

Kinematic Insights into the Survival of Milky Way Star Clusters.

From Perturbations to Persistence: Star Cluster Evolution in Our Galaxy.



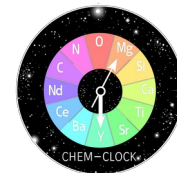
C. Viscasillas Vázquez, L. Magrini, L. Spina, G. Tautvaišienė, M. Van der
Swaelmen, S. Randich, and G. G. Sacco



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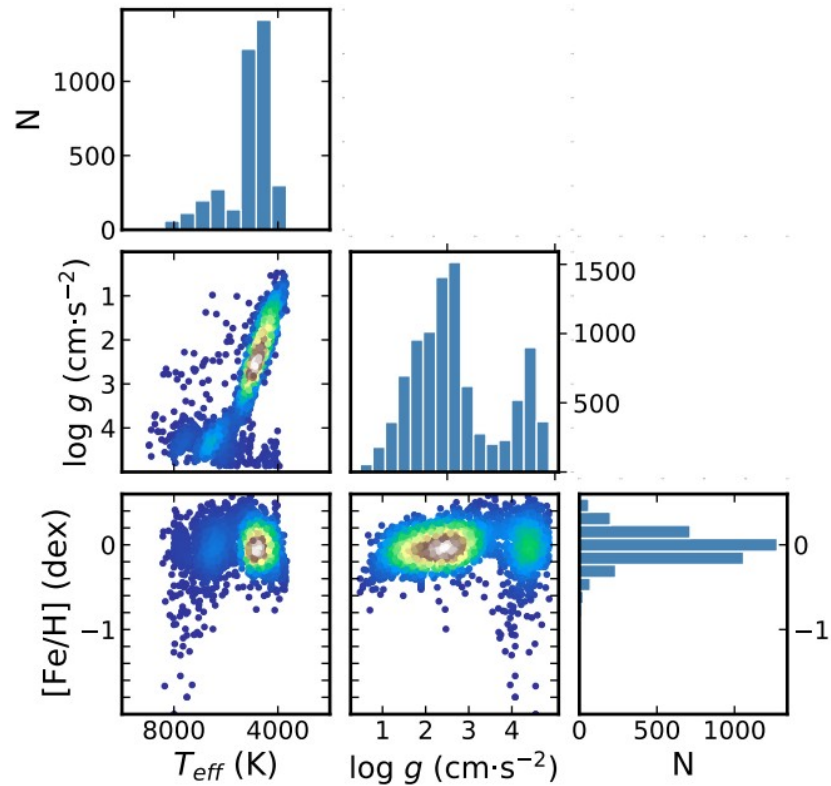
➤ Introduction
Samples
Kinematical properties
Conclusions

- The **survival time** of a cluster depends on factors such as its **mass**, **density**, **size**, and the **environment** at its birth and location.
- The gravitational effects of the Galactic **bar**, **spiral structures**, and **molecular clouds**, influence its dynamical evolution.
- We aim to investigate whether **open clusters** and **field stars** exhibit different responses to perturbations causing radial migration.

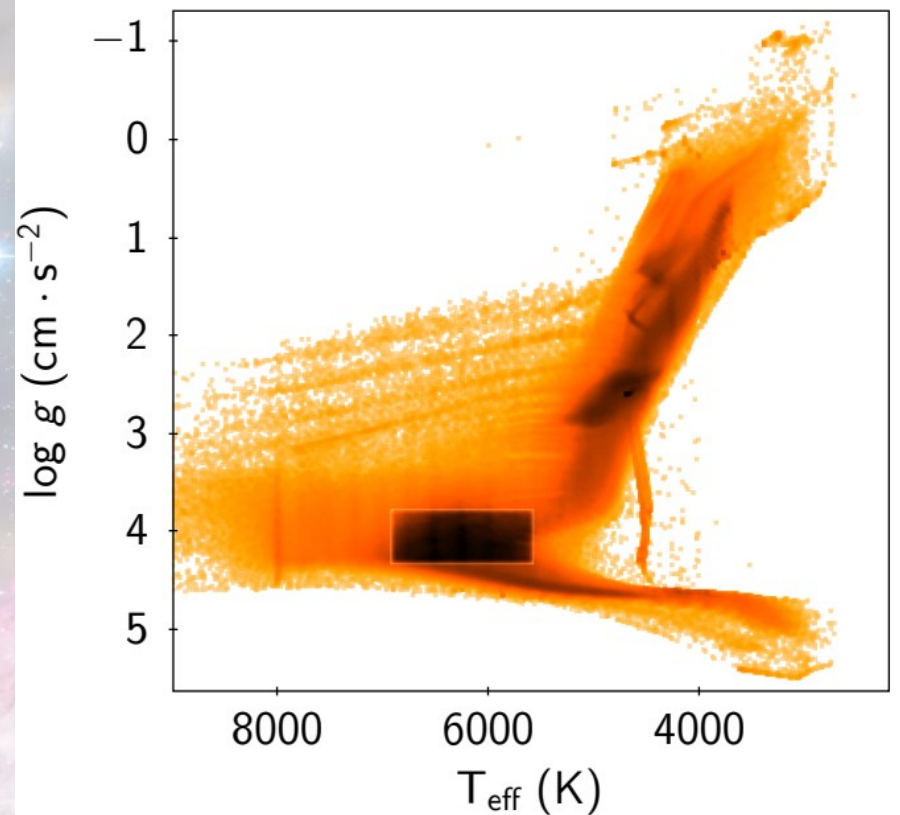


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➤ **Samples**
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~4,000 member stars



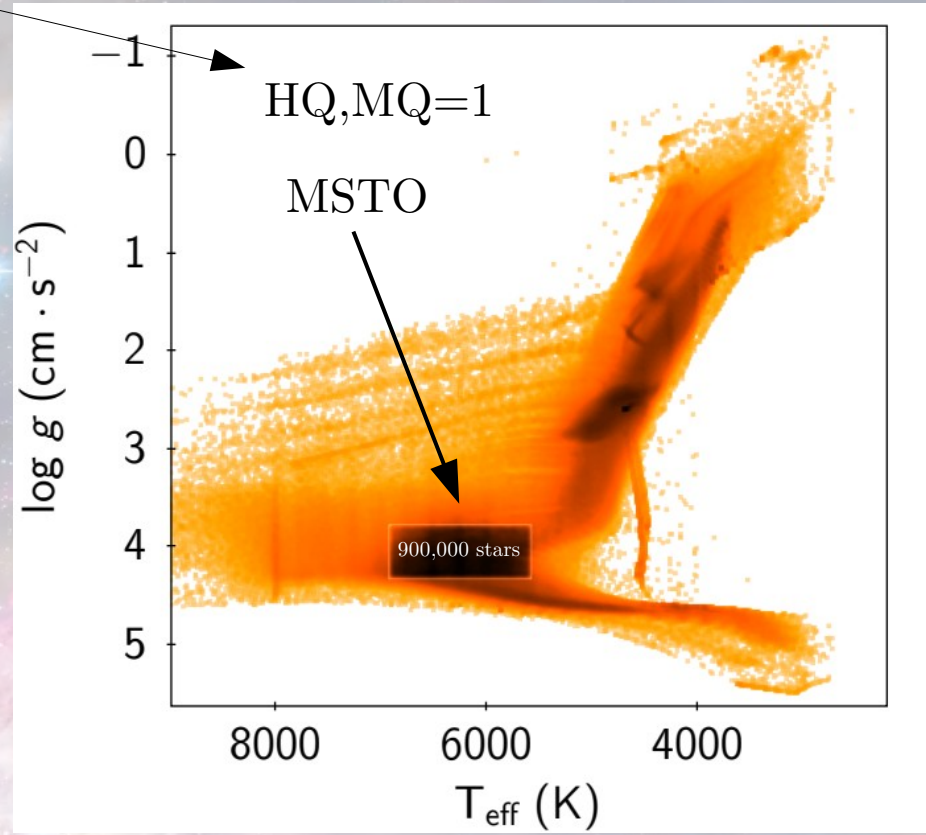
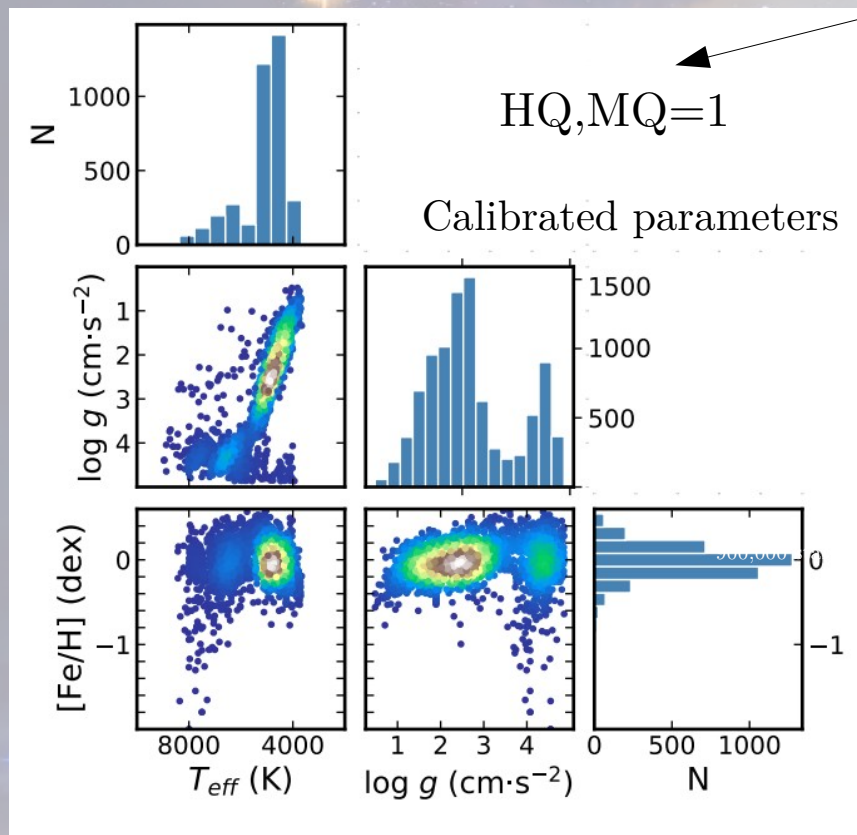
~5 million field stars



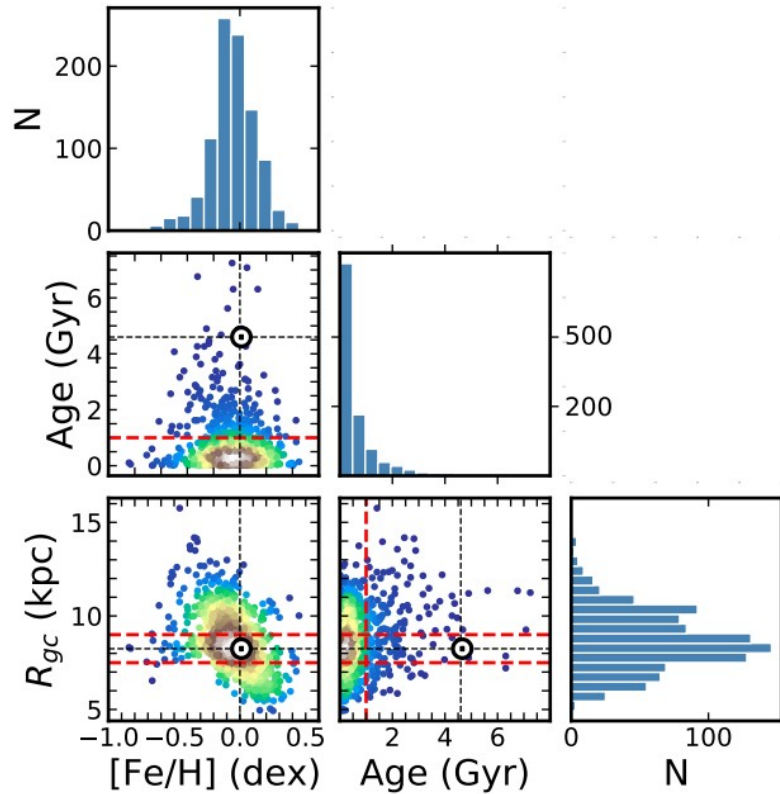
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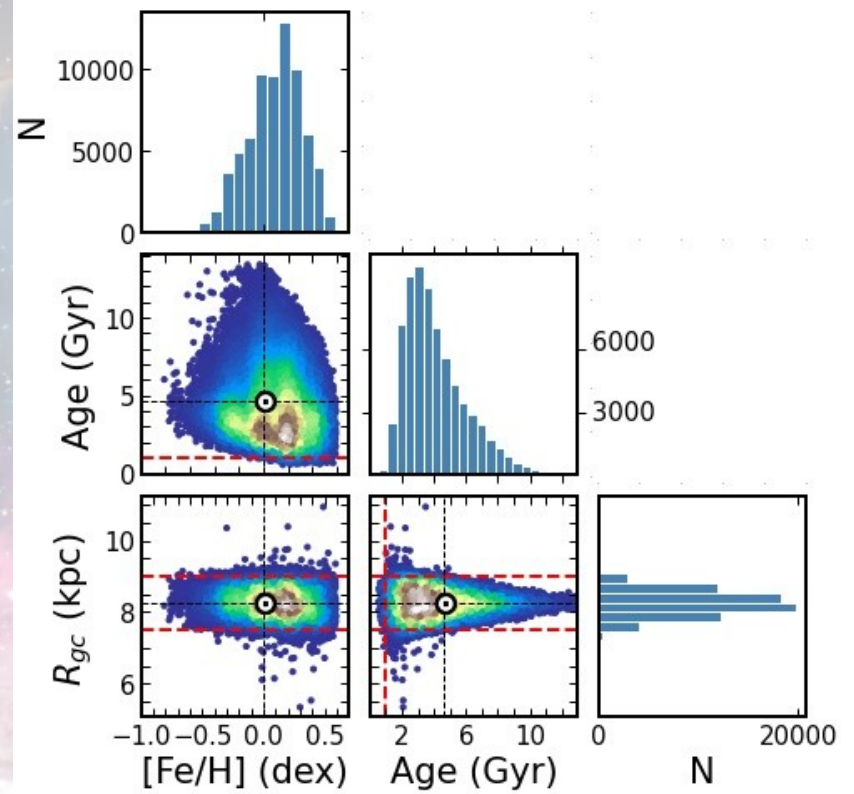
Same quality criterion



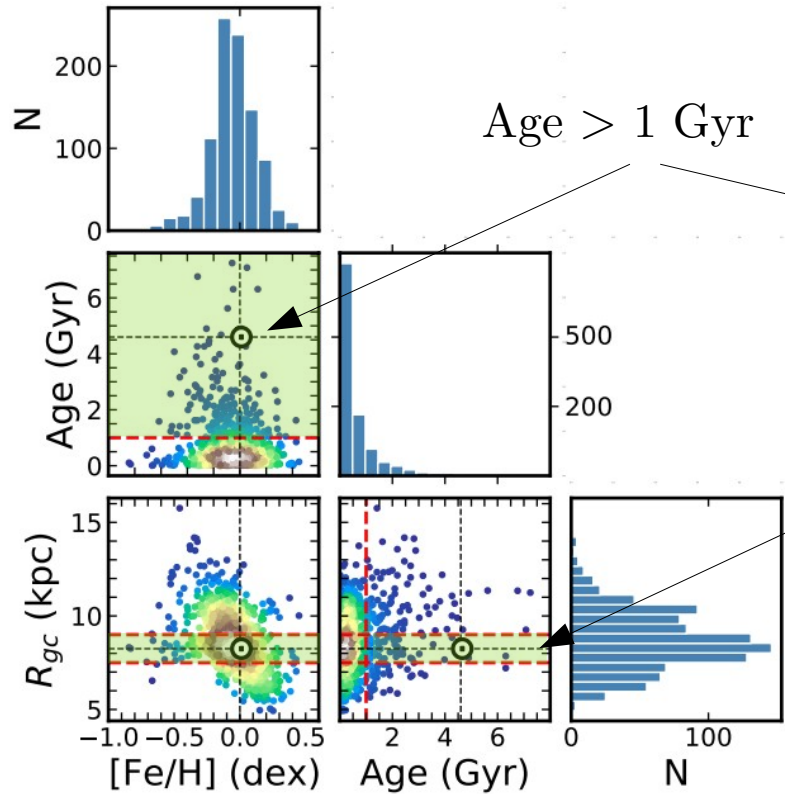
~1,000 open clusters



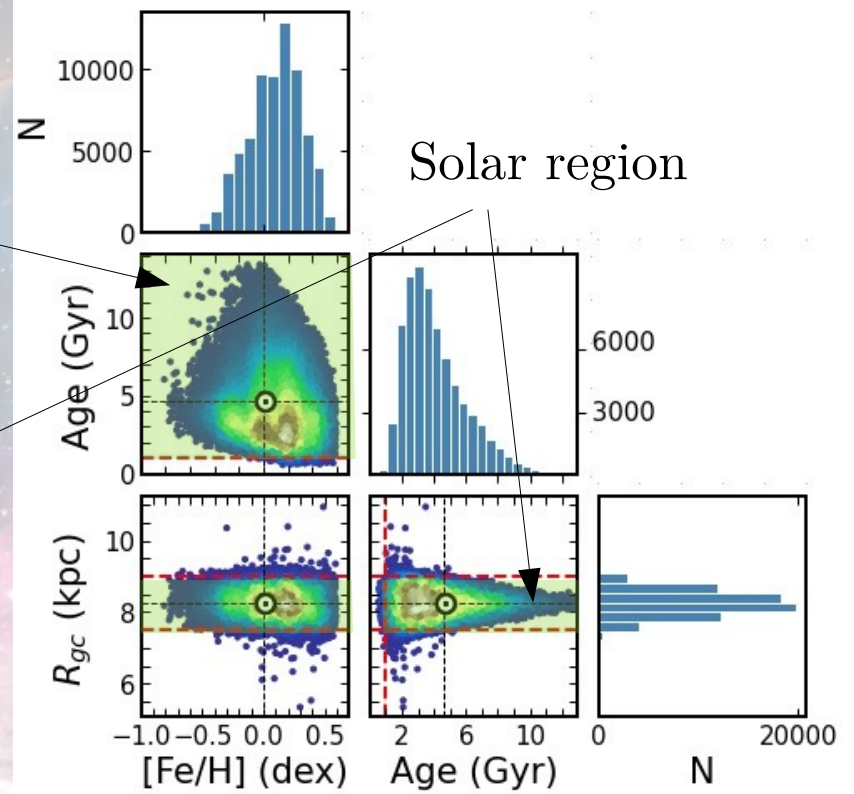
~70,000 field stars



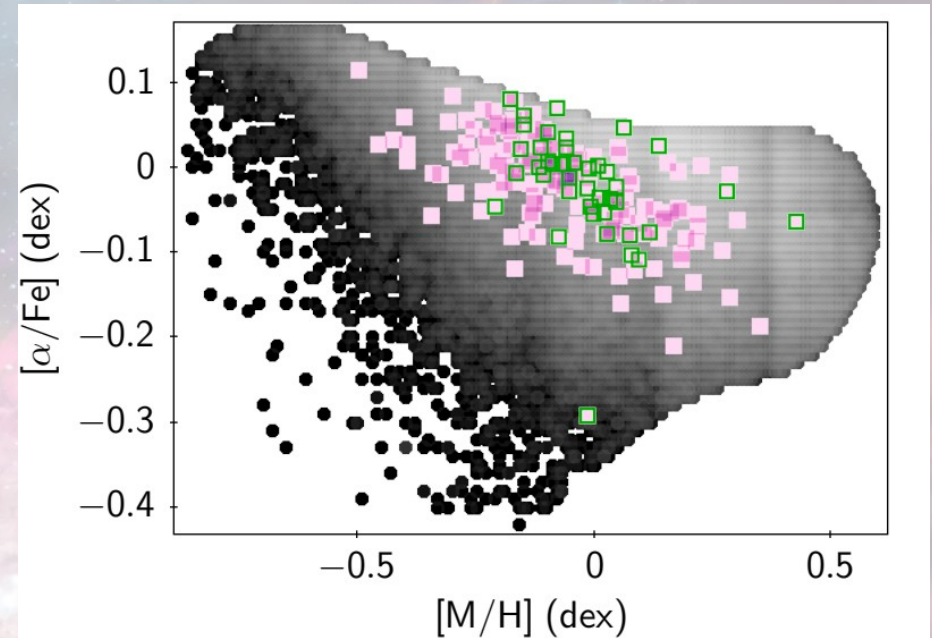
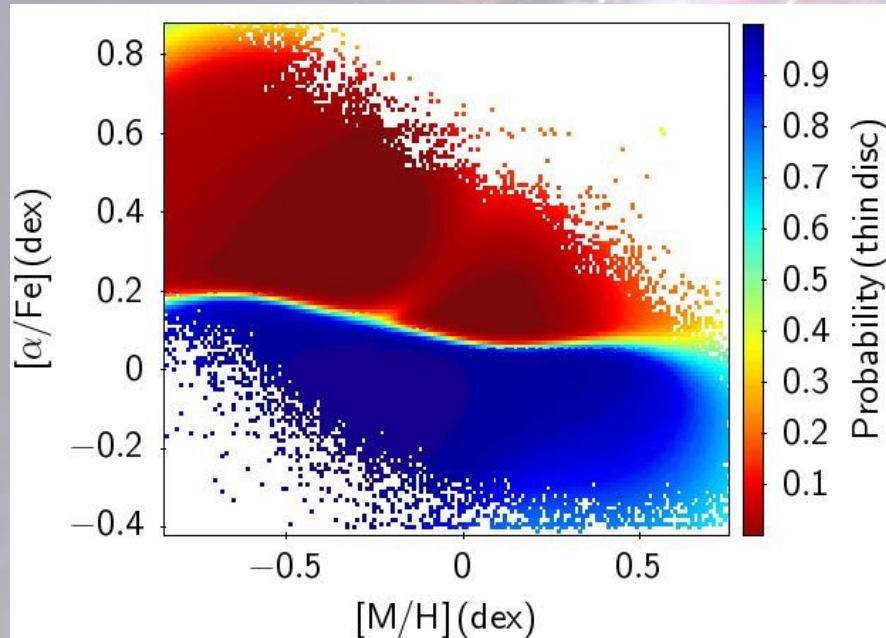
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Tinsley–Wallerstein Diagram (TWD)

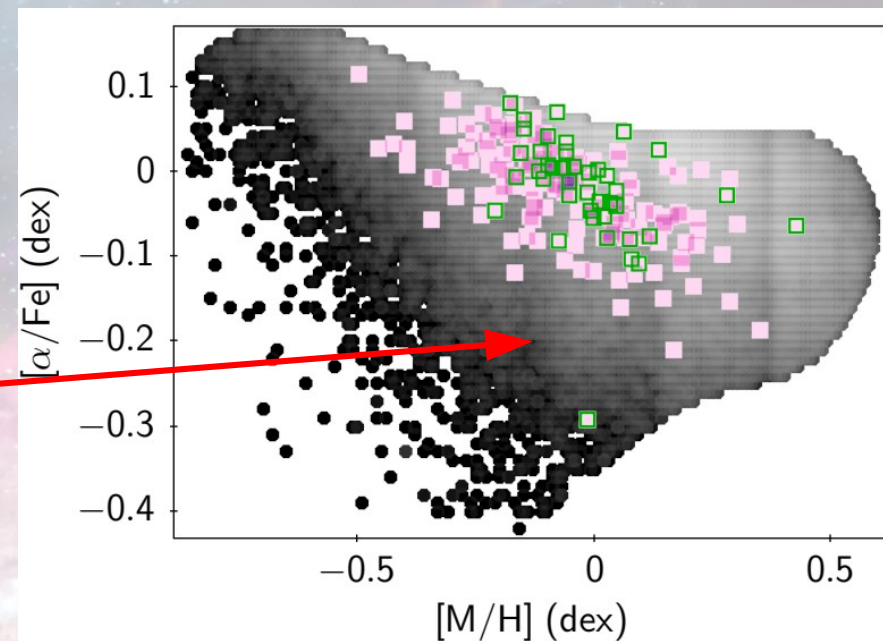
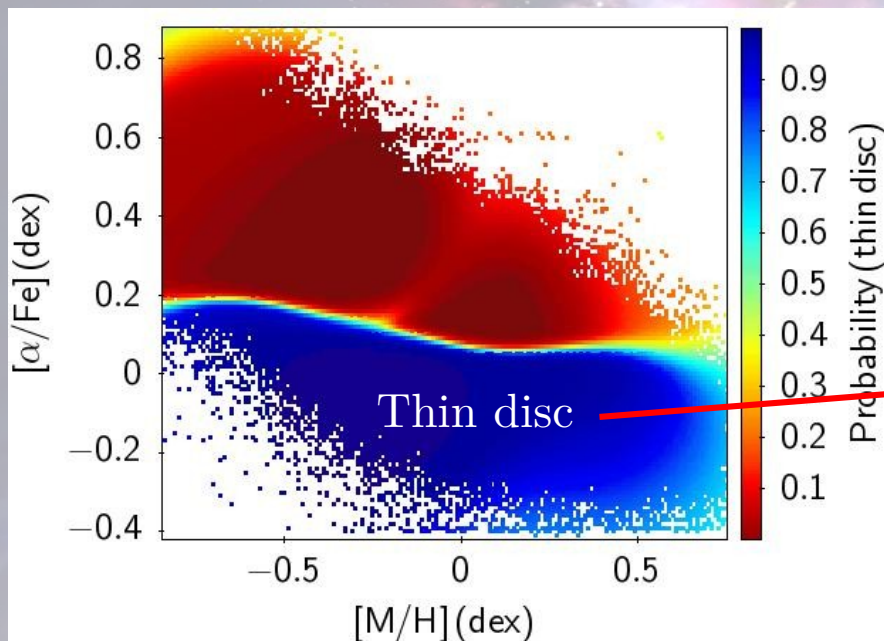


Tinsley–Wallerstein Diagram (TWD)

- ~900,000 MSTO stars
- ~200,000 ($P > 0.9$), SVMs
- ~66,000 (solar region)

Final sample

- ~200,000 ($P > 0.9$)
- ~170 OCs ($P > 0.9$)
- ~40 OCs (solar region)



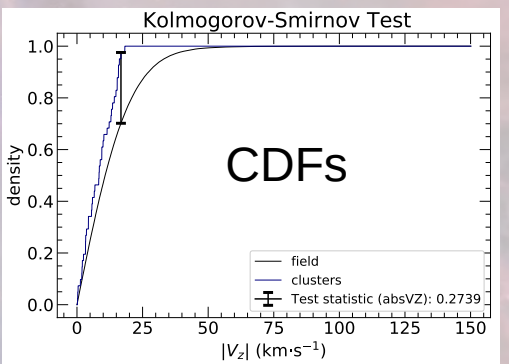
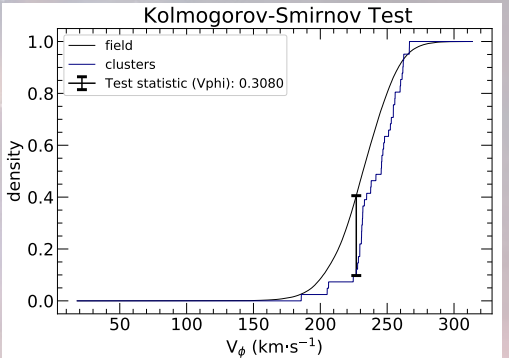
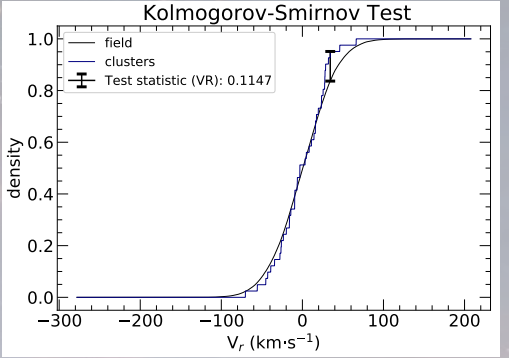
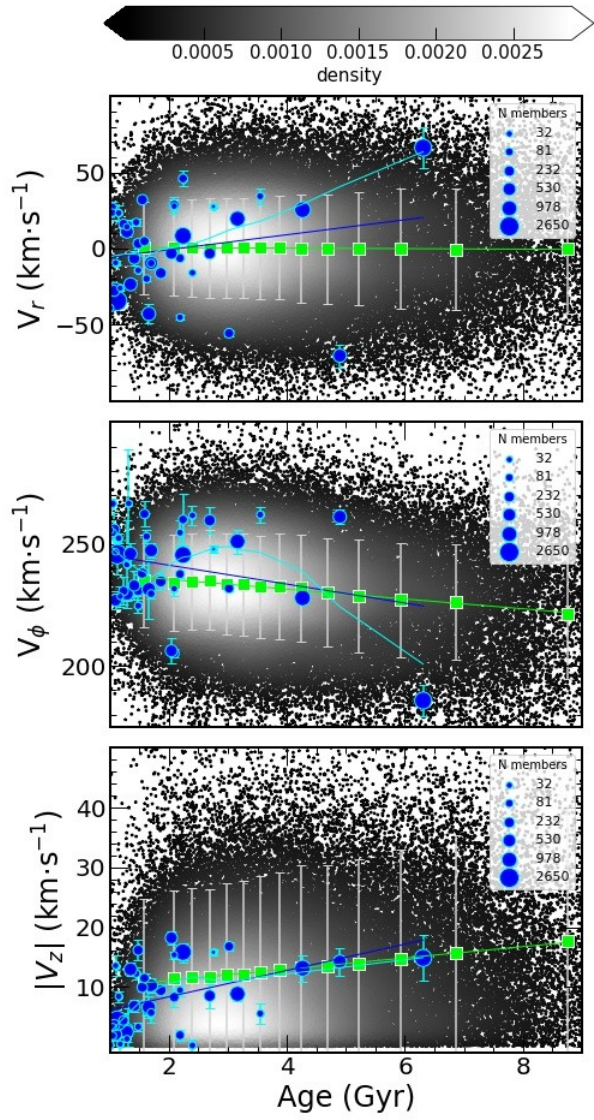


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Space velocities

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$ V_z $	+0.947	9.162	+0.176	0.000	+0.149	0.000
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$ V_z $	+2.203	+3.931	+0.455	0.003	+0.530	0.000
R	-0.023	8.284	-0.059	0.713	+0.023	0.887
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Viscasillas, Magrini, Spina et al. A&A, 2023.

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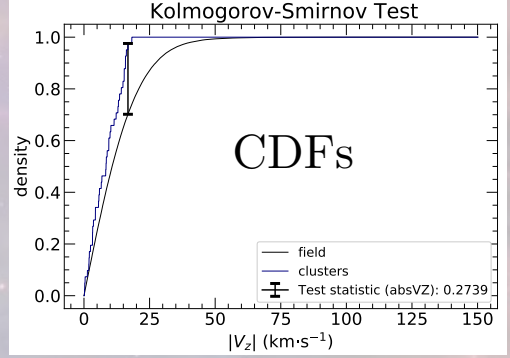
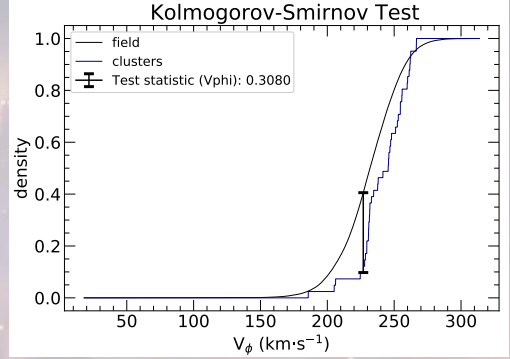
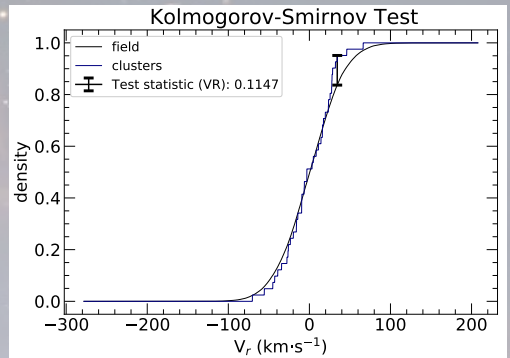
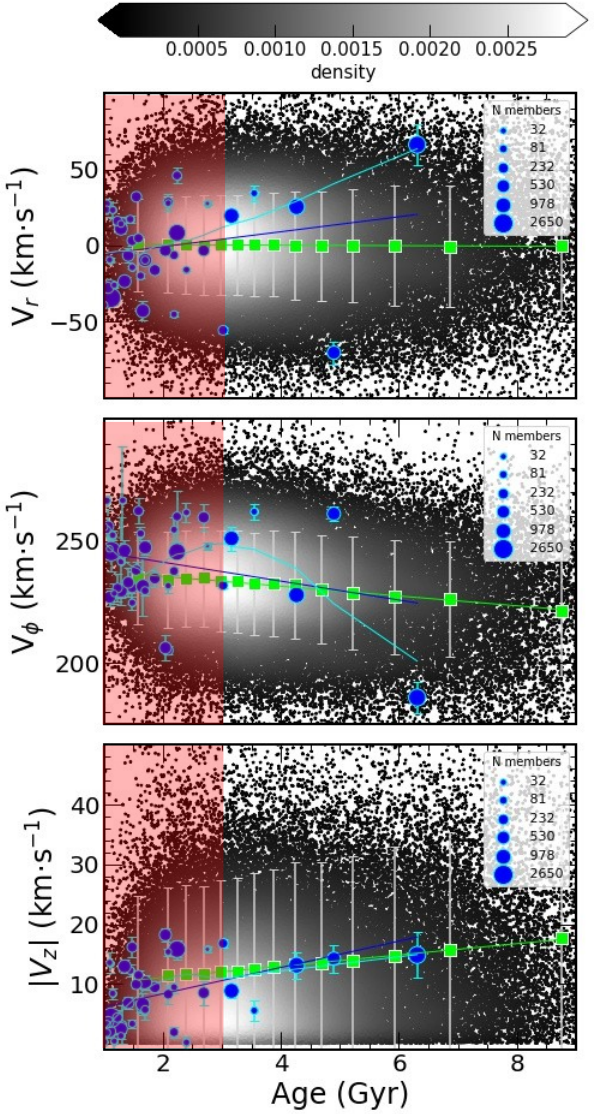
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Viscasillas, Magrini, Spina et al. A&A, 2023.

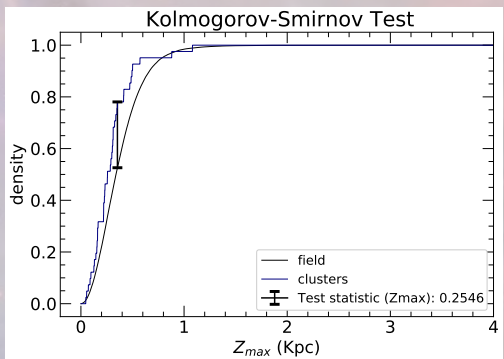
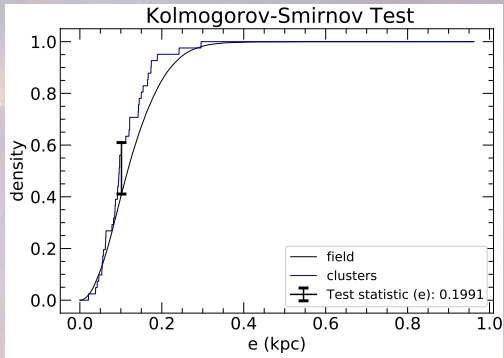
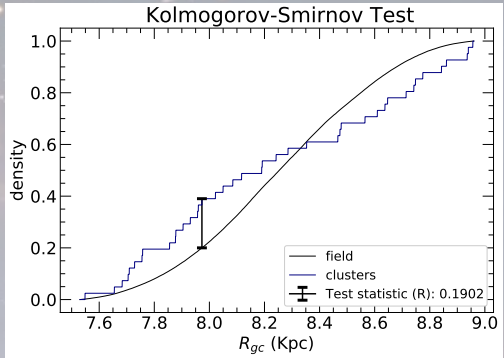
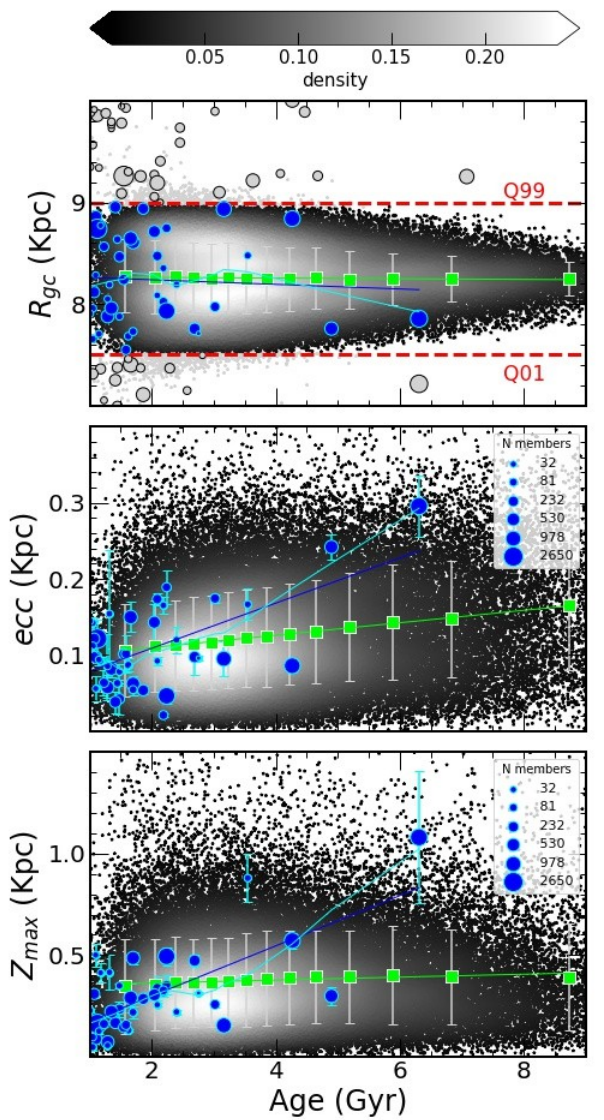


CDFs

Orbital parameters

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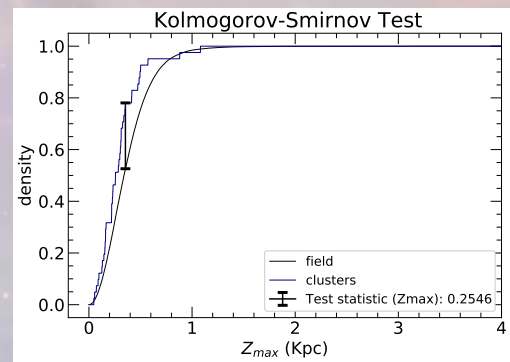
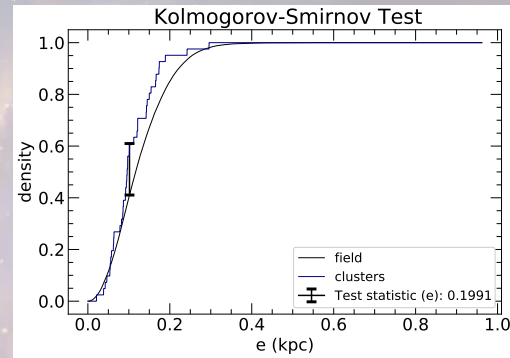
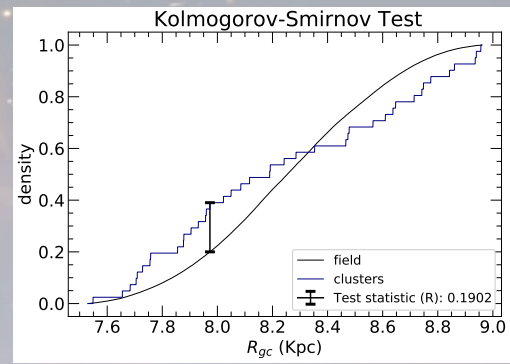
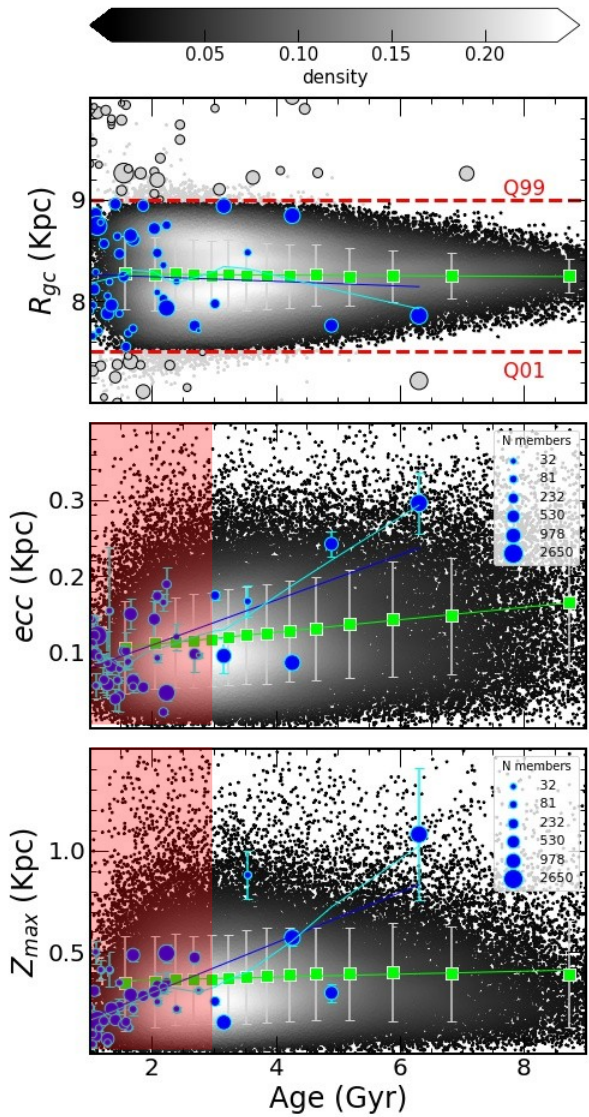
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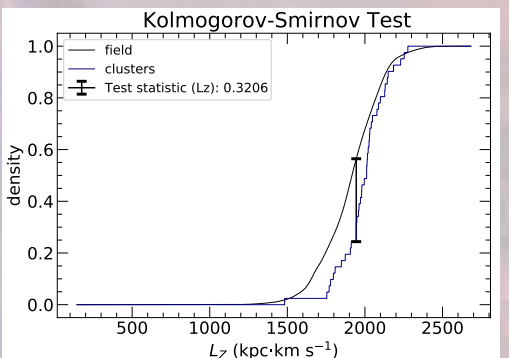
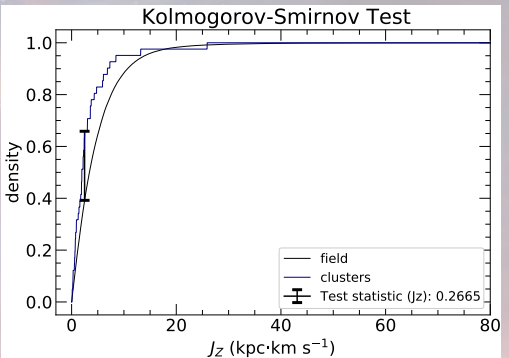
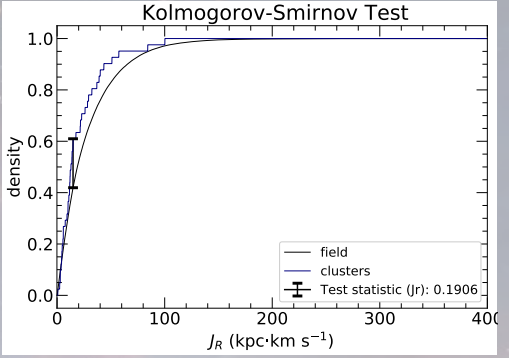
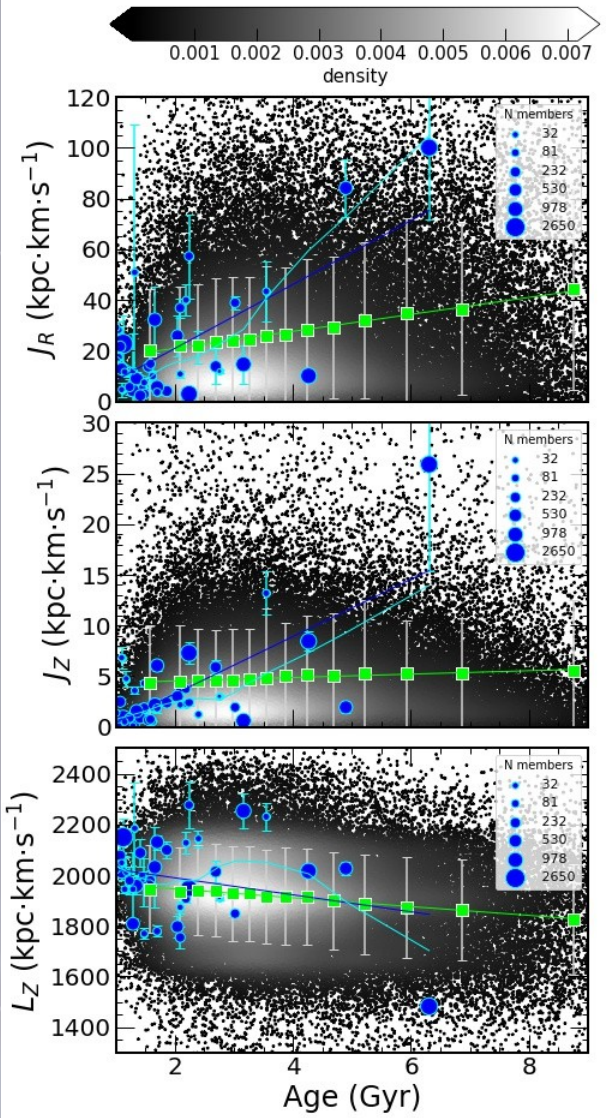
Viscasillas, Magrini, Spina et al. A&A, 2023.



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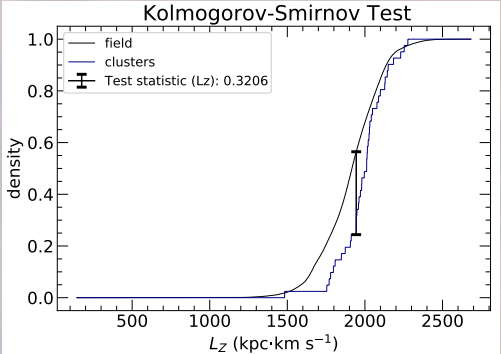
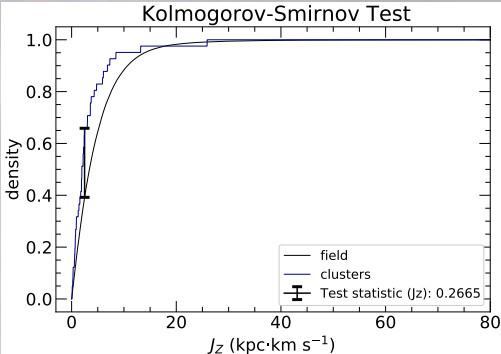
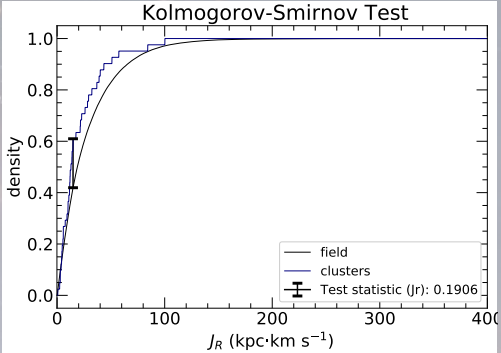
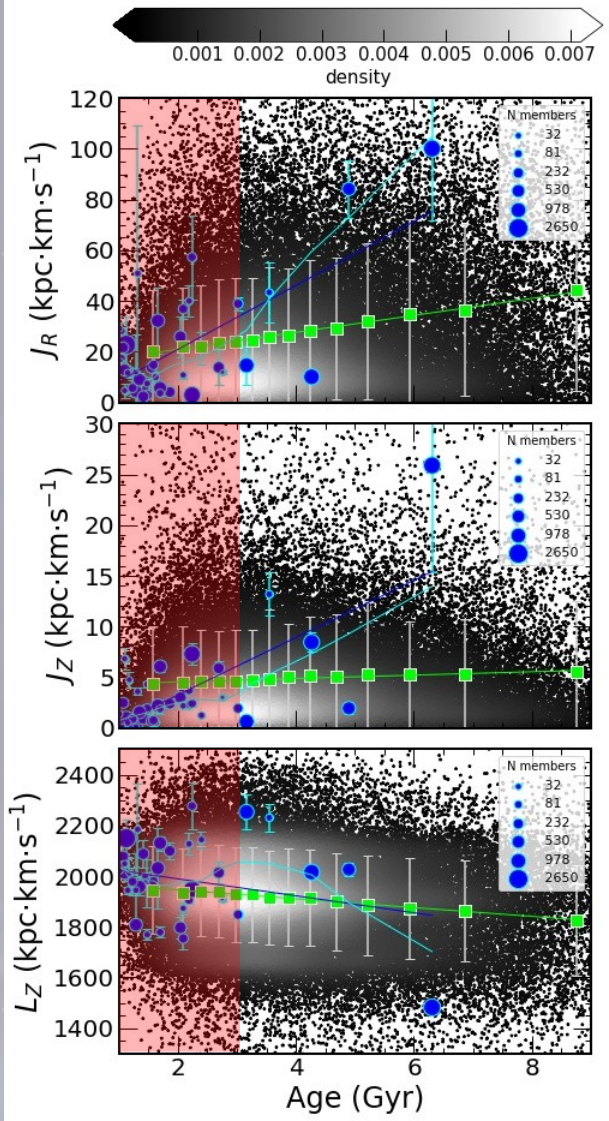
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- **Oldest** surviving **clusters** are generally **more massive** and tend to move on orbits with **higher eccentricity**.
- Despite being reliable tracers of the Galaxy's past composition, they **may not reflect their current location's composition**.
- **Kinematic properties must be considered** when comparing data and models of chemical evolution.
- Intrinsic **differences** between **clusters** and **isolated stars** need to be taken into account.
- To validate results, new studies are crucial, especially those **increasing the sample** size of open clusters, particularly **at older ages**.

Open questions to discuss: what are the possible causes of the different behavior of the clusters with respect to the field stars?

For more info, visit:

<https://ui.adsabs.harvard.edu/abs/2023arXiv230917153V/abstract>

DOI: <https://doi.org/10.1051/0004-6361/202346963>

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Grazie mille! 🙏

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