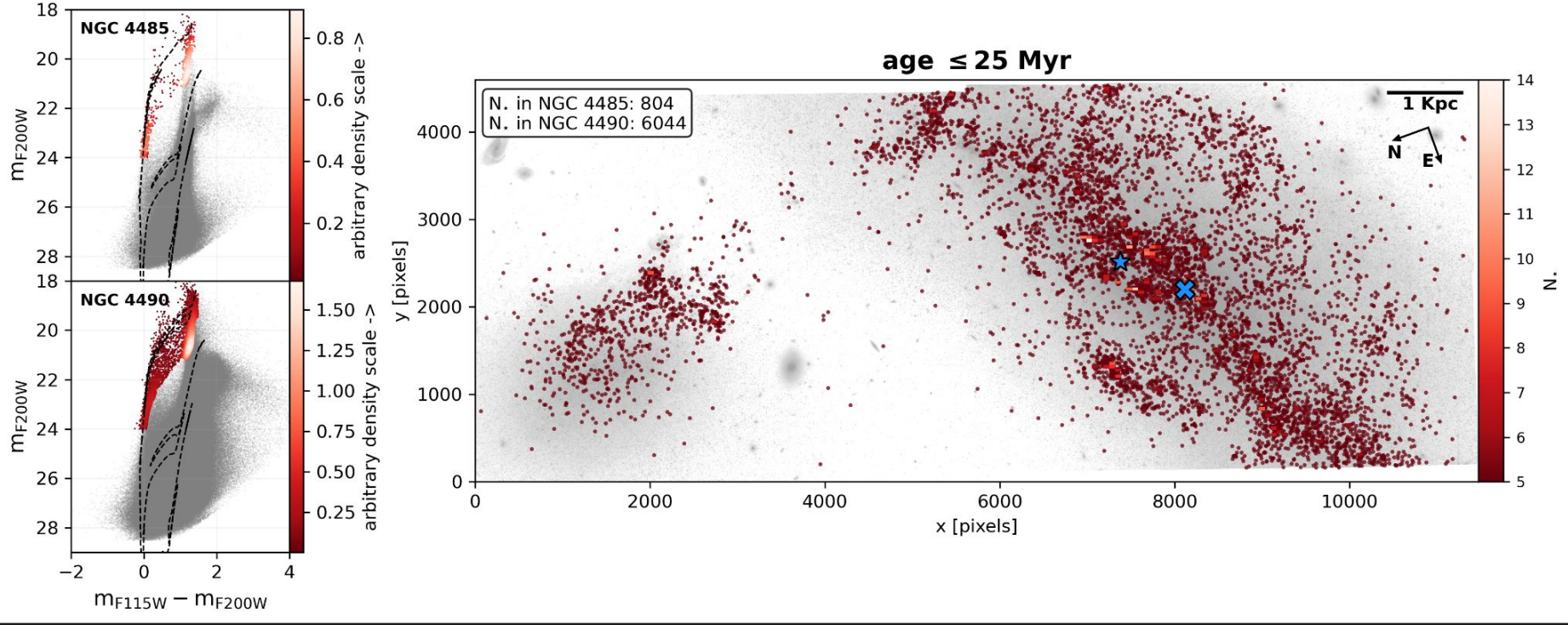




Dwarf galaxies

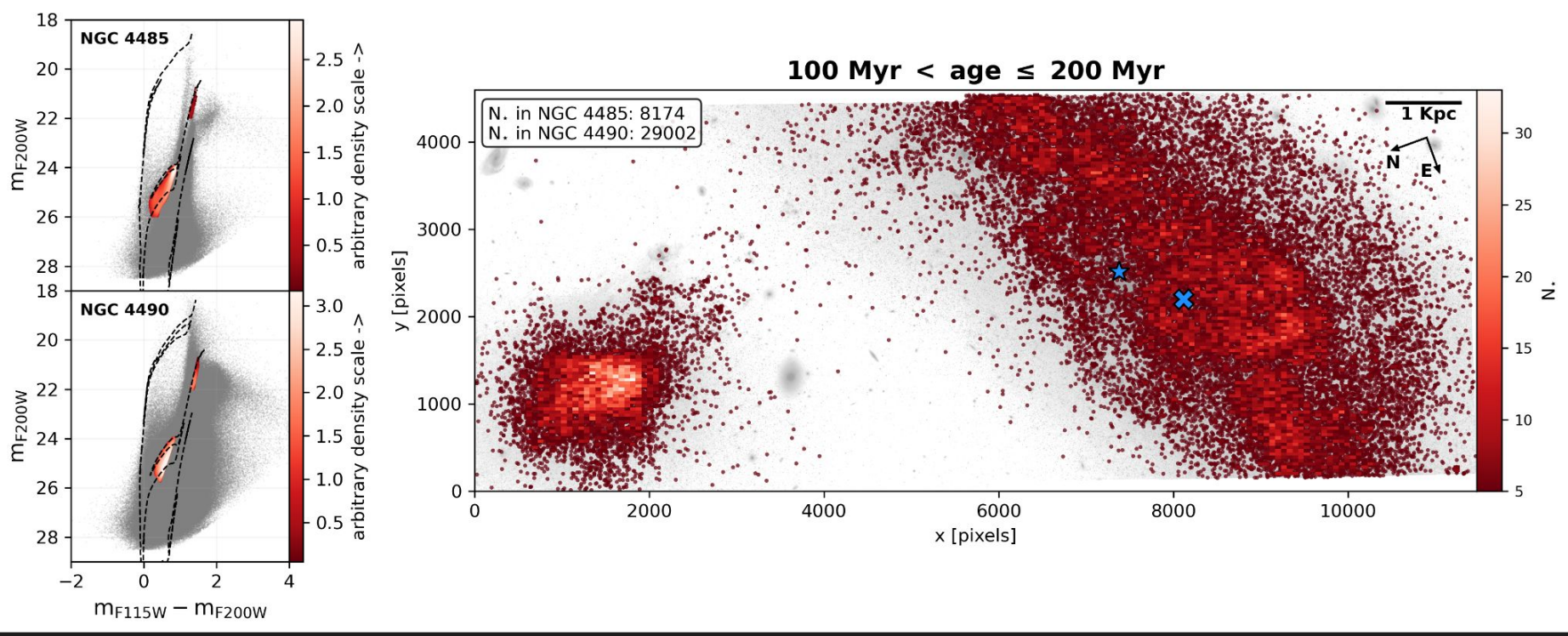


Young stars spatial distribution



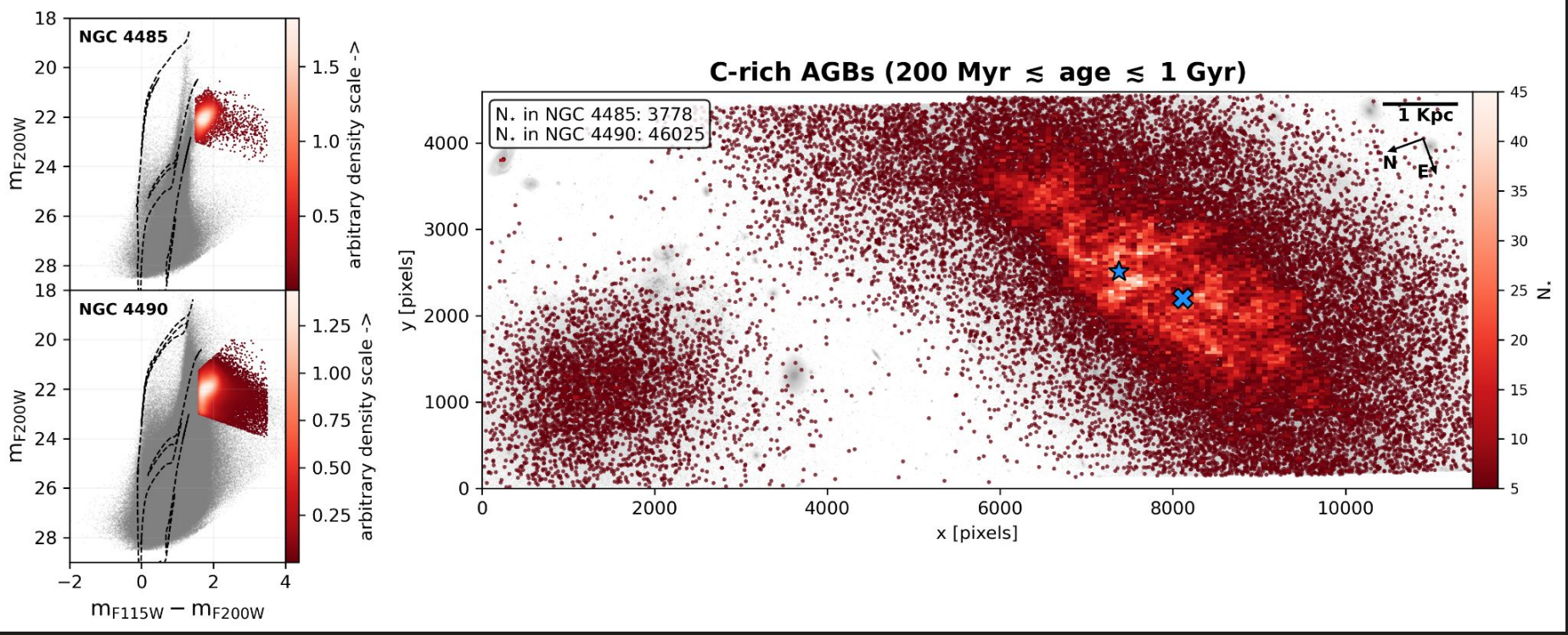
Bortolini et al. 2025

Young stars spatial distribution

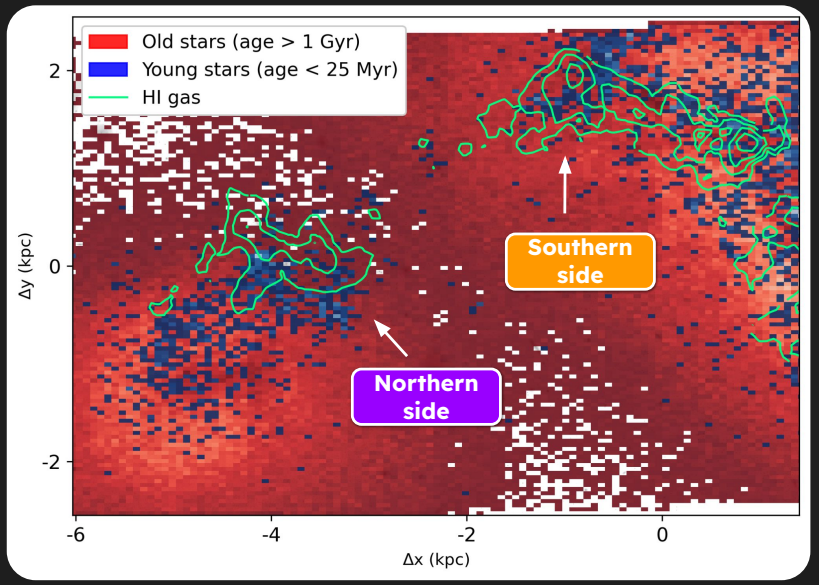


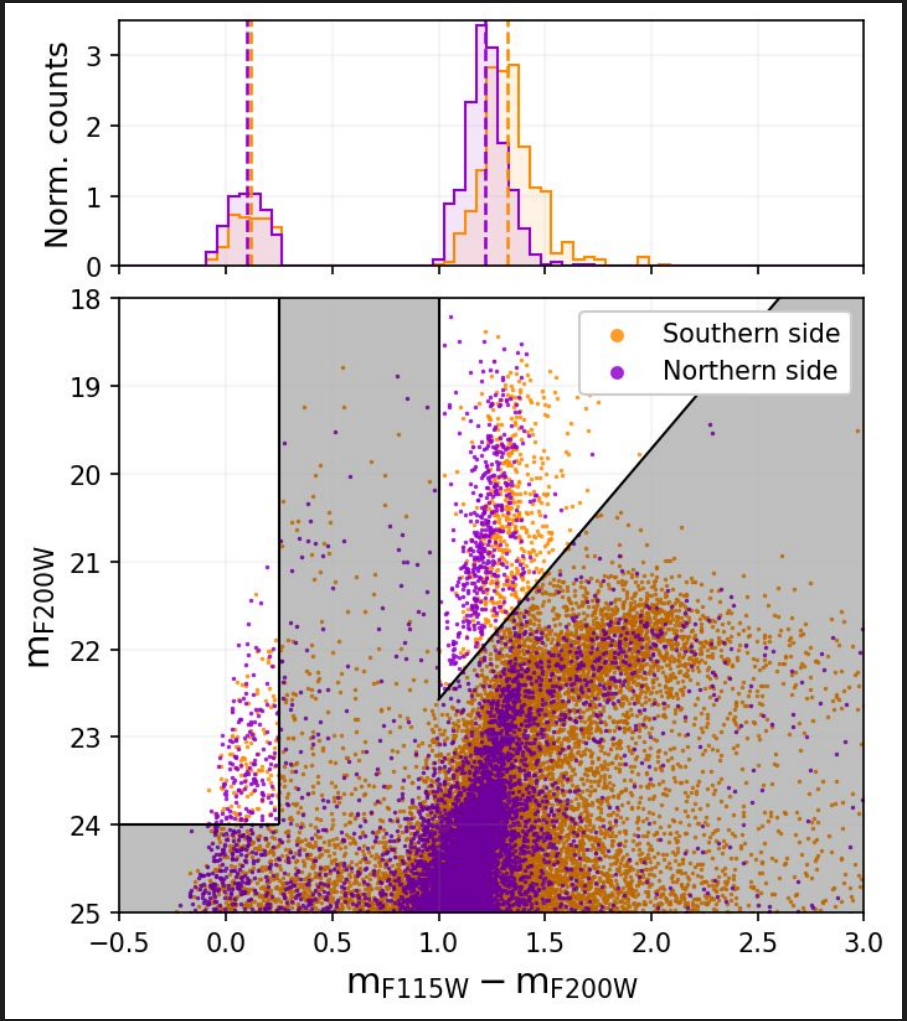
Bortolini et al. 2025

Old stars spatial distribution



Bortolini et al. 2025


Old stars (age > 1 Gyr)
Young stars (age < 25 Myr)
HI gas
Southern side
Northern side
Δy (kpc)
Δx (kpc)
2
0
-2
-6
-4
-2
0


Norm. counts
Southern side
Northern side
m_{F200W}
$m_{F115W} - m_{F200W}$