No globular cluster progenitors in Milky Way satellite galaxies

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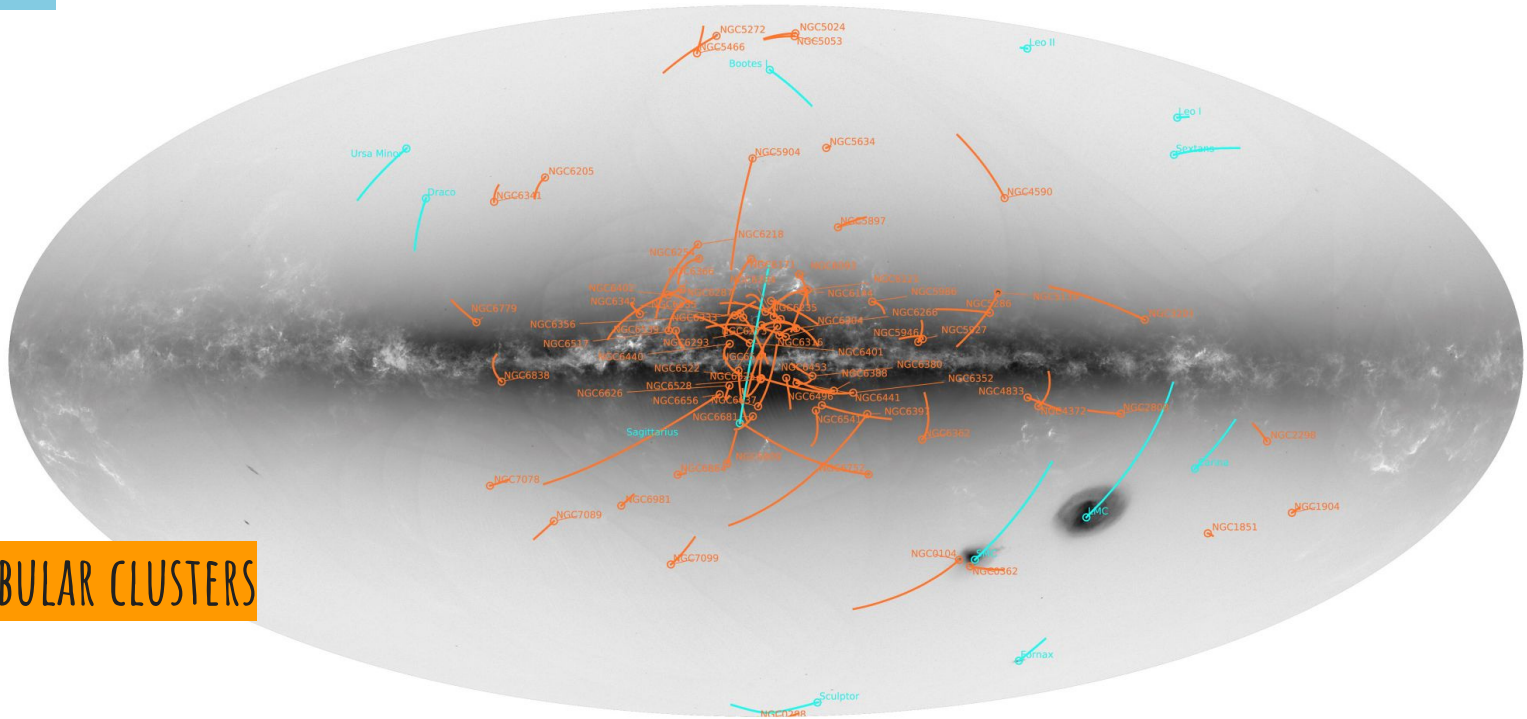
Inria

Paris, mai 2022

GAIA MISSION: FULL 6D PHASE SPACE

11 MW SATELLITES



170 GLOBULAR CLUSTERS

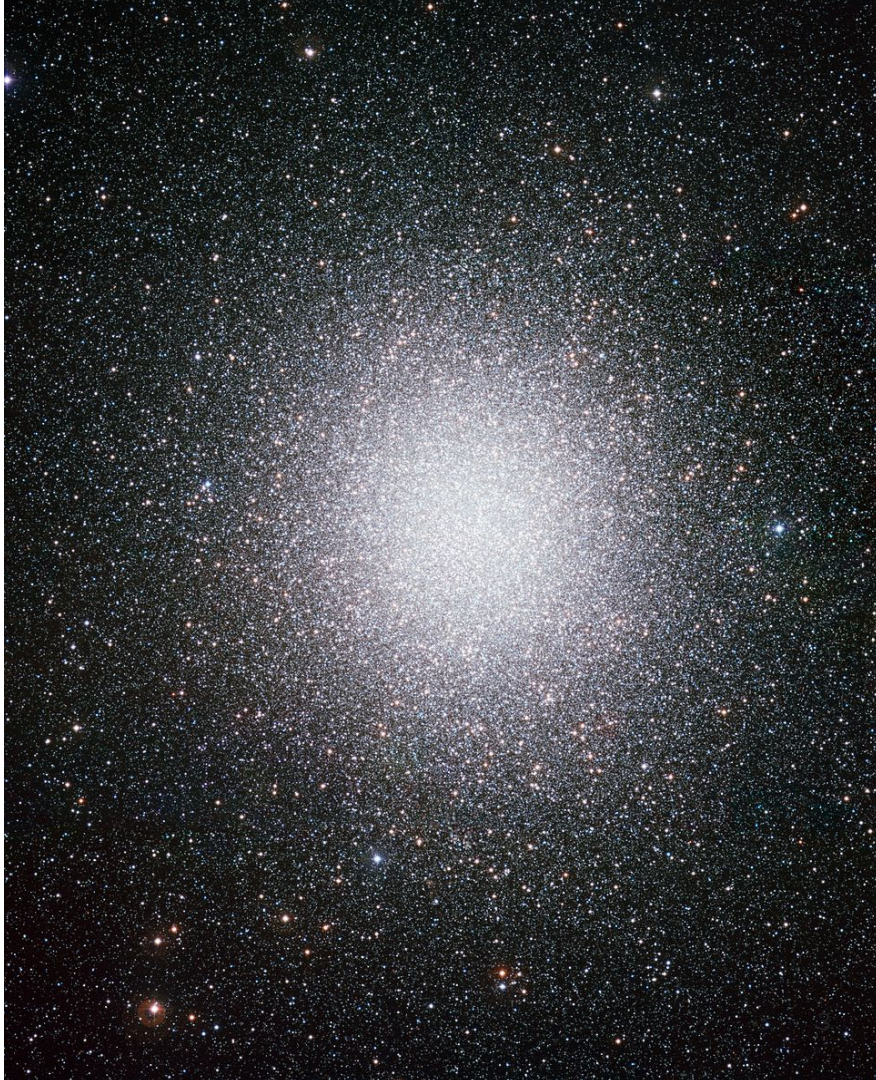
Origins of MW globular clusters

In-situ origin
62 of MW GCs likely formed in the MW

Ex-situ origin
55-65 of MW GCs have an extragalactic origin

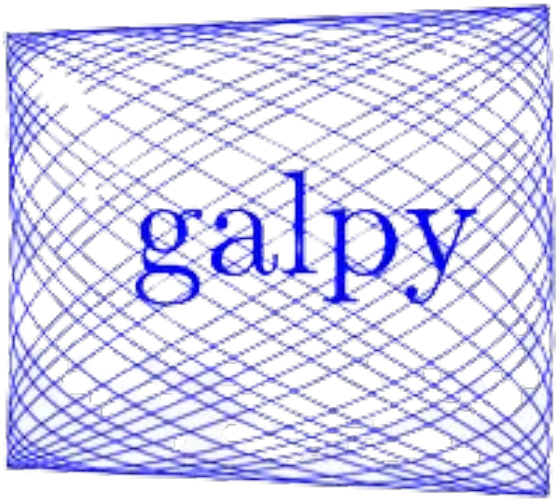
Heterogeneous origin
The rest

Kruijssen+19, Massari+19,



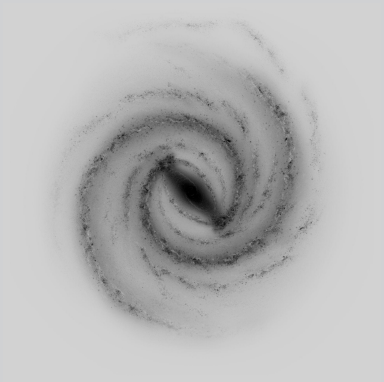
INTERNATIONAL COLLABORATION

Prof. Jo Bovy
Astronomy and Astrophysics Department at the University of Toronto



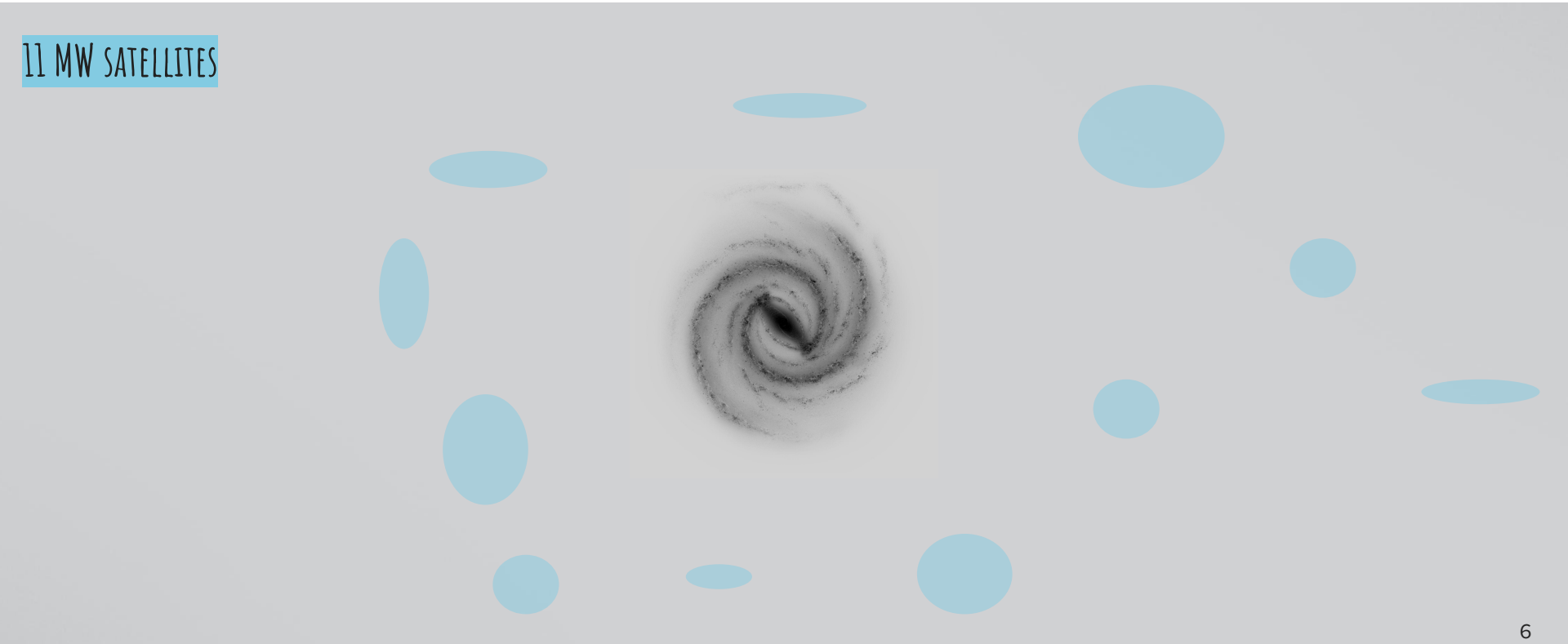
ORBITAL INTEGRATION CODE

THE MW ENVIRONMENT



THE MW ENVIRONMENT

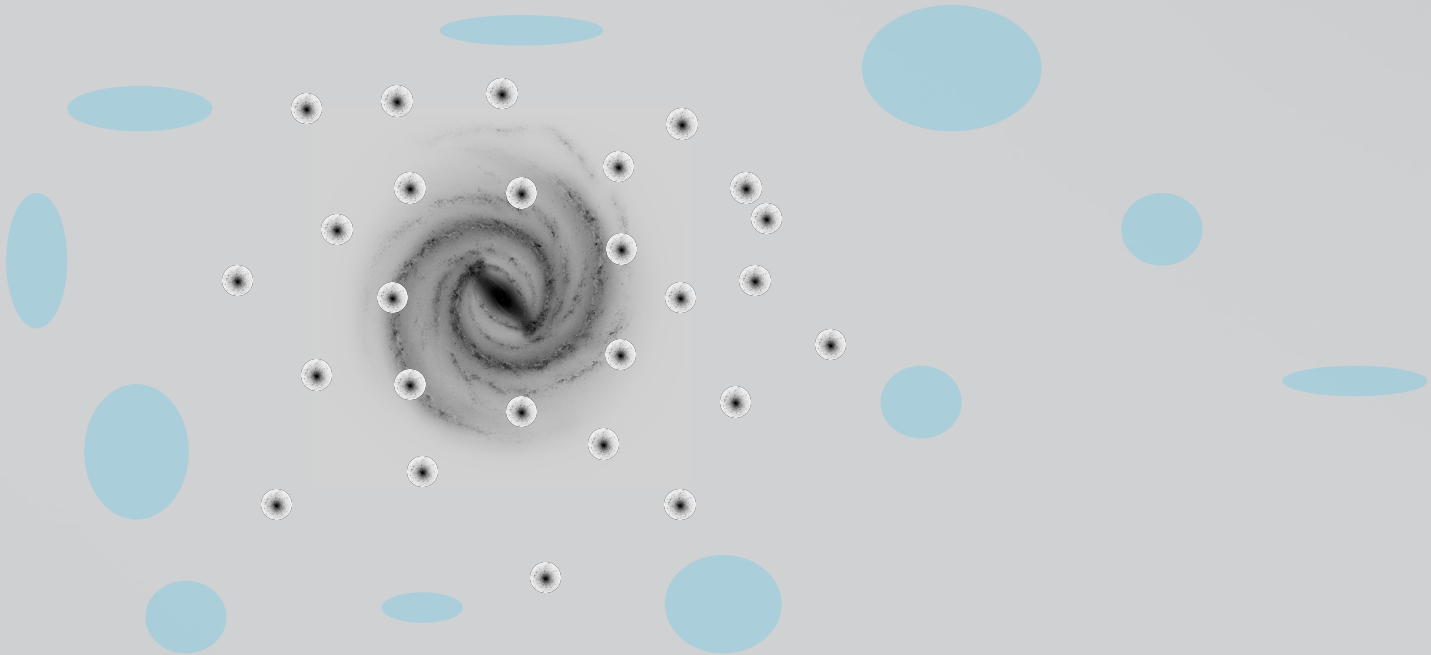
11 MW SATELLITES



THE MW ENVIRONMENT

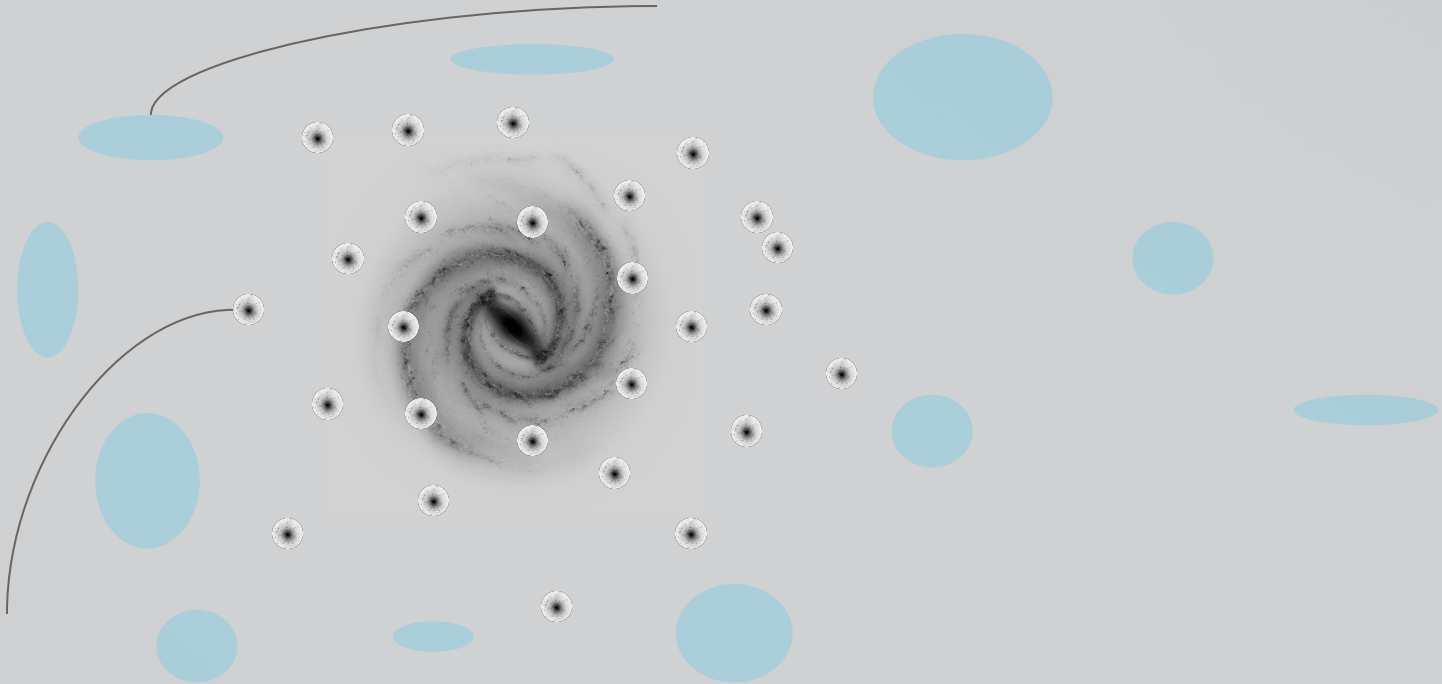
11 MW SATELLITES

- 170 GLOBULAR CLUSTERS



THE MW ENVIRONMENT

- 11 MW SATELLITES
- 170 GLOBULAR CLUSTERS



Globular cluster-Satellite association criteria

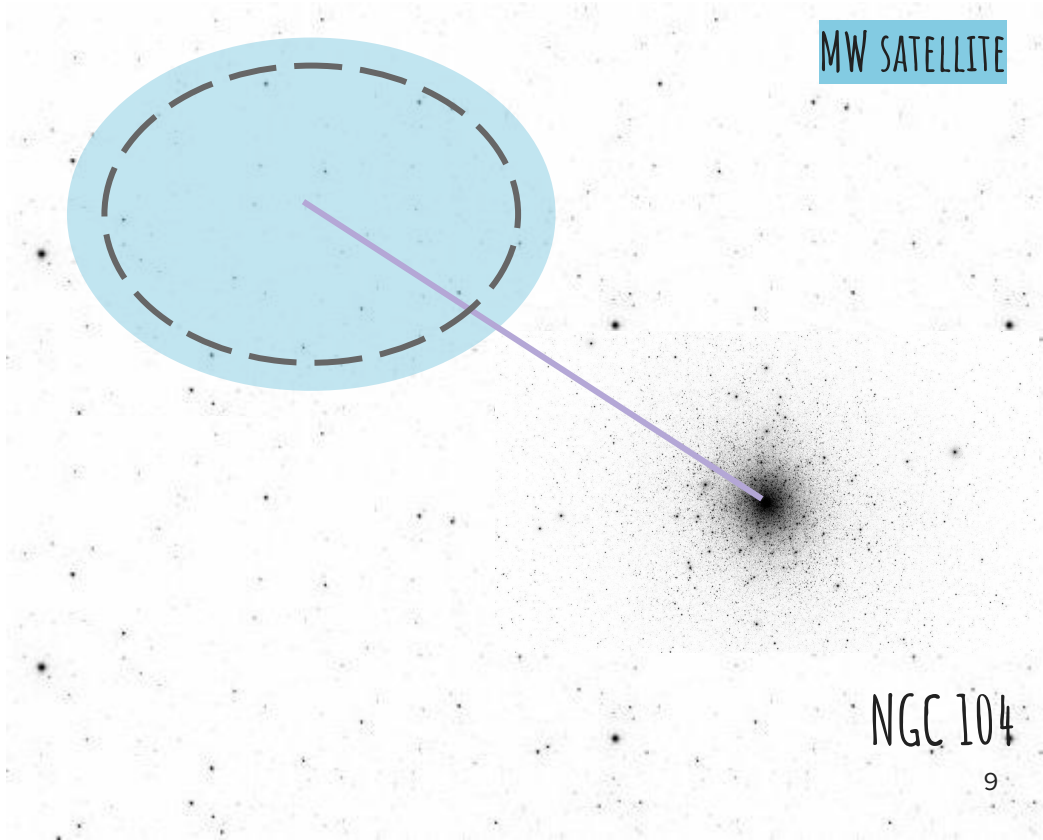
Distance criterion

D^{GC} < Tidal radius of the satellite

Velocity criterion

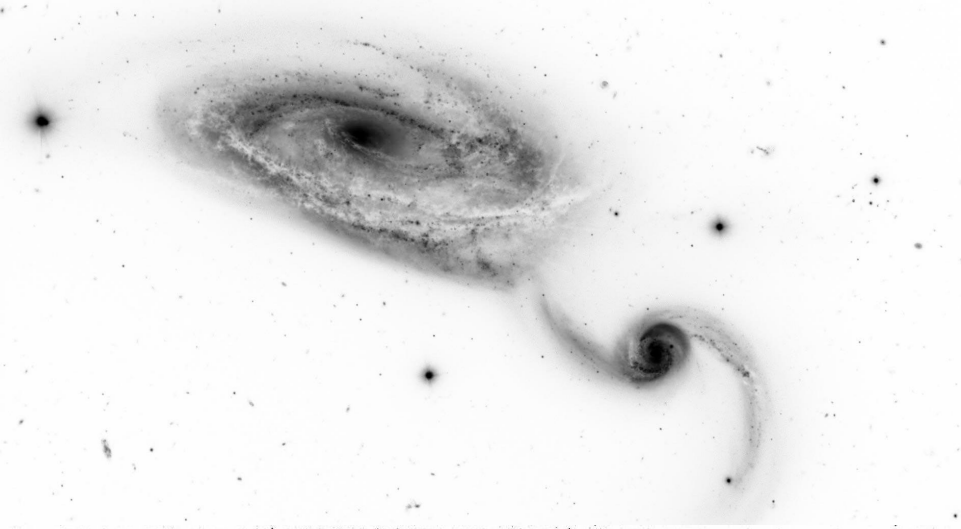
V^{GC}< Escape velocity of the satellite

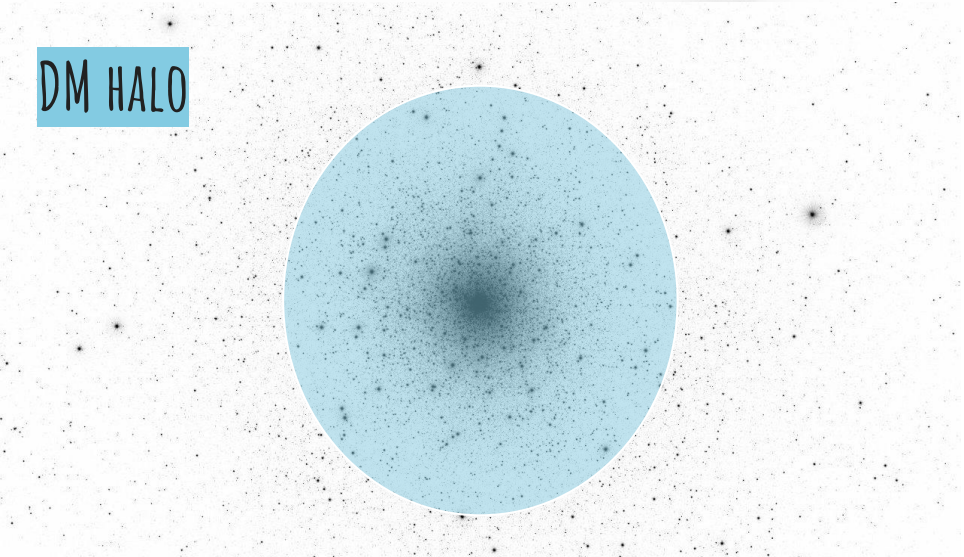
$P_{GC}(\text{MW satellite})$ = Probability of having been bound to a MW satellite



None of the 170 globular clusters show any clear association with the 11 MW satellites

Boldrini&Bovy+21





IMPLICATIONS?

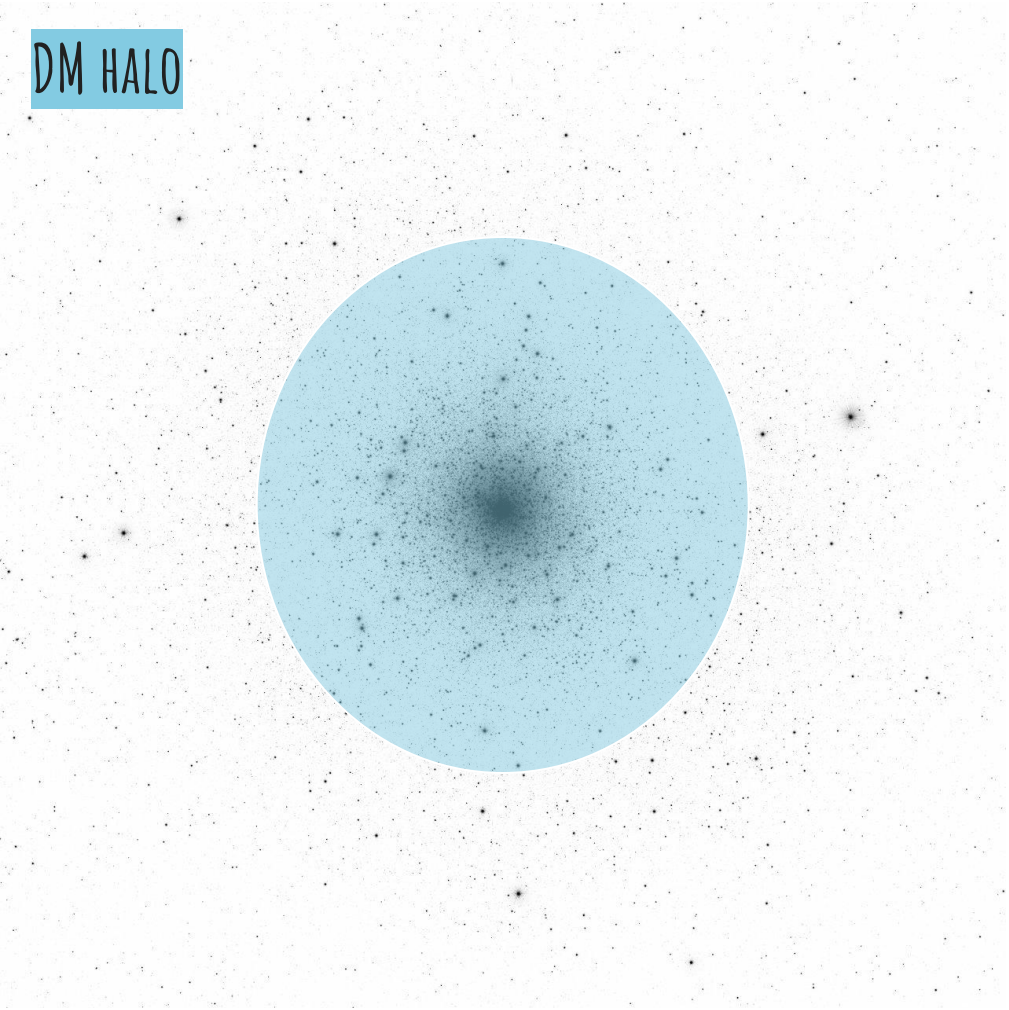
OPTION 1

Now disrupted satellites

OPTION 2

Globular clusters may have had a dark matter halos

DM HALO



HOW TO GO FURTHER?

Evolving MW potential

MW has drastically grown before z = 2 due to mergers

Globular clusters with DM halo

Investigating their orbital history backwards in time