Getting to Know the Stellar Clusters in NGC 1569

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10″
157.5 pc

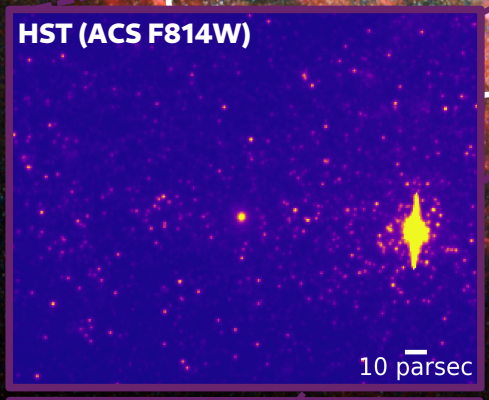
Pointing 1

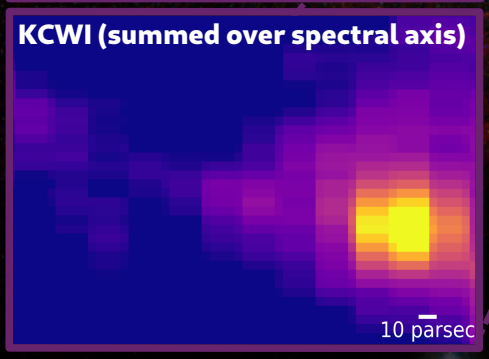
Pointing 2

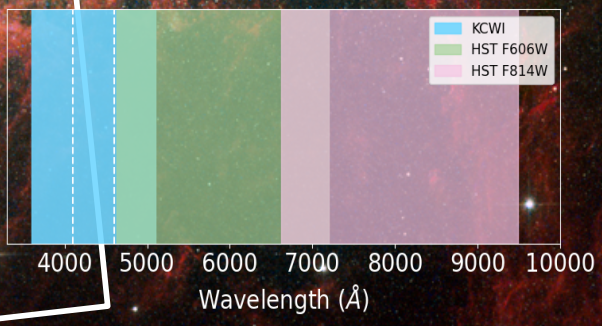
Pointing 3

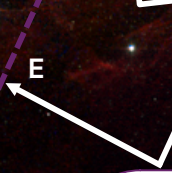
NGC 1569
red: F658N filter (Hα + [N II]),
green: F606W filter,
light blue: F5002N filter ([O III])
dark blue: F487N filter (Hβ)

See also figure 1, Hamel-Bravo et al. (2024)









Star formation episodes

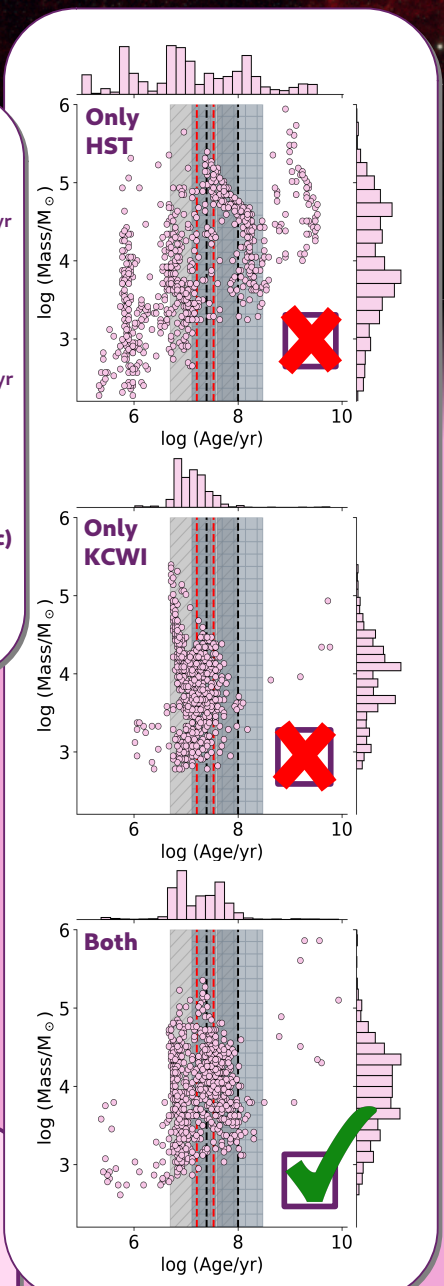
Our work
2 episodes,
8.3±1.5 Myr and 45±1.5 Myr

Greggio+ 98
1 inferred episode,
5-100 Myr

Angeretti+ 05
2 inferred episodes ,
13-37 Myr and 40-300 Myr

Anders+ 04
2 episodes,
25±4 and 100±4 Myr
Assuming fully sampled IMF

Anders+ 04 (stochastic)
2 episodes,
16±5.4 and 34±4.7 Myr
Assuming stochastically sampled IMF
(Krumholz+ 15, fig 13)



Why Clusters Matter

As the birthplaces of most stars, **stellar clusters**, link star formation and galaxy evolution.

We study clusters in **NGC 1569**, a nearby, low-metallicity, low-mass galaxy, using **high-res HST imaging and Keck/KCWI IFU data** to trace how stars form and shape their environment.

NGC 1569 at a glance

D = 3.25 Mpc (Tully+ 13)

12+log(O/H) = 8.2 (Kobulnicky+ 97)

$M_\star = 10^{8.6}\ M_\odot$ (Leroy+ 19)

Breaking Degeneracies

Clusters may appear redder due to either **dust extinction** or **stellar ageing**—two effects that can look the same.

We disentangle them using **broad wavelength coverage** to capture both massive, blue stars and lower-mass, red stars.

Since low-mass clusters ($<10^4\ M_\odot$) often don't fully sample the IMF, we model **stochastic effects** to avoid this assumption.

Recovering Star Formation Peaks

- Simulate **10^7 synthetic clusters** with `SLUG` (da Silva+ 12, 14; Krumholz+ 15)
- **Bayesian inference** with the Python library `cluster_slug`
- **Correct for extinction** using Hβ/Hγ ratios.

Key Result: We only recover the **two peaks of star formation** in NGC 1569 if we **combine HST and KCWI** and **account for stochasticity** in star formation.

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