THE GALACTIC ANTICENTRE

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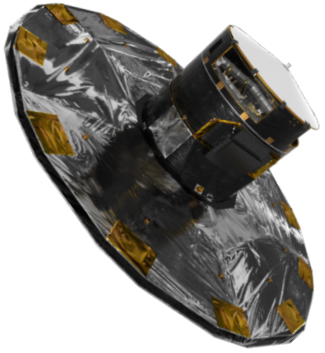
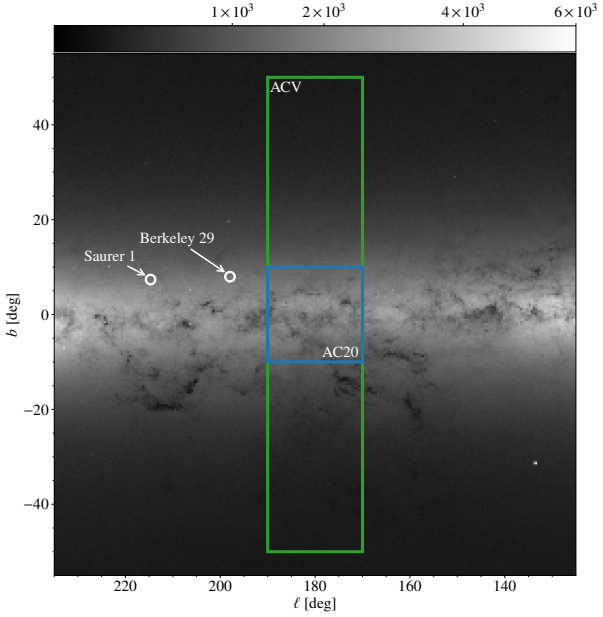
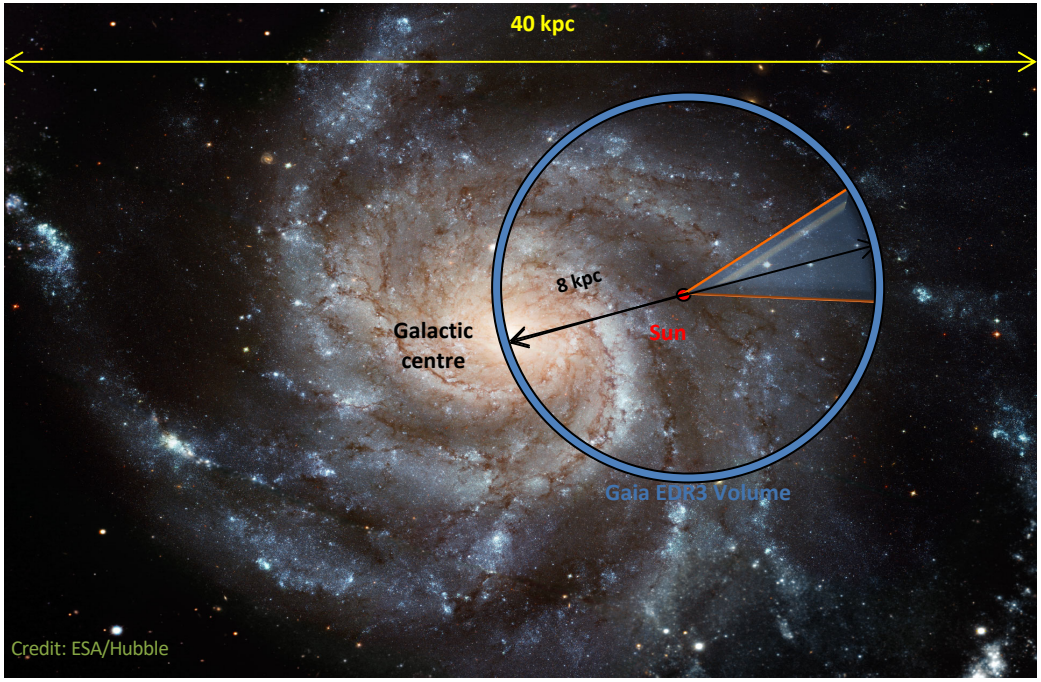




The Galactic Anticentre



- a meeting point of distinct components of the Galaxy (the disc, the halo)
- shows signatures of internal and external perturbations
- hosts ancient and recently disrupted stellar systems of extragalactic origin

- A disc direction with low extinction
- Determination of the rotation and vertical velocities only with astrometry (no need of radial velocities)

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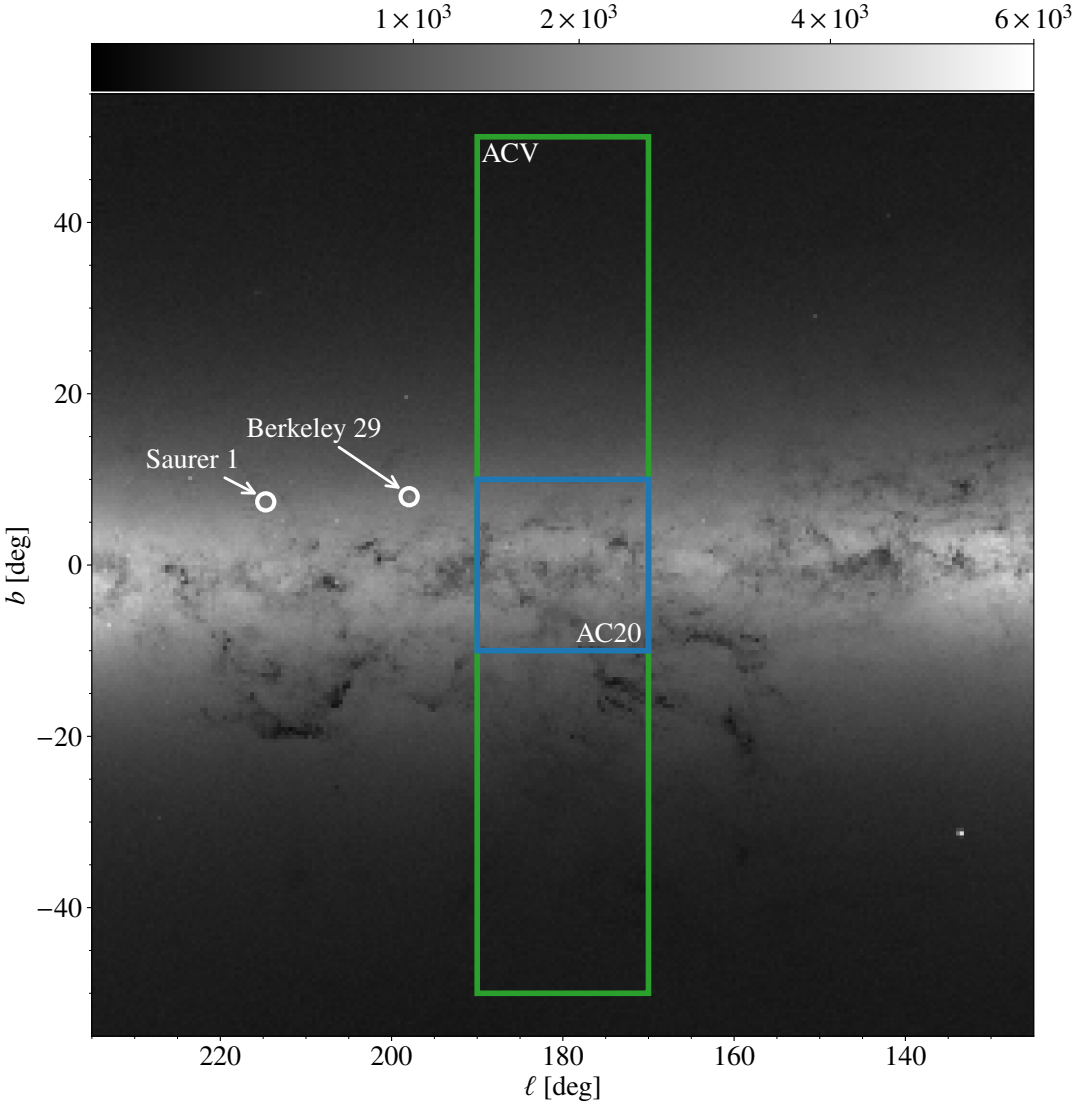
sources


1×10^3
2×10^3
4×10^3
6×10^3
ACV
AC20
Berkeley 29
Saurer 1
40
20
0
−20
−40
b [deg]
220
200
180
160
140
ℓ [deg]

The improvements in EDR3

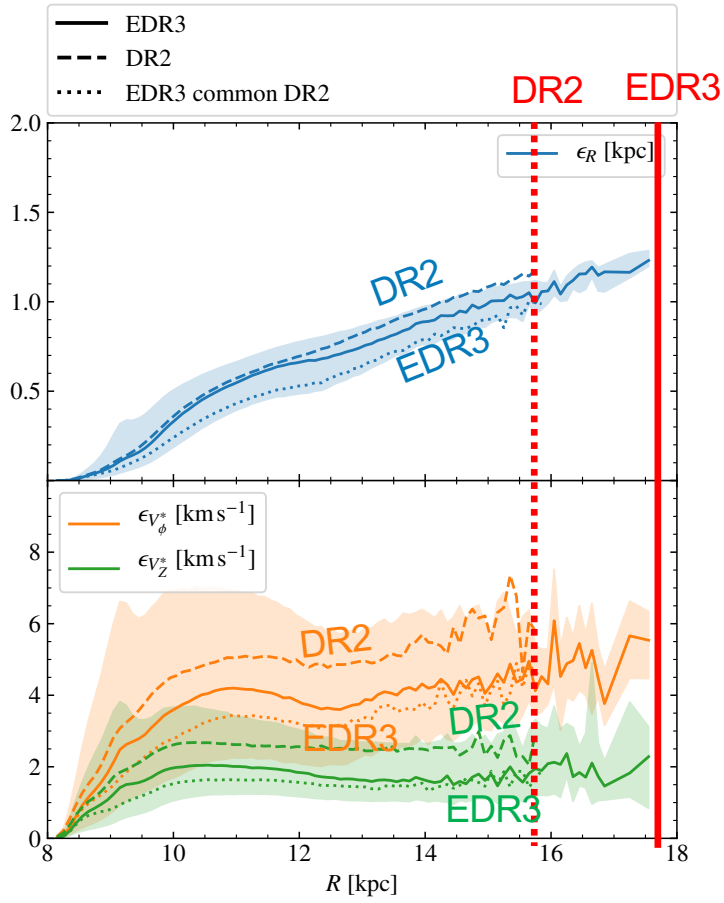
- stars with small parallax uncertainty within 20º around the anticenter

DR2 **3M stars** → EDR3 **4M stars**

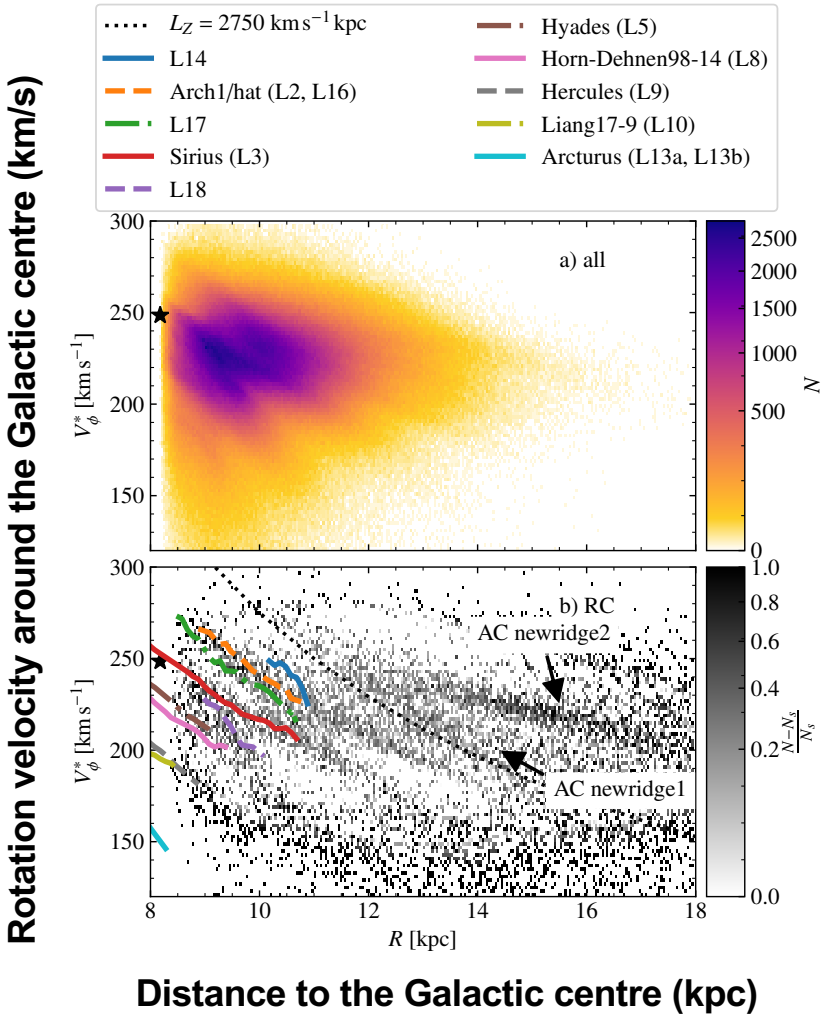
- Uncertainties in positions and velocities much smaller
- Reaching farther regions in the confines of the disc

Distance uncertainty

Velocity uncertainty



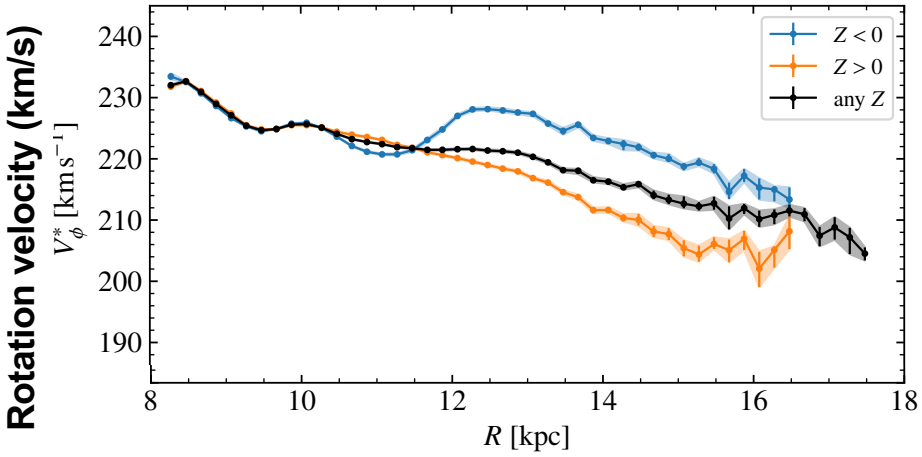
Substructures now seen farther away



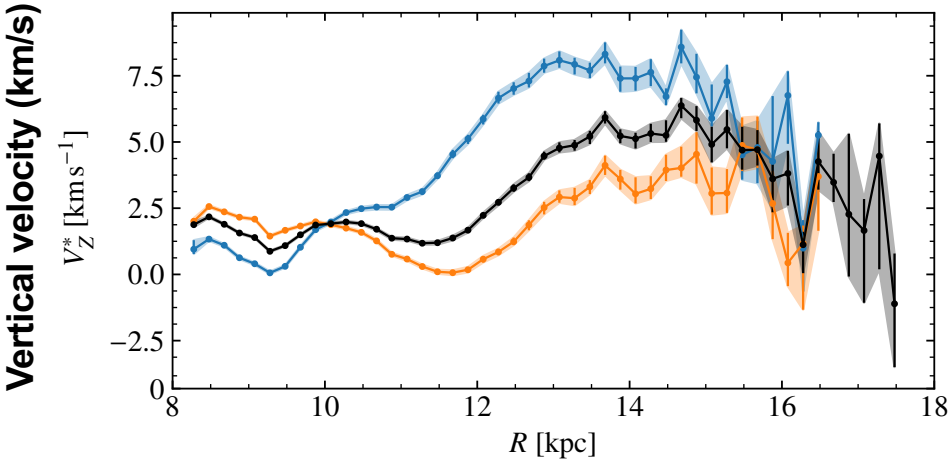
- Known disturbances (ridges) extending farther away
- New ridges seen

Global kinematics of the disk

All stars
Z>0 above the plane
Z<0 below the plane



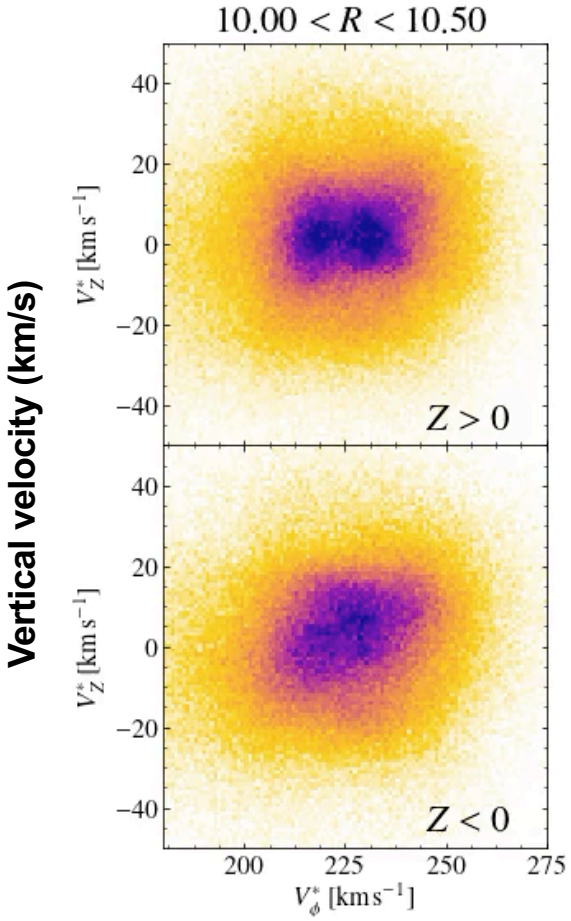
Distance to the Galactic centre (kpc)



Distance to the Galactic centre (kpc)

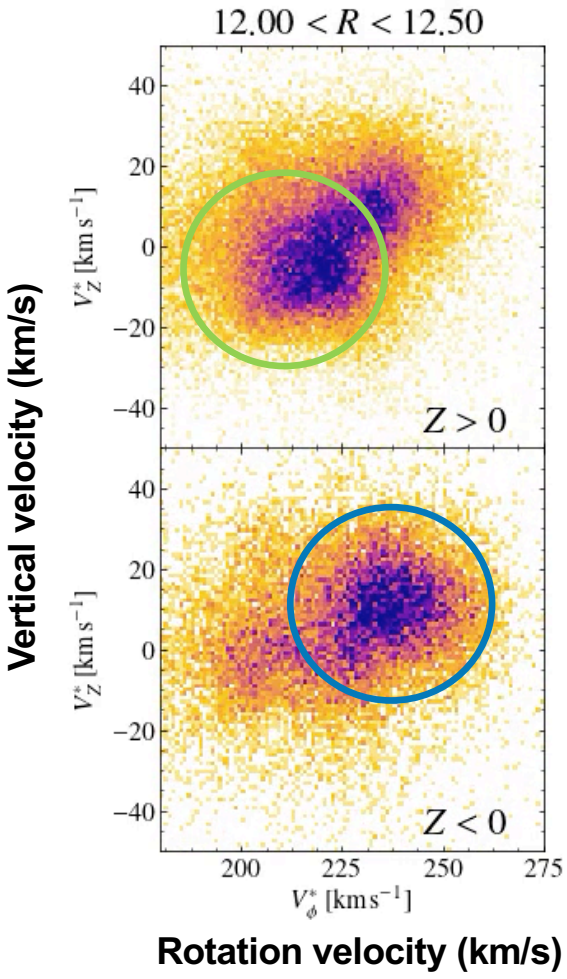
- Stars rotating at 18 kpc from the centre
- Symmetry is broken: stars above and below the Galactic plane do not move equally
- Change of behaviour around 10 kpc with large asymmetries

Complex dynamics of the disk



Complex dynamics of the disk

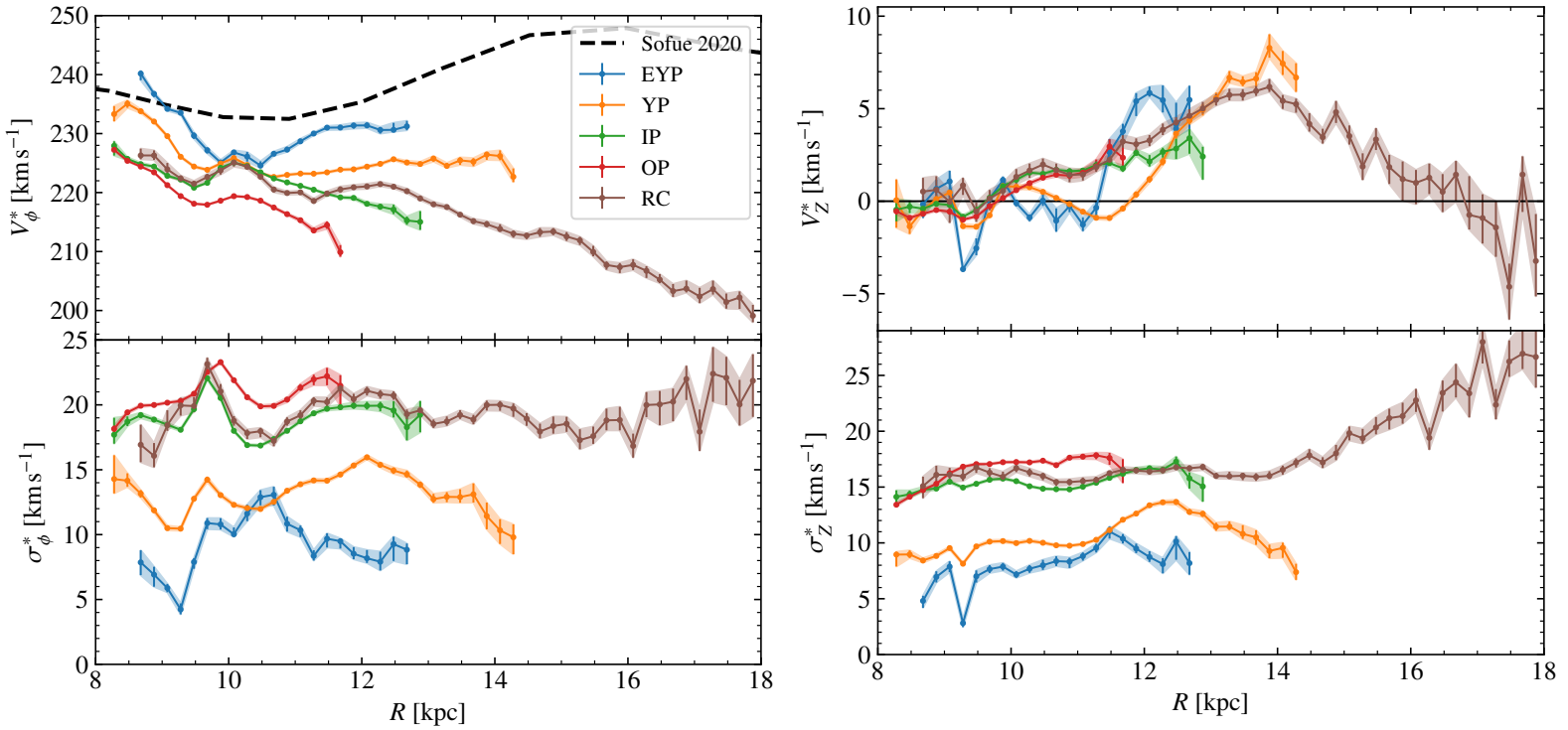
- An up and down bimodality at large R
- Possible origins: spiral arms, disc warp, external perturbation



Most stars above the plane rotate slower and move downwards

Most stars below the galactic plane rotate faster and move upwards

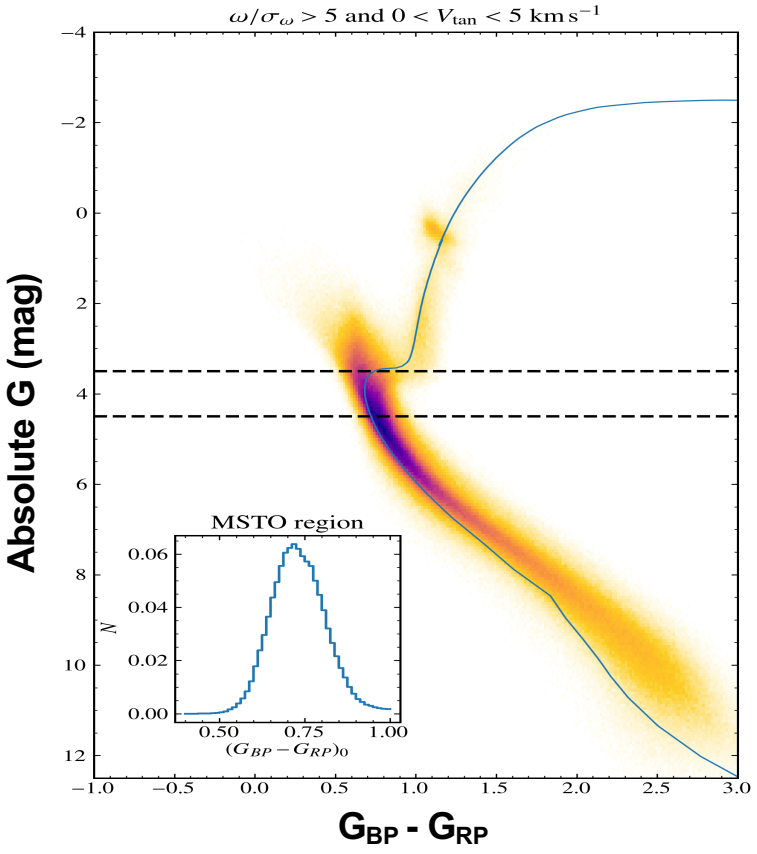
Different populations



- Younger stars have larger rotational motions than older stars as expected
- Clear oscillations, depending on the population

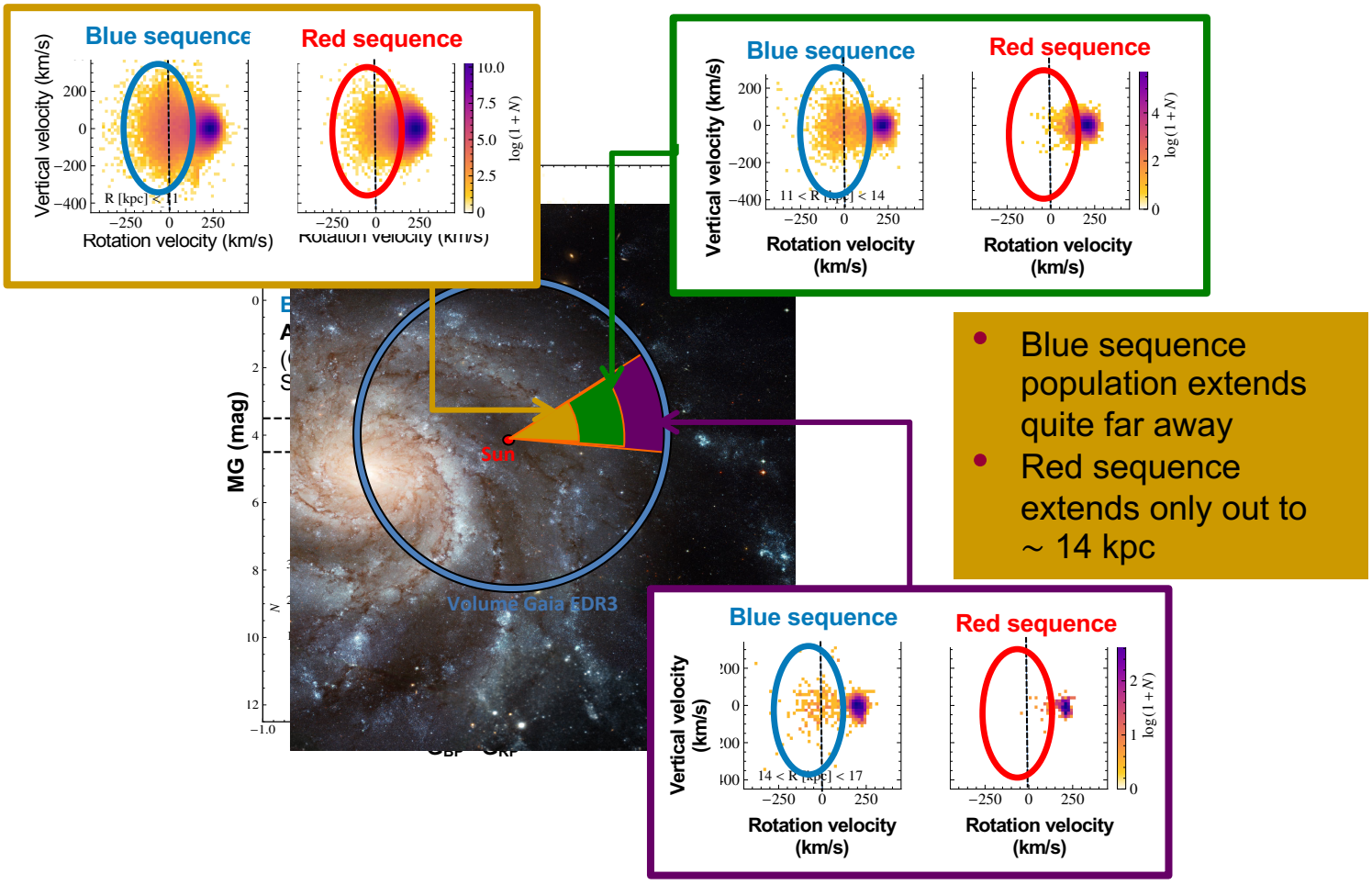
Tracing different Galactic populations

Blue sequence:
Accreted halo
(Gaia-Enceladus-Sausage)



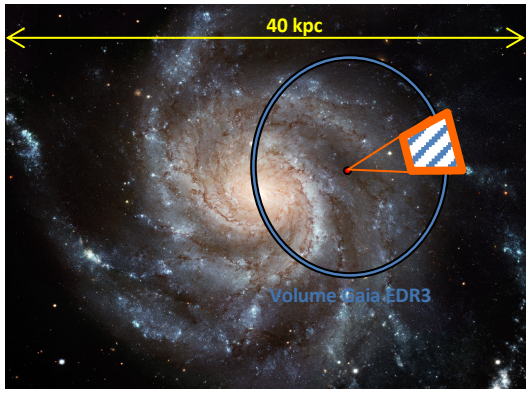
Red sequence:
Heated thick disc
(a proto-galactic disk present at the time of the merger with Gaia-Enceladus-Sausage)

Tracing different Galactic populations



- Blue sequence population extends quite far away
- Red sequence extends only out to ~ 14 kpc

The confines of the Galactic disc



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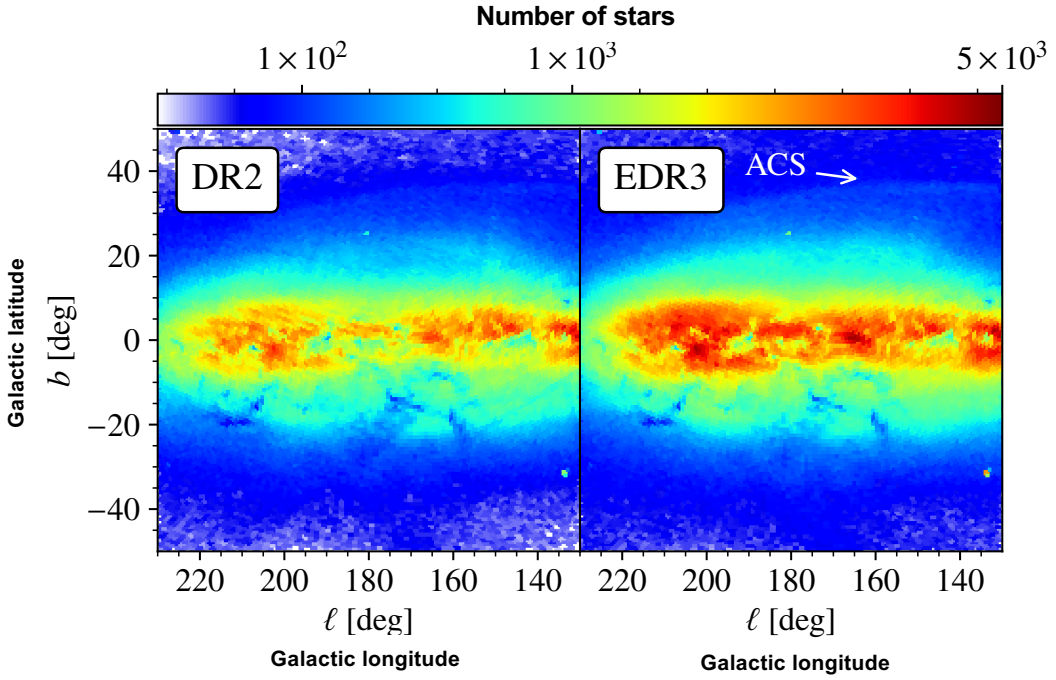
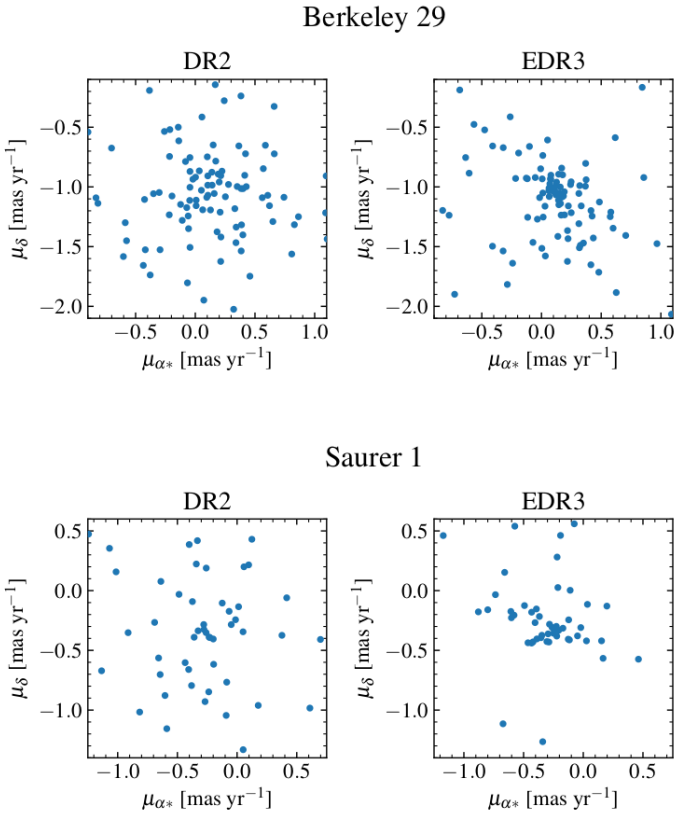
Stars >10 kpc from the Sun

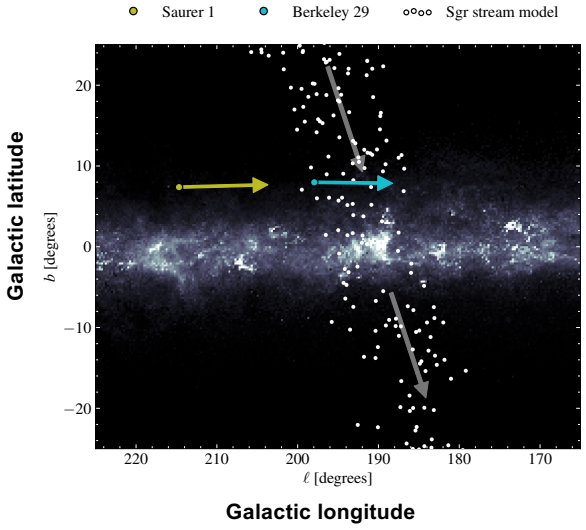


- Structures in the outer disc clearly visible at distances larger than 10 kpc: notable improvement with respect to DR2

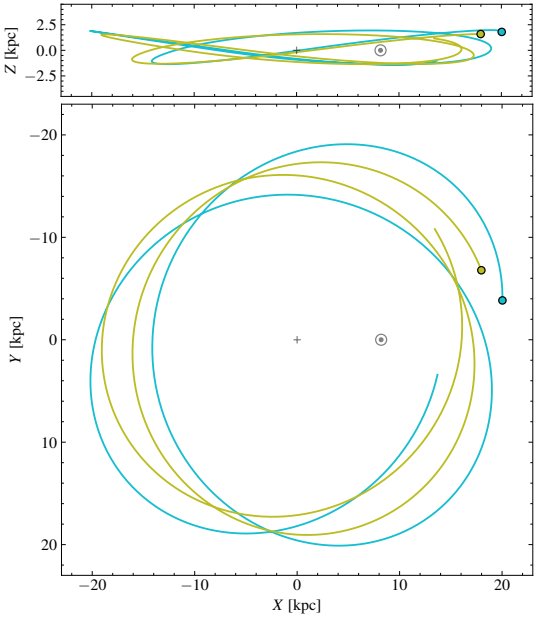
Open clusters beyond the edges of the disk

Proper motions in DR2 and EDR3





Determined orbits



- These old and far away open clusters are on disc-like orbits

The Galactic Anticentre

- **Extension of the horizon towards the very end of the disc:**
  - new complex patterns of movement in the outskirts of the Galactic disc
  - density structures from internal and external origin
  - precise orbits of outsider open clusters

- **Exploration of Galactic ancient components:**
  - a smaller proto-Galactic disc
  - debris from past merger scattered through the Galaxy