I Zw 18 in the UV/blue
- tracing the hot star population

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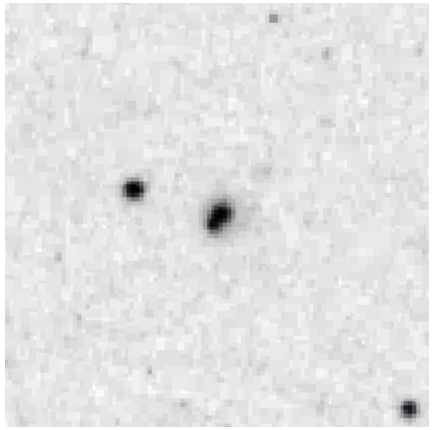
I Zw 18



- Discovery: Zwicky 1966
- Strong nebular em and low Z: Sargent/Searle 1970, 1972
- Oxygen (Alloin 1978, and many following) 12+log(O/H)≈ 7.2 (3% solar)
- HST imaging with WFPC2 resolved young stars with V < 26 mag and Hα filaments (also from ground), Hunter & Thronson 1995, Dufour+96
- A young galaxy? Deep HST/ACS campaigns in V & I (Izotov & Thuan 04) ⇒ Yes, (Aloisi+07) ⇒ No, due to RGB and Cepheids. Distance 18 Mpc
- Also many spectroscopic campaigns from ground and HST, finding e.g. WR features and HeII (Izotov+97, Legrand+97; IFS Kehrig+16, Rickards Vaught+23)

JWST imaging with NIRCam F115W, F200W, F356W and F444W (plus MIRI) (Hirschauer+2024)

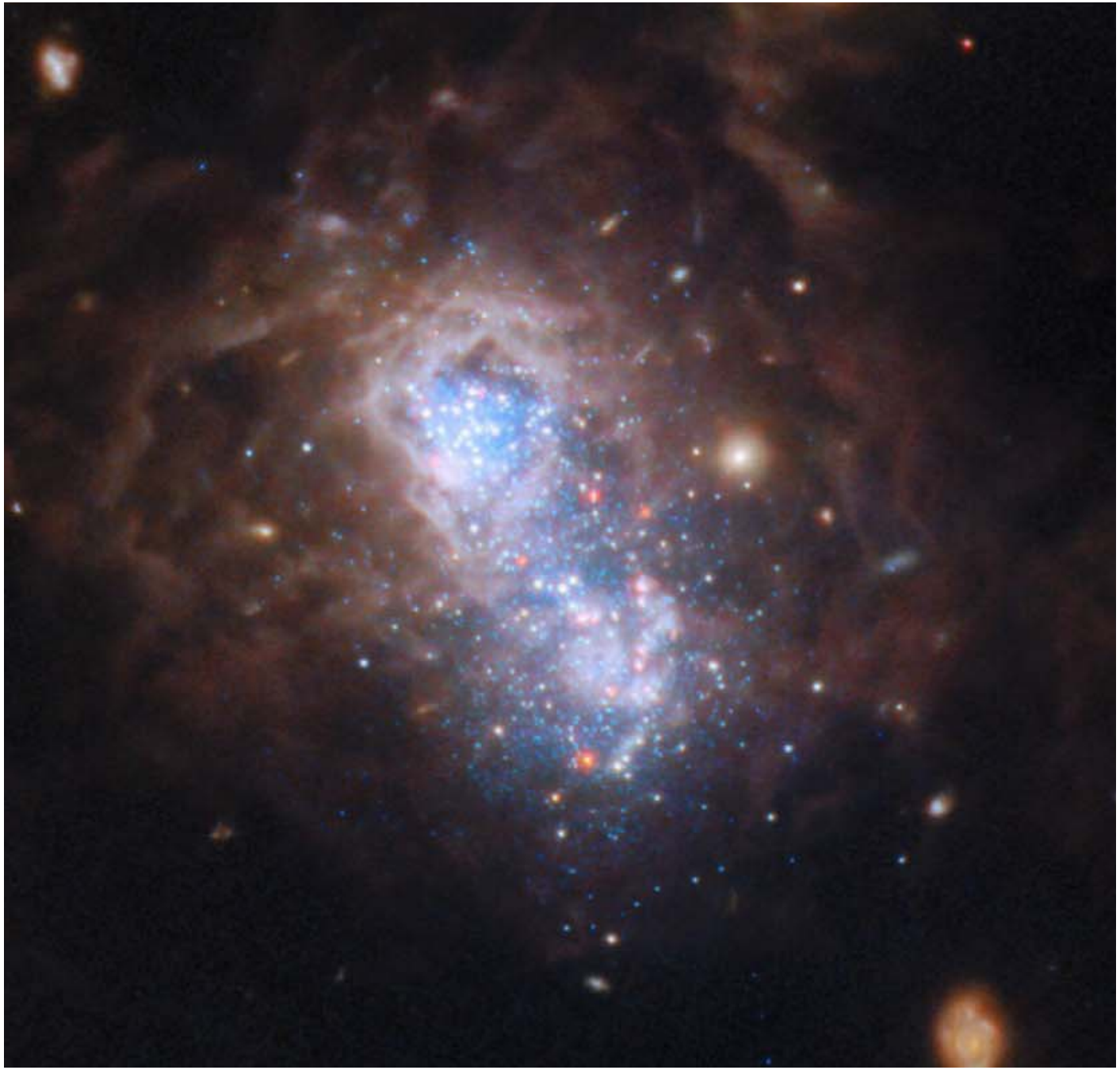
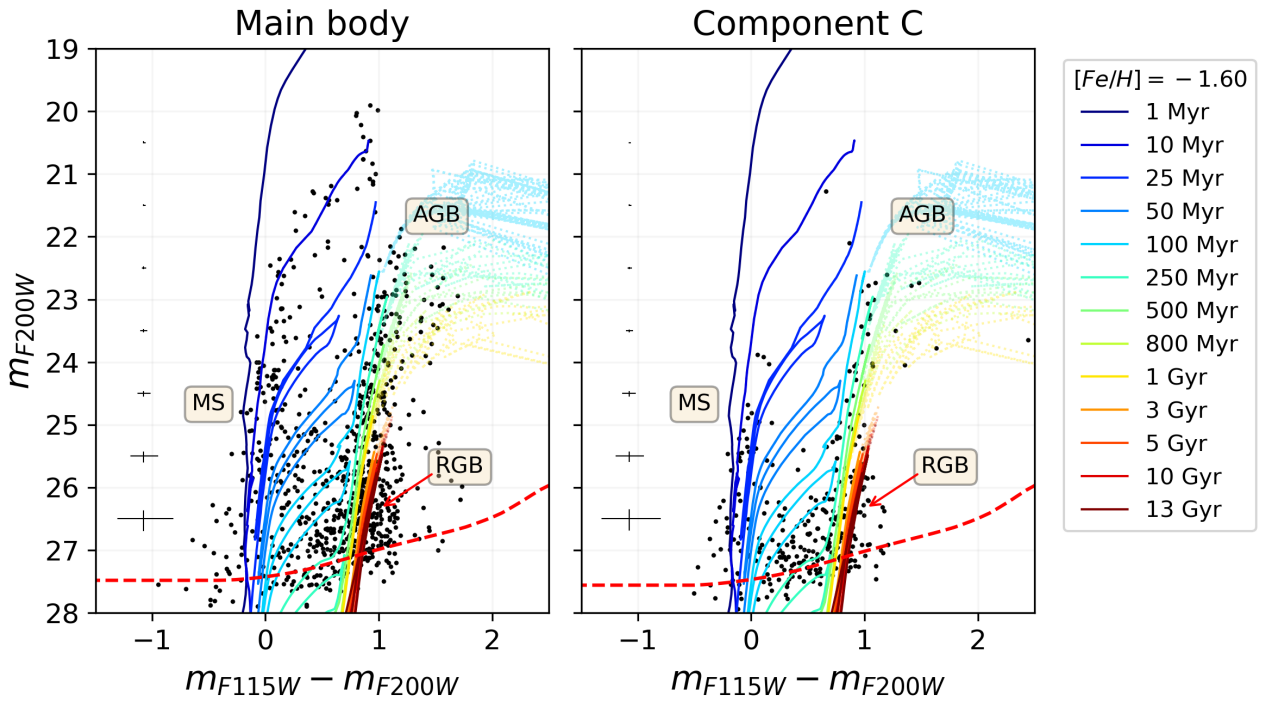
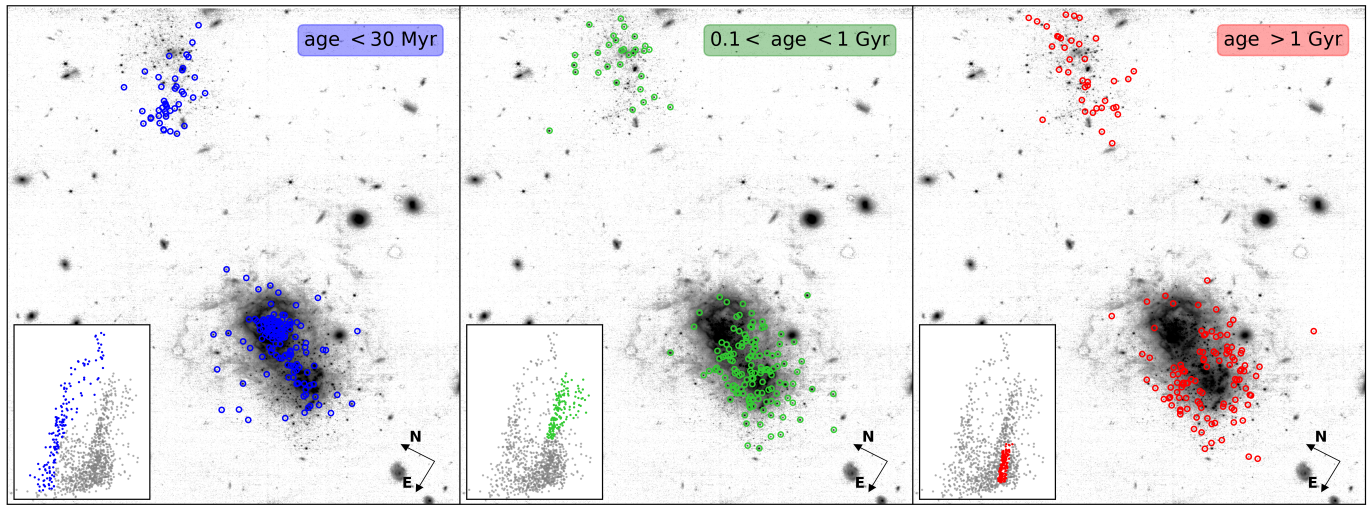


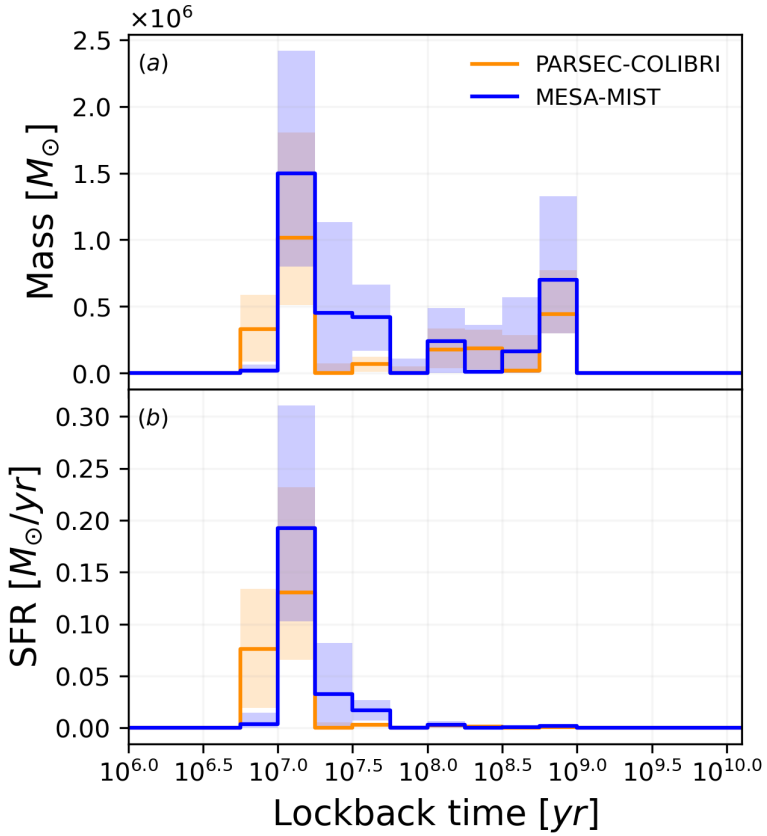
Figure 2. Four-color near-IR composite image of I Zw 18 in NIRCam F115W (dark blue), F200W (light blue), F356W (orange), and F444W (red). Image orientation

Some results from NIRCam: Bortolini, Östlin, Habel et al. 2024





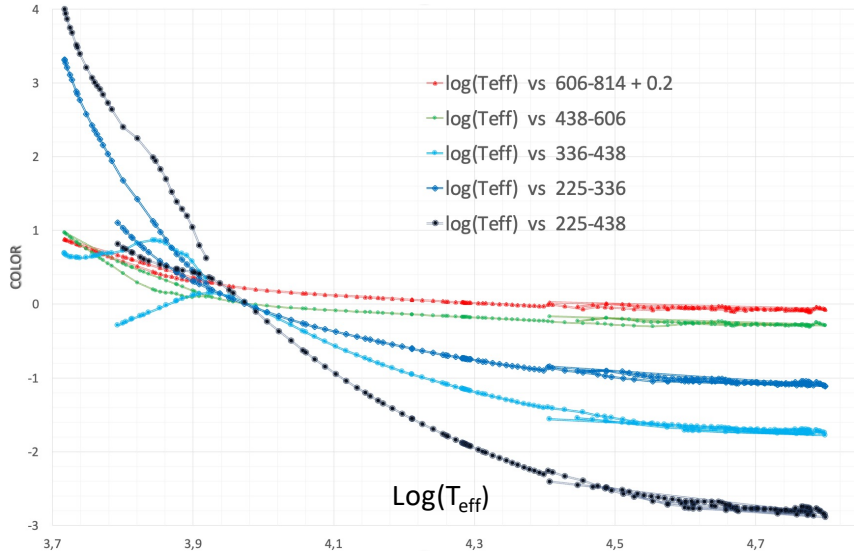
SE component

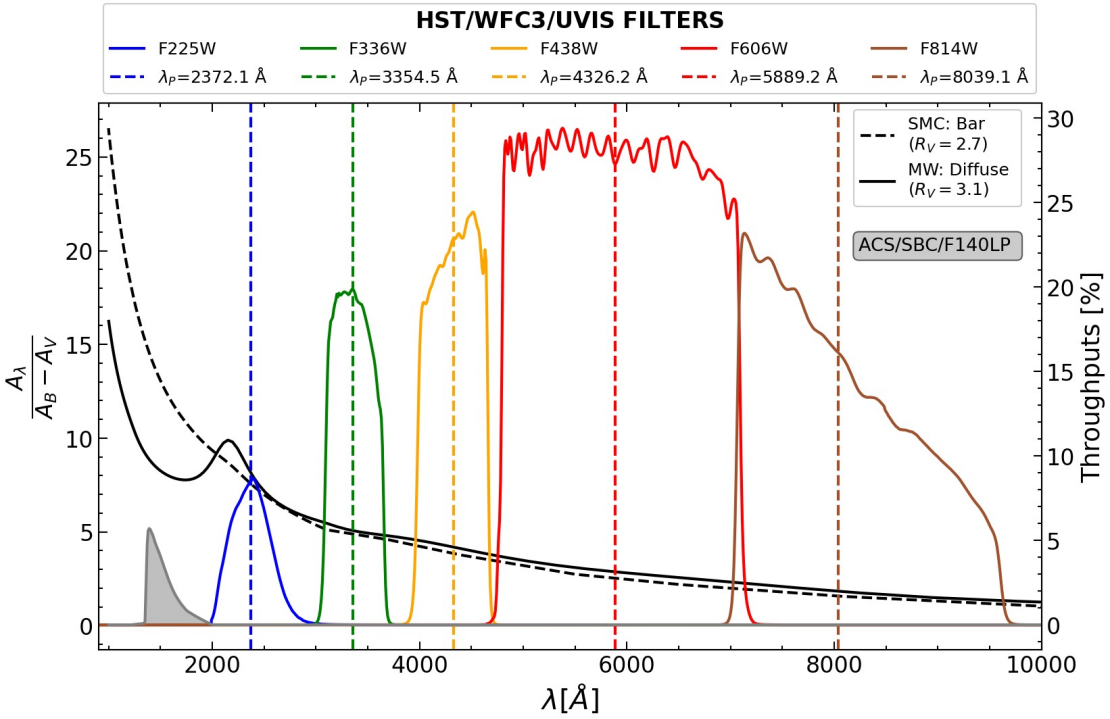


Revisiting IZw18 with HST in the UV/blue (17129)

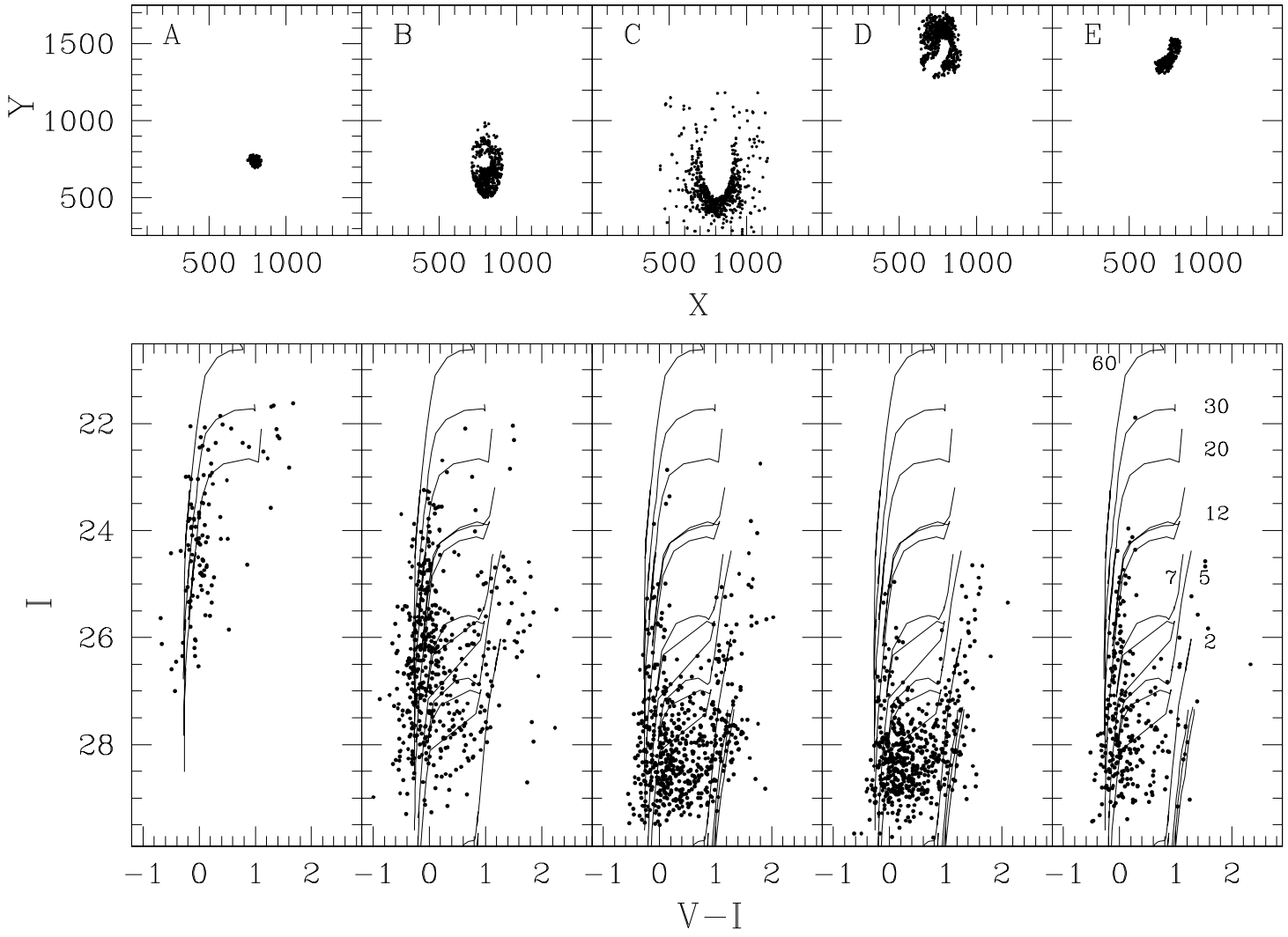
28 orbits of imaging in ACS/SBC/F140LP (~1500Å), and UVIS with filters: F225W, F336W, F438W & F469N (HeII)

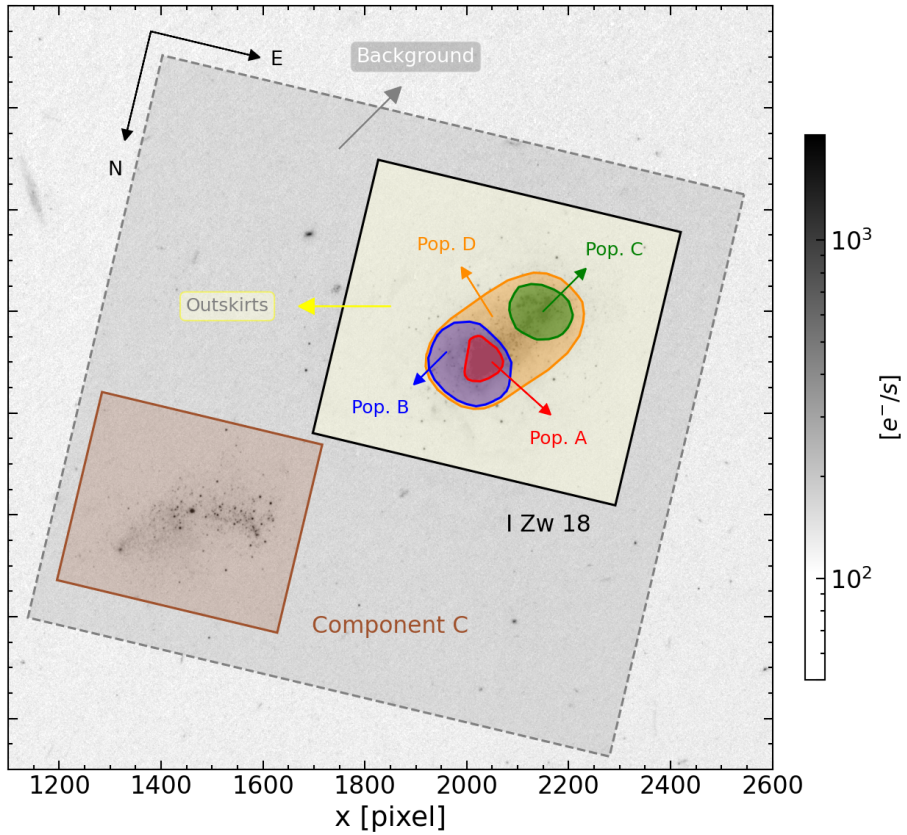
- V-I is insensitive to T_{eff} above 10 000 K, MS is vertical
- UB/blue gives more leverage for T_{eff} and extinction
- Identify hot stars and HeII sources



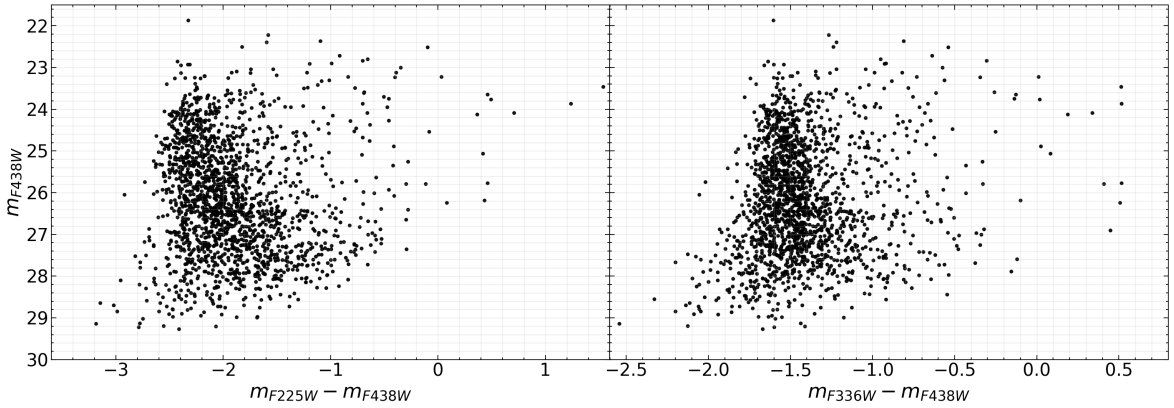


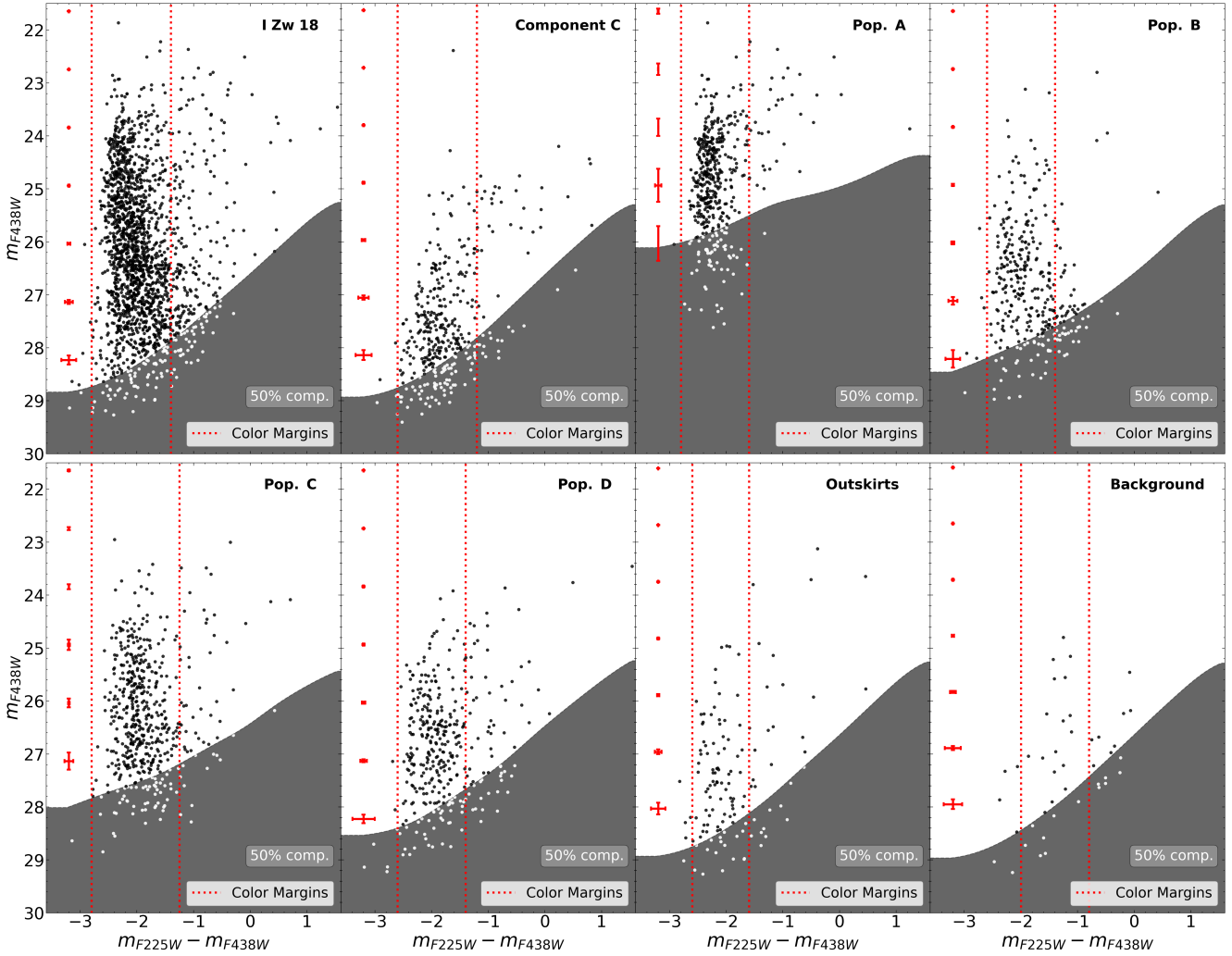
Stars with mass ≥ 30 $M_{\odot}$ present in A (NE region)
From deep HST V & I
Annibali+2013



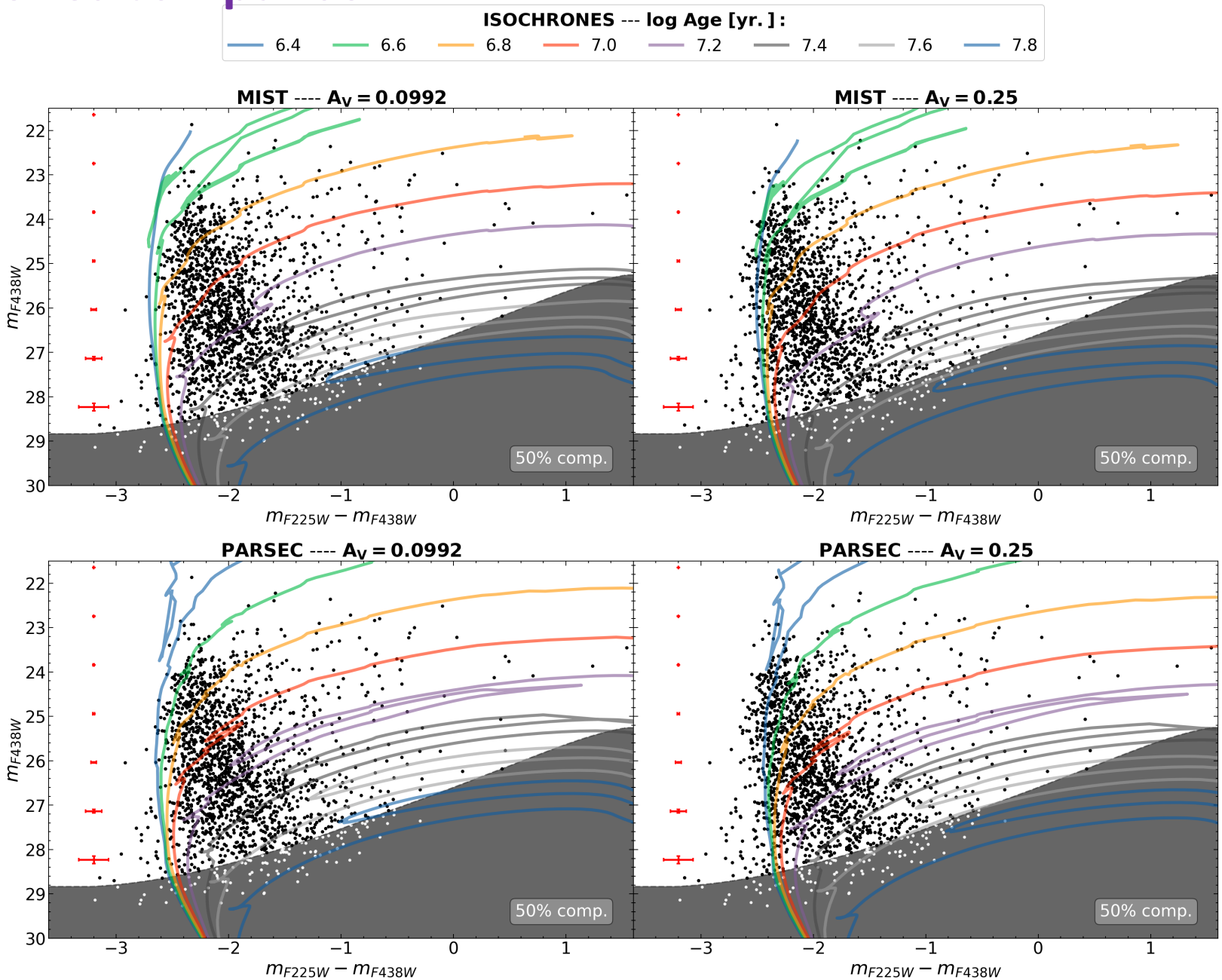

E
N
Background
Pop. D
Pop. C
Outskirts
Pop. B
Pop. A
I Zw 18
Component C
1200
1400
1600
1800
2000
2200
2400
2600
x [pixel]

10^3
10^2
$[e^-/s]$


m_{F438W}
$m_{F225W} - m_{F438W}$
$m_{F336W} - m_{F438W}$

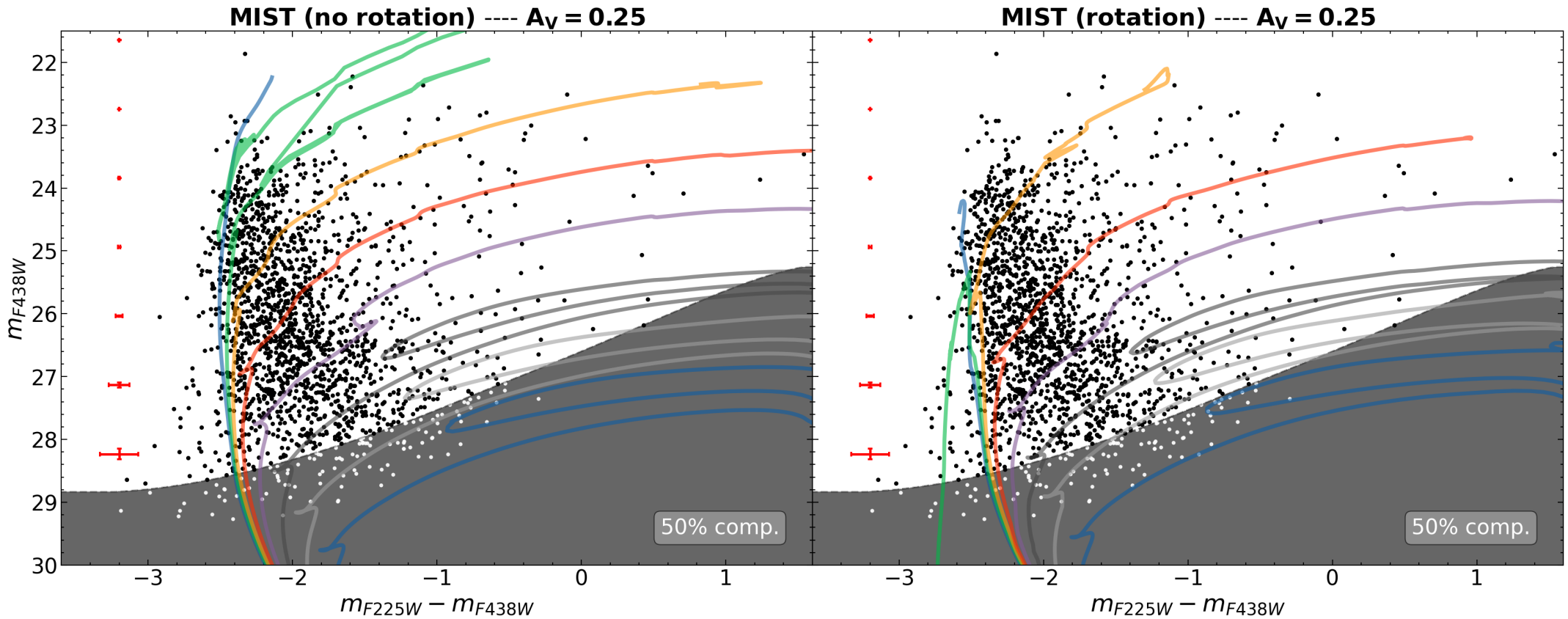

I Zw 18
Component C
Pop. A
Pop. B
Pop. C
Pop. D
Outskirts
Background
50% comp.
Color Margins
m_{F438W}
$m_{F225W} - m_{F438W}$

Isochrones comparison…

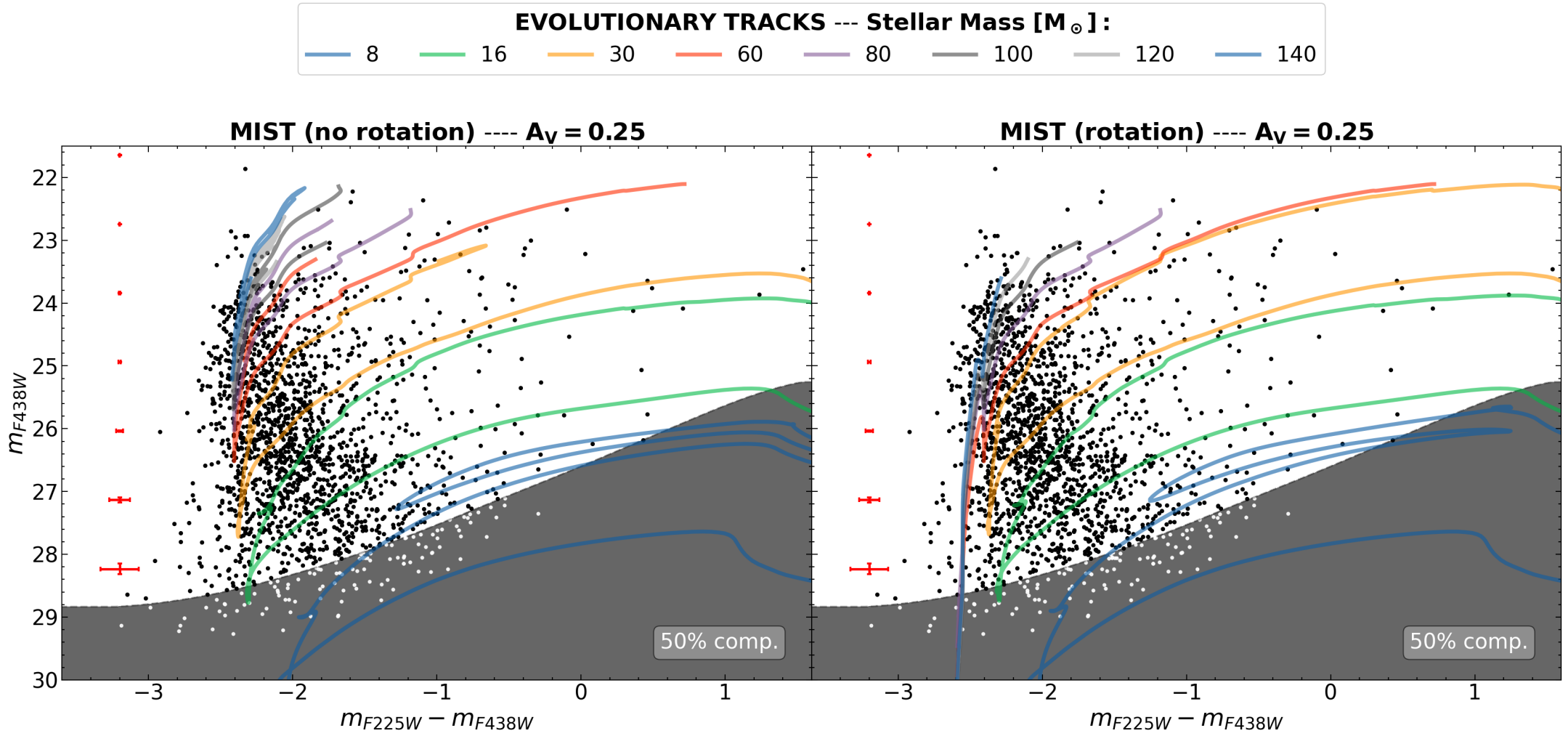


Foreground reddening not enough?

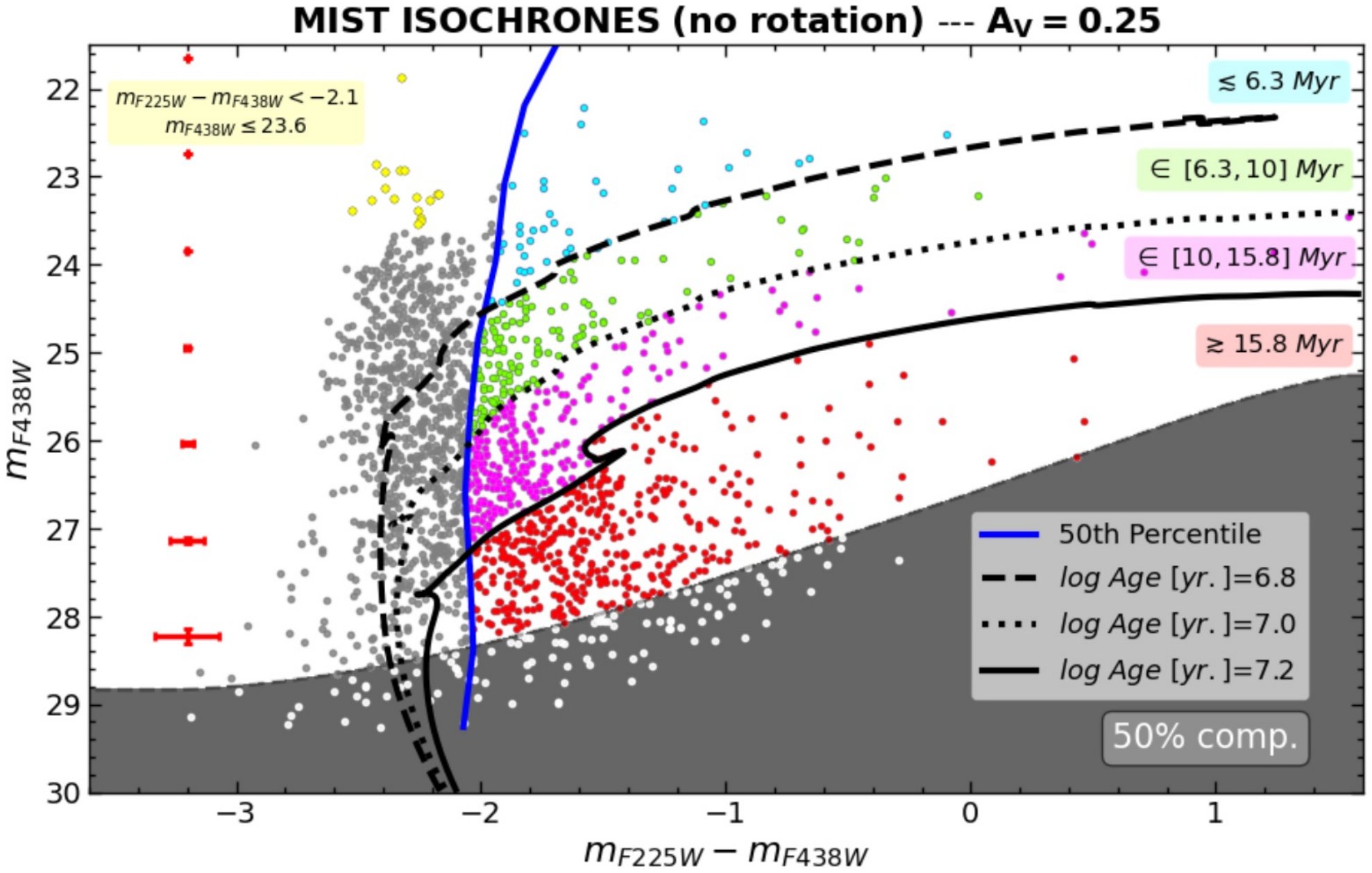
Isochrones without/with rotation



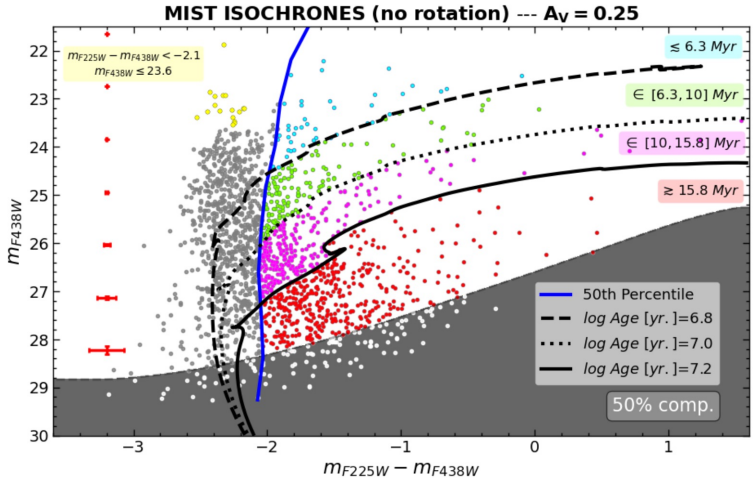
Stellar masses and evolutionary tracks

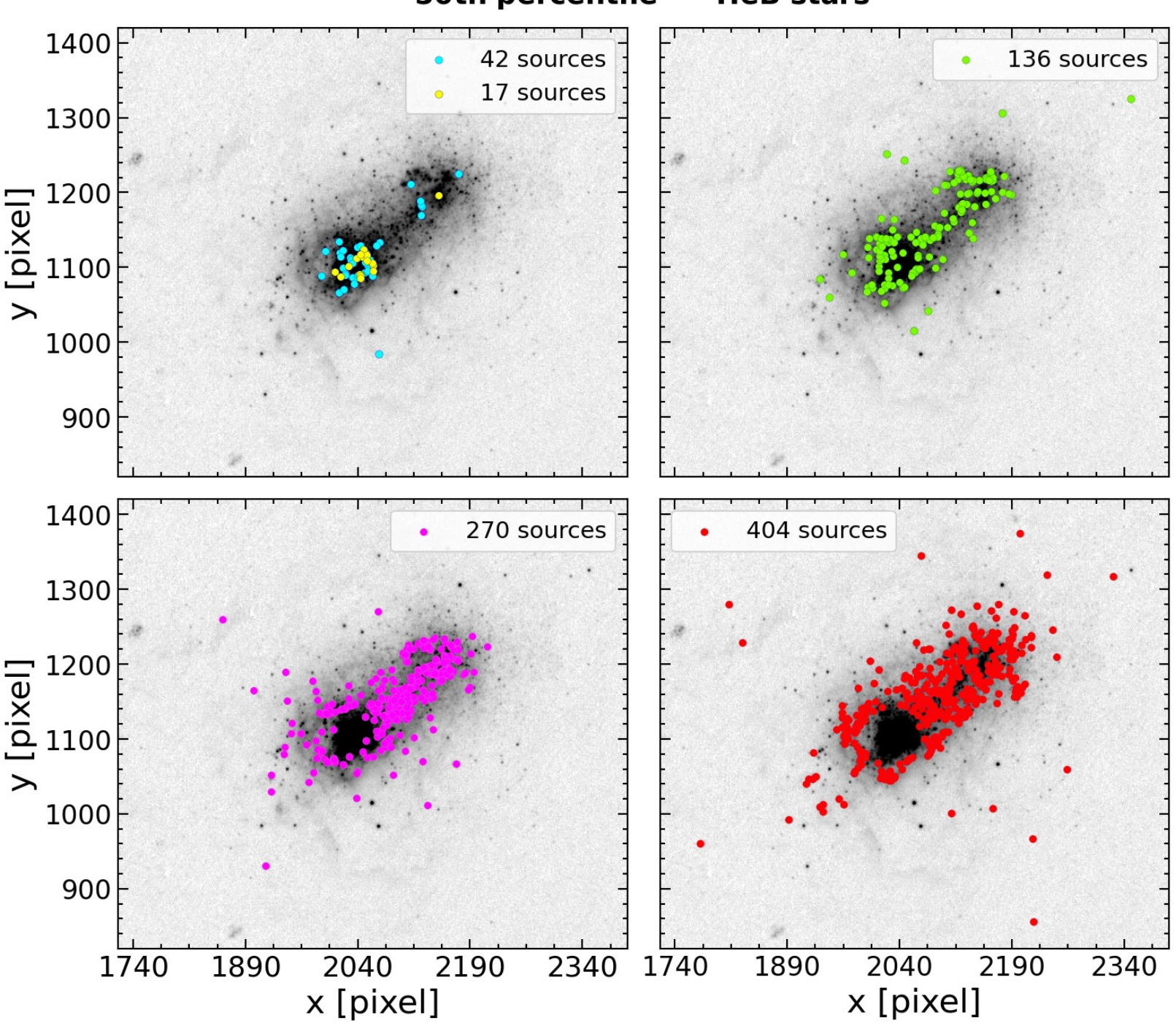


Where are the stars?

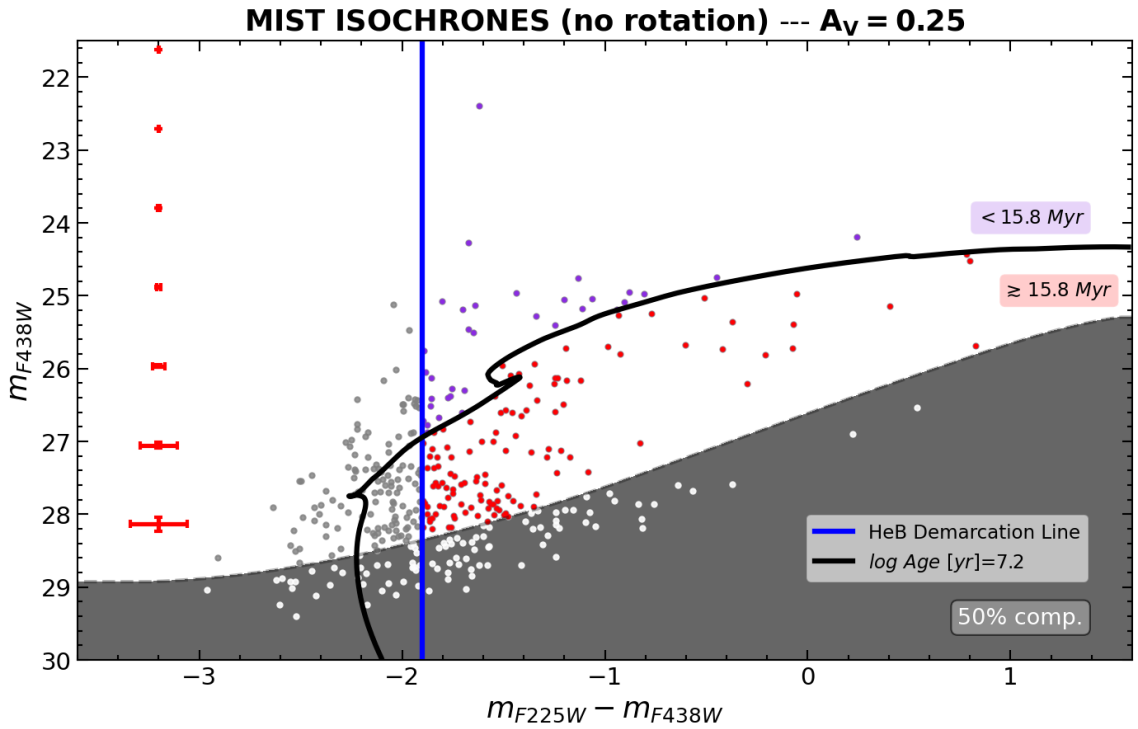


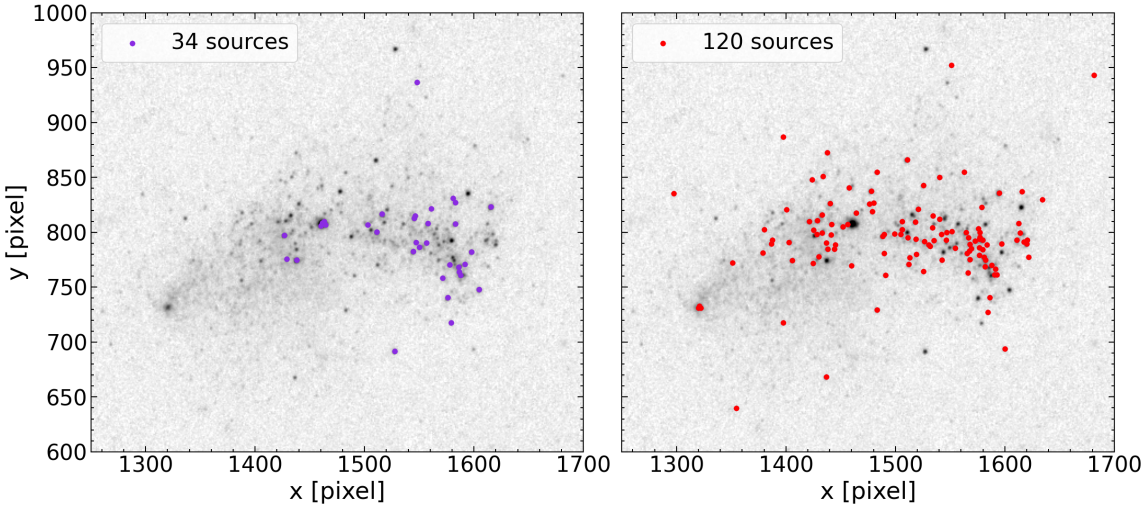
Where are the stars?





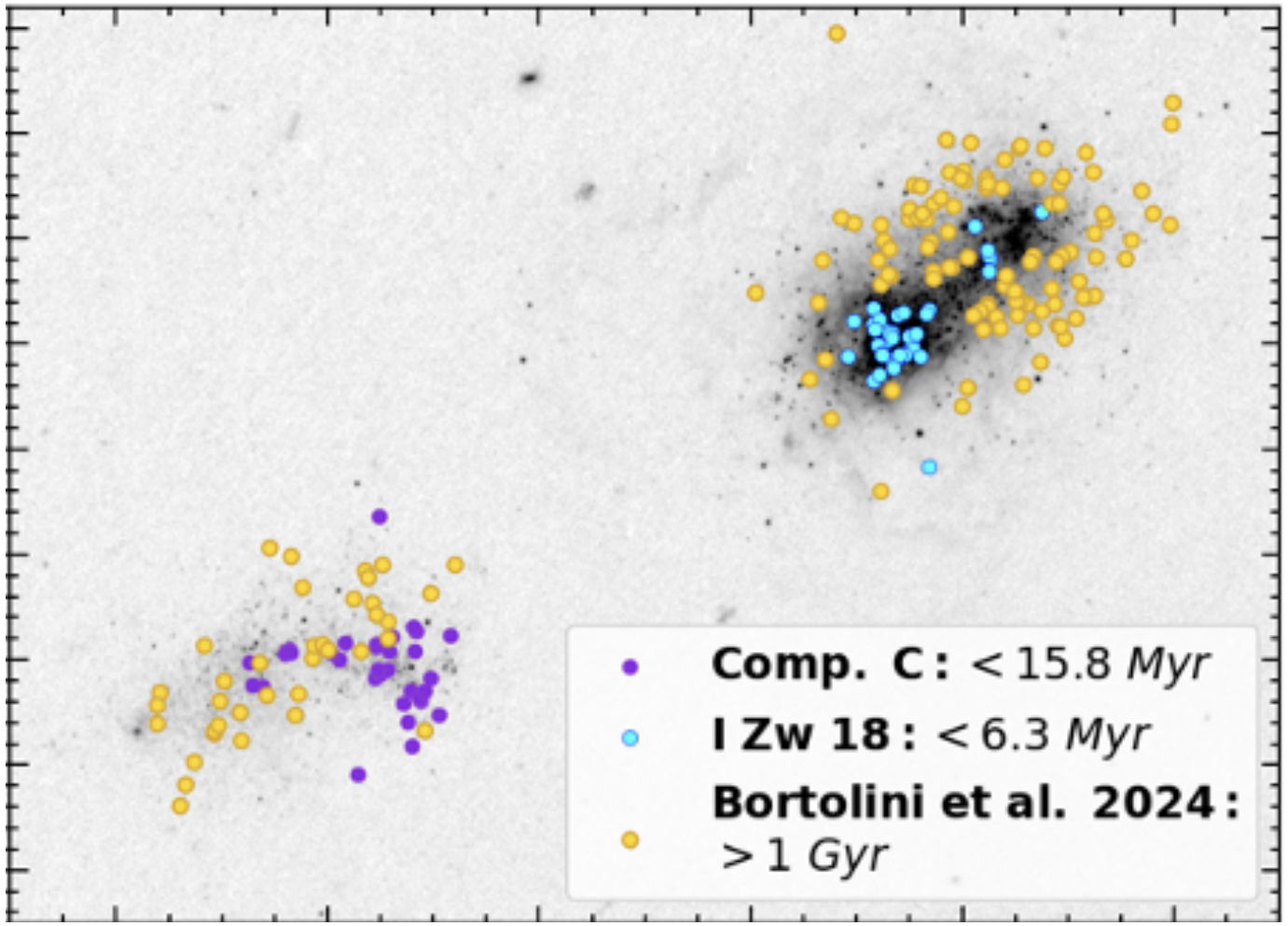
Companion = component C

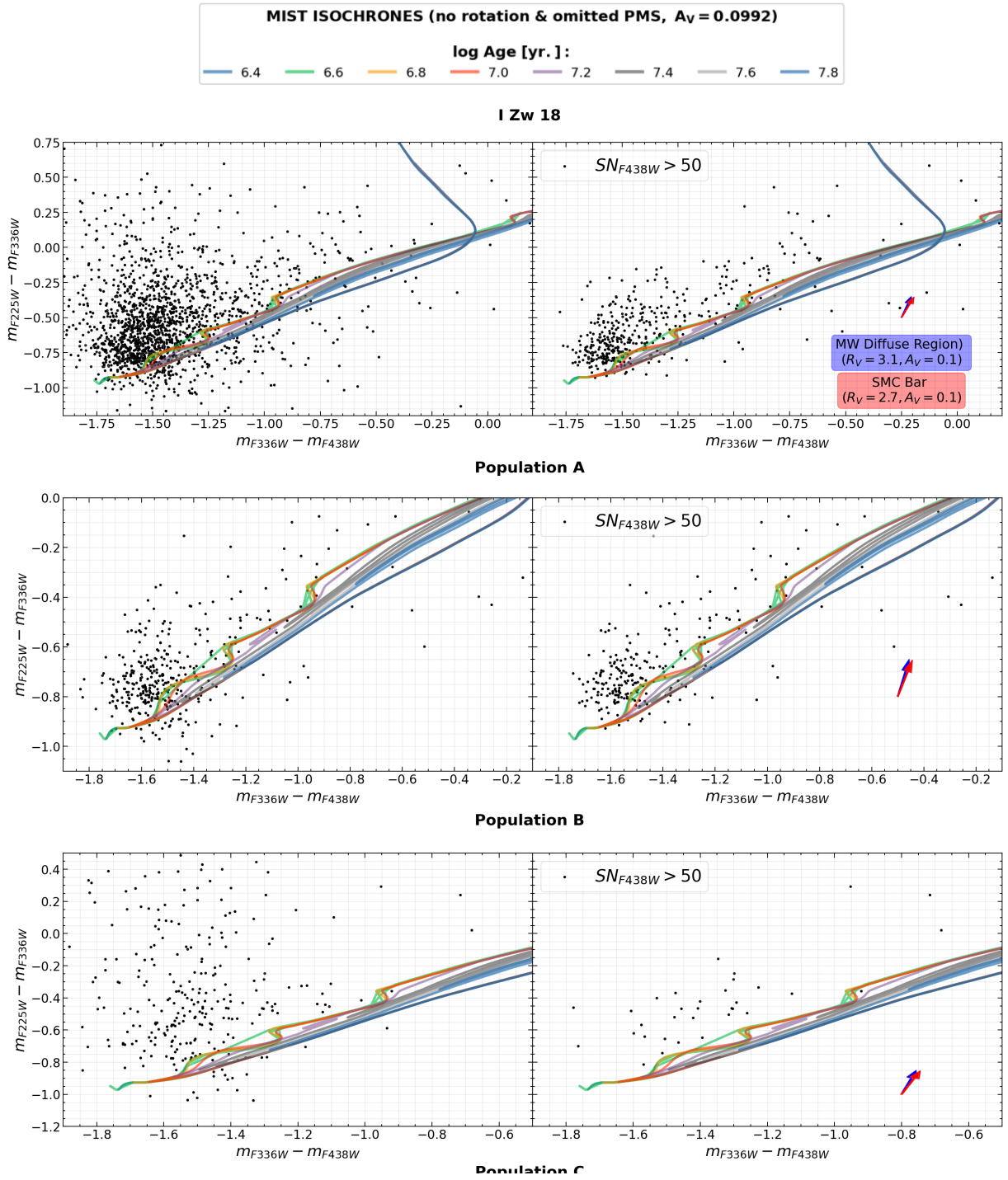




Location of young vs old stars

Not complete for young stars (only HeB)





Color-color diagrams:

Extinction is NOT homogeneous,

But ranges from A_V = 0 to 0.4

HeII emission, resolved

(Rikards Vaught 2023, see also Kehrig+2016, Brown+02)

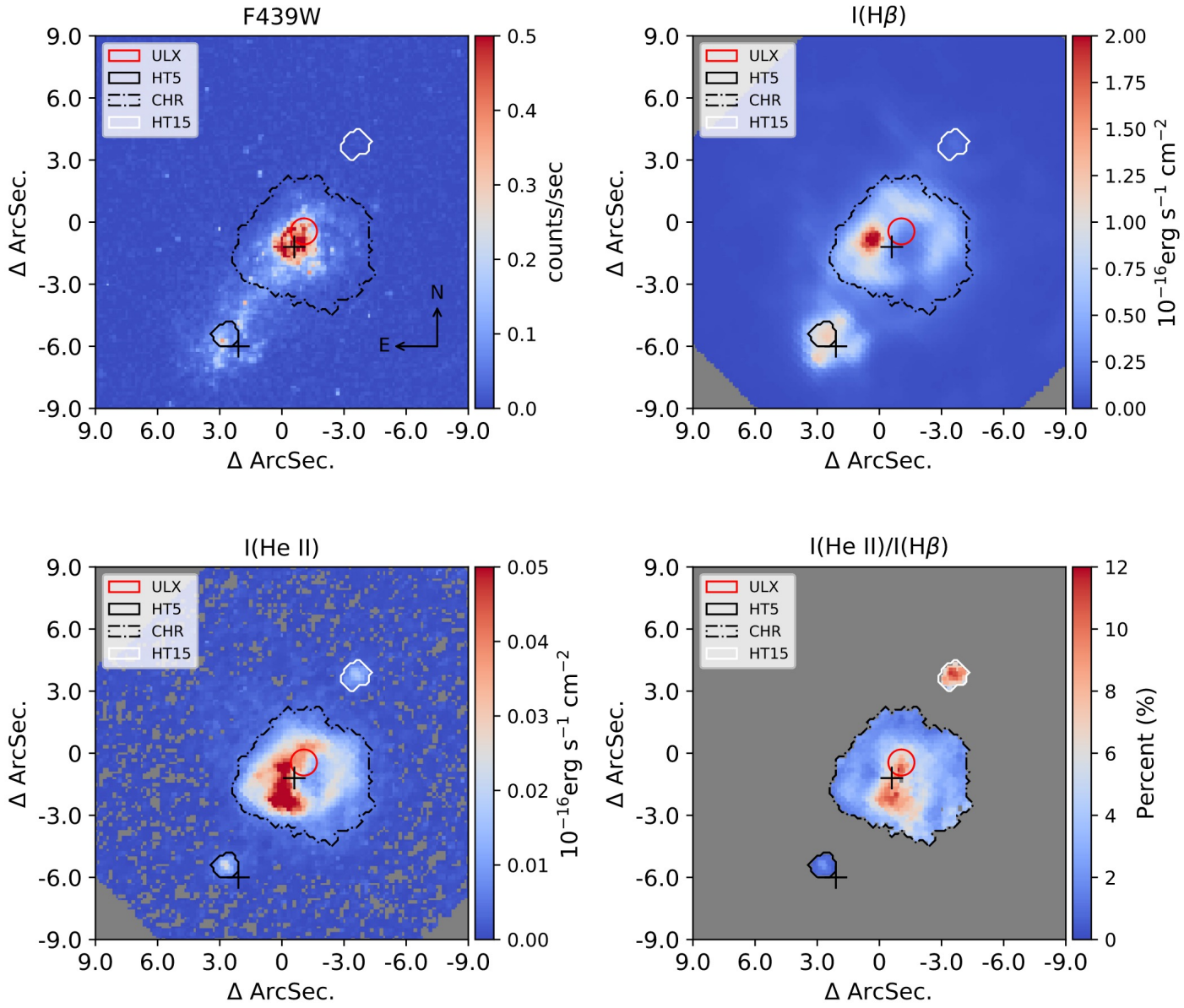
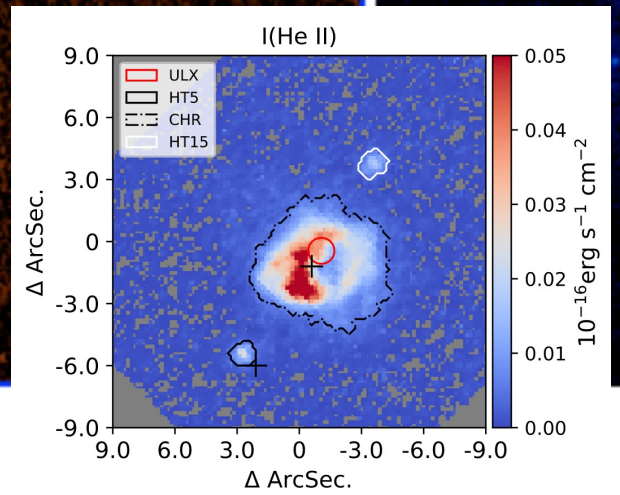


Figure 1. 2D imaging of I Zw 18. Top left: the HST F439W image of I Zw 18 shows the approximate locations of the IZW18-SE/NW (cross-hairs) in comparison to the He III regions. The borders of the three He II emitting regions, HT5 (black dashed), CHR (black solid), and HT15 (white solid) are defined to contain pixels with He II emission S/N > 3. Also shown is the position and astrometric uncertainty of the ULX (red solid). Top right and bottom left: the integrated Hβ and He II emission line maps. Bottom right: He II(λ4686)/Hβ for the three He II emitting regions.

HeII 4686Å continuum subtracted

1500Å



Next steps

- Derive the recent SFH (< 30 Myr) details
- Build dynamical model to account for IZw18 and C spatial evolution
- How does the stellar extinction vary across IZw18?
- Are standard extinction laws appliable, or do IZw18 require a new one?
- Which are the sources of HeII emission
- Multi wavelength study of bright stars across UV and IR