

Young population

Emergence in old

Star clusters after

Smashing with dense

Interstellar clouds leading to the

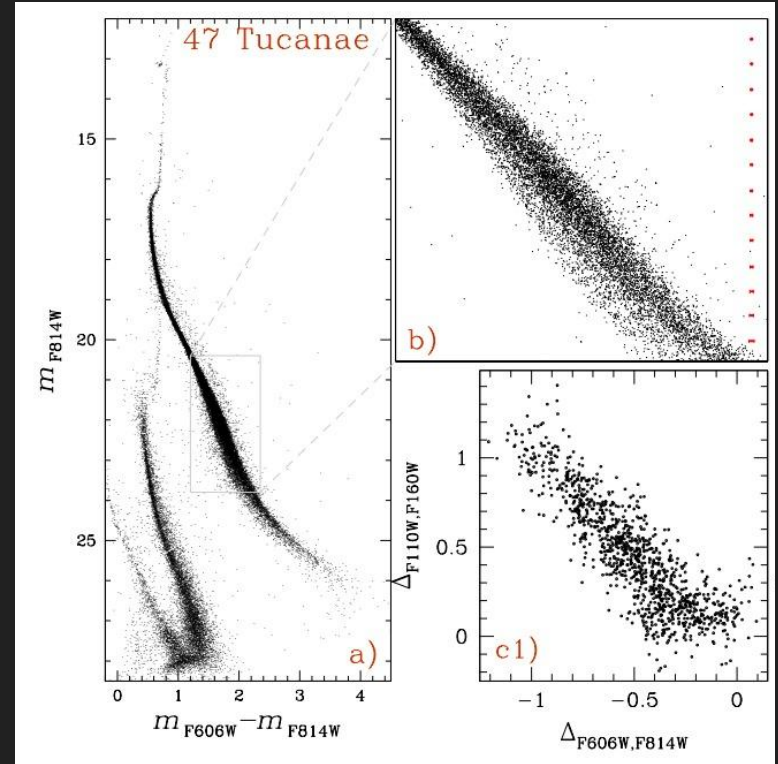
Regeneration of stars

YESSIR

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Multiple star generations in Globular Clusters (GCs)

- Populations with different metallicities
 - metal-poor, evolved stars
 - metal-rich, main sequence stars
- Visible in H-R diagram
 - e.g. 47 Tucanae: main sequence bands
- Possible causes:
 - multiple star-formation bursts
 - accretion of stellar feedback
 - **YESSIR**: collision with a molecular cloud (MC)



Milone et al. (2023)

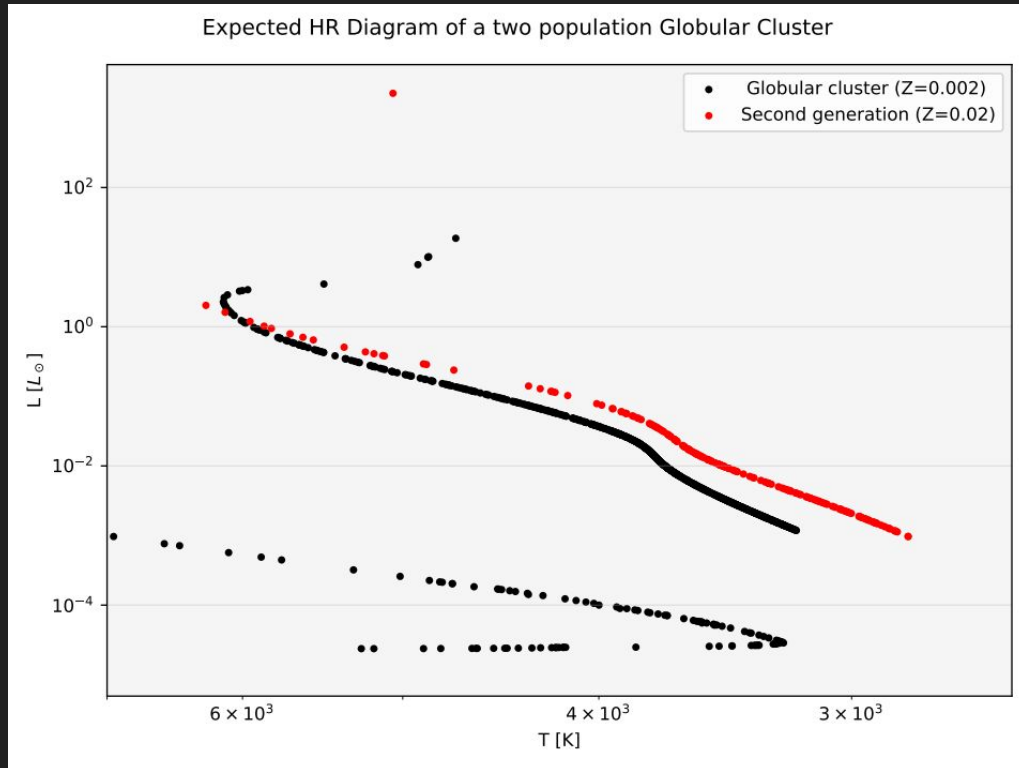
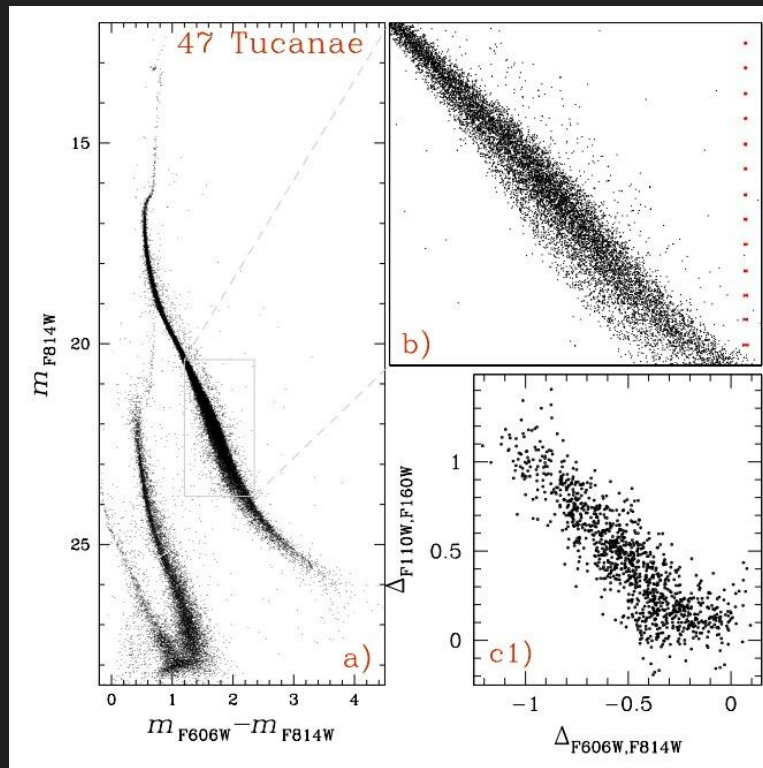
Scientific case

- Collision with dense molecular clouds
 - Given 50 km/s and size of cloud 200 parsec: $T \sim 1 \text{ Myr}$
- Outcomes
 - New star formation triggered by collision
 - Capturing existing stars in the cloud
 - Rejuvenation of globular cluster stars

Implementation

- Codes:
 - Gravity code (GC)
 - Hydrodynamics code (MC)
 - *Stellar code (evolution two distinct populations)*
- Parameter Space:
 - Fixed Masses, metallicity and sizes of GC and MC
 - Start with fixed $N_{\text{particles}}$ for both objects
 - Explore different impact parameters and velocities

Expected result



Citations

- Bastian, N. and Lardo, C., “Multiple Stellar Populations in Globular Clusters”, *Annual Review of Astronomy and Astrophysics*, vol. 56, pp. 83–136, 2018.
- Milone, A. P. and Marino, A. F., “Multiple Populations in Star Clusters”, *Universe* vol. 8, no. 7, p. 359, 2022.
- Milone, A. P., “Multiple stellar populations in globular clusters with JWST: an NIRCам view of 47 Tucanae”, *Monthly Notices of the Royal Astronomical Society*, vol. 522, no. 2, pp. 2429–2447, 2023.