DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

What will Euclid measure concerning the GCs? *Lançon et al. 2021*

- Stellar mass based on luminosity
- Projected position in the sky
- Projected distance to the host galaxy
- Projected size (it will be difficult to estimate)
- Photometric redshift
- Number per galaxy
- Environment: isolated GCs? Properties of the host galaxy?
- Age/Metallicity (it will be difficult to estimate)

DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

EUCLID STRENGTH: STATISTICS!!

New constraints on? Improve our understanding of?

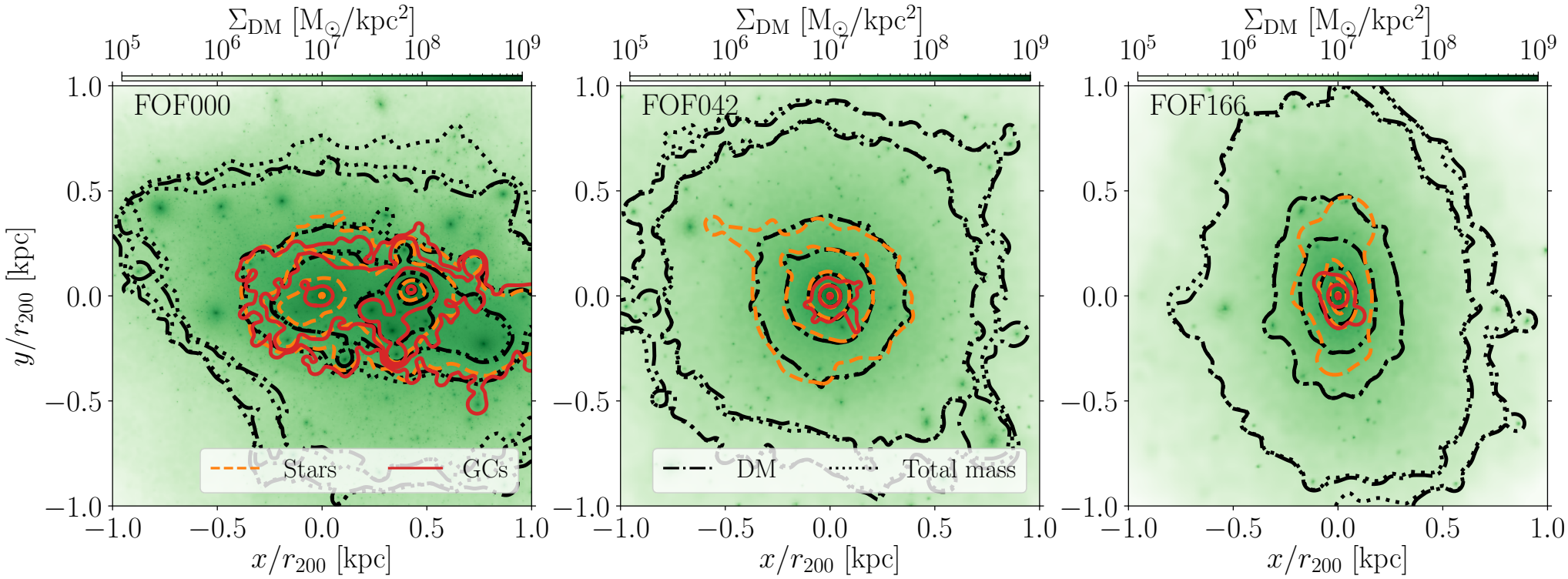
- Nature of dark matter
- Nature of globular cluster
- Galaxy formation model

DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

Constraining the nature of dark matter

- **Shape of host dark matter halos from**
  the stellar surface brightness maps
  the number density maps of GCs

Reina-Campos et al. 2022

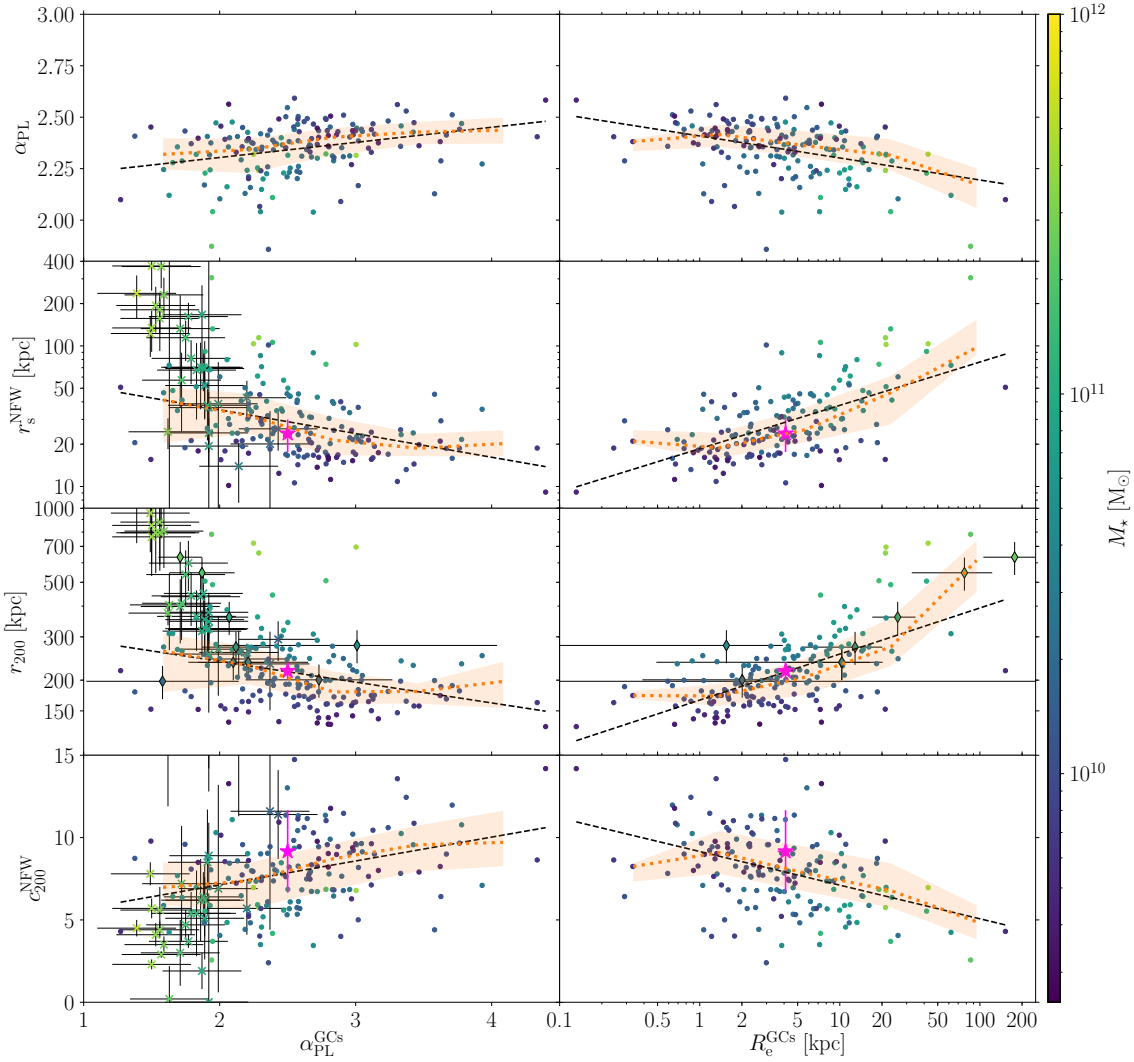


DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

Constraining the nature of dark matter

- Structural parameters of their host dark matter halos (slope, scale radius, virial radius, concentration)
  from
  the projected radial profiles of GCs

Reina-Campos et al. 2021



DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

Constraining the nature of dark matter

- Host dark matter halo profile by resolving the Timing problem:

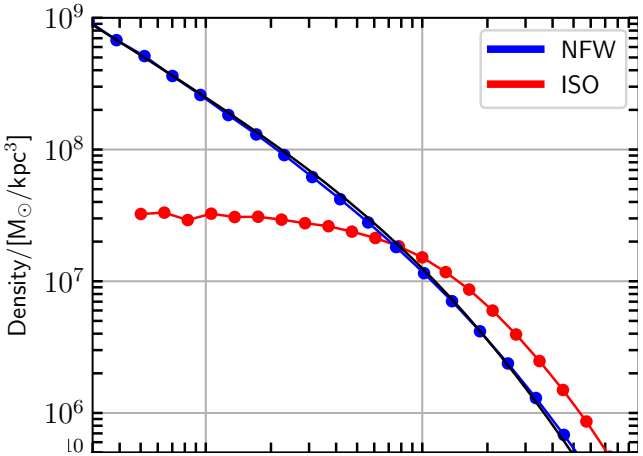
  « The infall time of GCs can be much shorter than the Hubble time in a NFW halo, so why we observe them? »

  from
  the spatial distribution of GCs

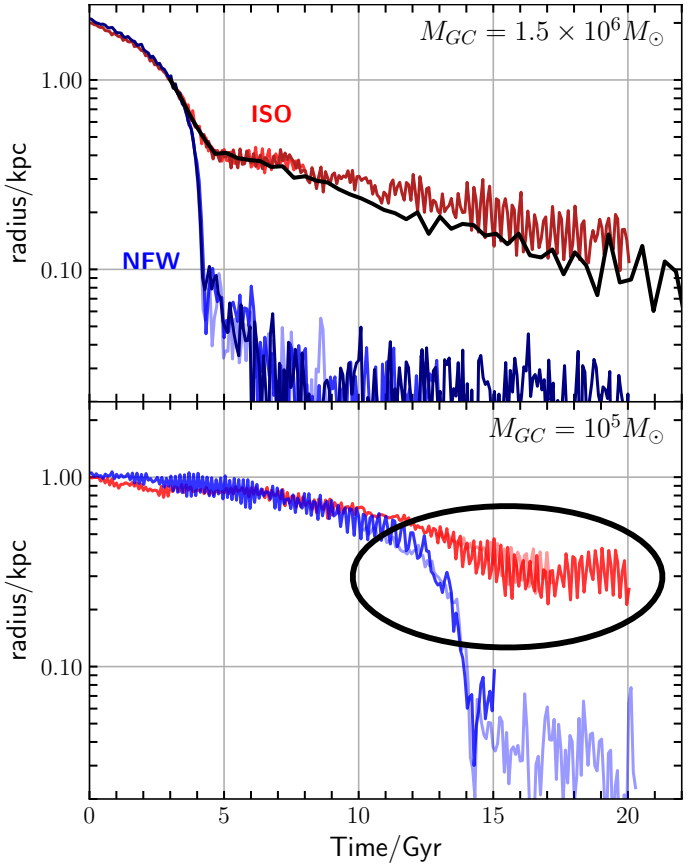
  Revealing core stalling effect or not!

Cole et al. 2012
Boldrini et al. 2019
Sanchez-Salcedo 2022
Bilek et al. 2021

Meadows et al. 2019



Meadows et al. 2019



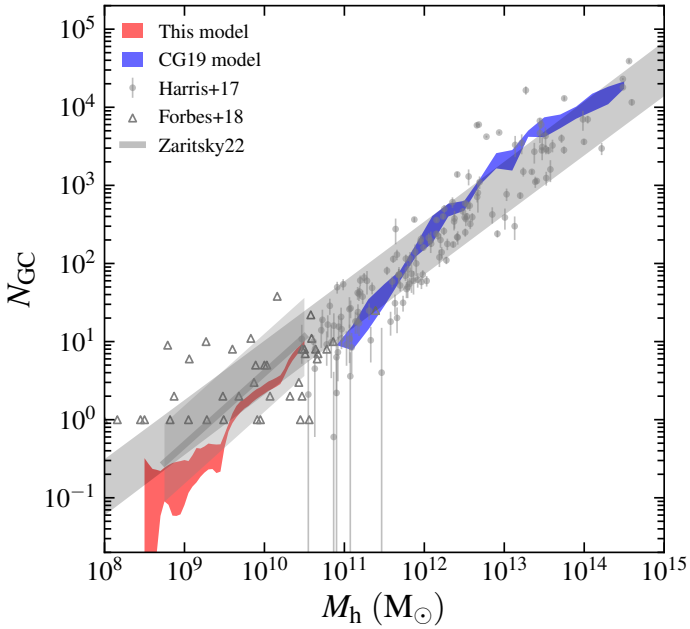
DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

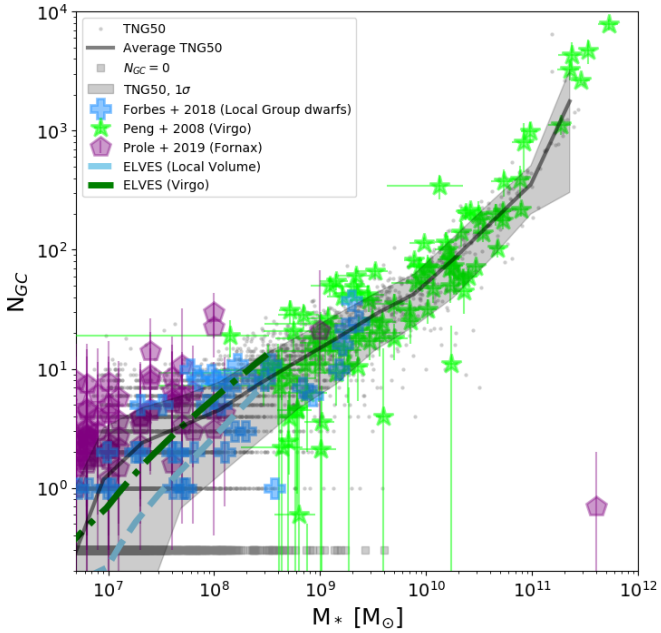
Constraining our galaxy formation model (& origins of GCs)

🍋 **Distinguish dark matter theories and feedback mechanisms from**
the number and specific frequency of GCs
especially for
dwarf galaxies

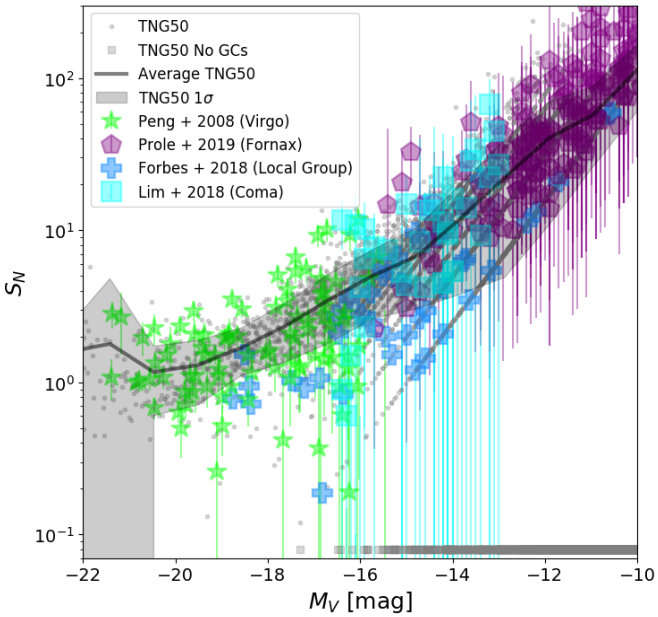
$$S_N = N_{\rm GC}\ 10^{0.4(M_V+15)}$$

Chen et al. 2023





Doppel et al. 2022



DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

Constraining the nature of globular cluster

🍋 Distinguish their formation mechanism:
- in gas clouds
- in dark matter substructure
- both

From
their environment (Isolated GCs? Close to dwarfs? At different redshift?)

Sameie et al. 2022
Vitral & Boldrini et al. 2021

DYNAMIC WITH EUCLID GLOBULAR CLUSTERS

Proposals for specific GC targets

- GC velocity **JWST**
- Profile for close GCs? **JWST**