

Unravelling the mass function of IC 4665

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Objectives: Provide a list of members, empirical isochrones, luminosity and mass functions of the nearby, young open cluster IC 4665.

The initial mass function is a fundamental parameter of stellar formation and evolution.

It is roughly known for intermediate masses but large uncertainties are still present for high and low mass stars.



Gaia [4] $\rightarrow \alpha, \delta, \varpi, \mu_{\alpha}^*, \mu_{\delta} + G, G_{BP}, G_{RP}$
> 1.3 billion sources up to $G = 21$.



DANCe [1] $\rightarrow \alpha, \delta, \mu_{\alpha}^*, \mu_{\delta} + \text{multifilter photometry}$
> 5 million sources up to $i = 27$.

Observations

IC 4665:

young (~ 35 Myr), nearby (~ 350 pc), open cluster
 $\sim 5\,500$ images from 13 instruments in 19 years baseline



Figure 1. Composite image of the center of IC 4665. In red circles the sources in the *Gaia* DR2 catalogue. Many sources are beyond the detection limit of *Gaia*.

[†] The DANCe Team is a group of international researchers working on the Dynamical Analysis of Nearby Clusters.
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Methodology

I. Astrometric & photometric analysis [1]

- Typical uncertainty in proper motions is < 1 mas/yr.
- Photometric calibration for the g, r, i, z, y and J, H, K_S bands.
- Deep stack images.
- We combine the DANCe catalog with *Gaia* DR2.

The final catalog contains $> 5\,500\,000$ sources.

II. Membership analysis [6]

1. Model the cluster and field populations

Field: Gaussian Mixture Model (GMM)

Cluster: GMM for astrometry + principal curve for photometry.

2. Infer posterior membership probabilities for each source to belong to the cluster.

Results

Encouraging preliminary results:

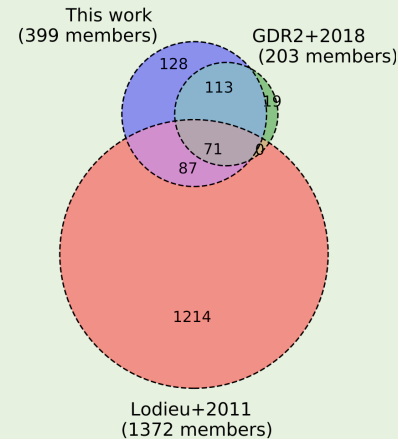


Figure 2. Venn diagram representing the candidate members identified in this work, the *Gaia* DR2 members [2] + [3] and the members from [5]. We note that this last one has a largely contaminated sample.

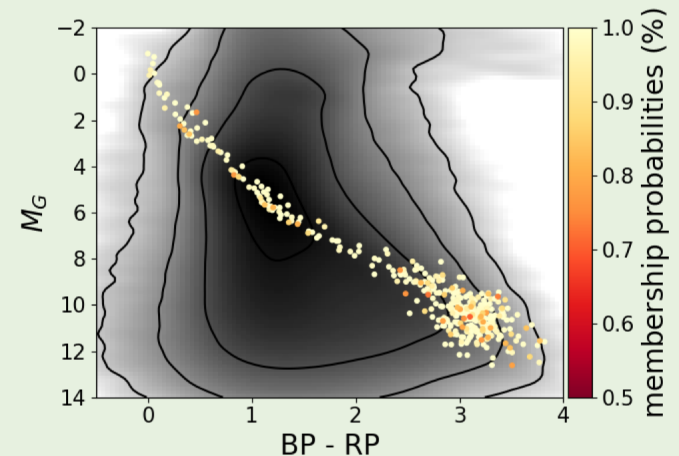


Figure 3. HR diagram of the IC4665 open cluster. The members of the cluster are color coded according to their membership probability. The kernel density estimation of the field is represented in the background. We note we have contamination from the field, specially for the low-mass stars. We are working on improve the performance of the membership analysis.

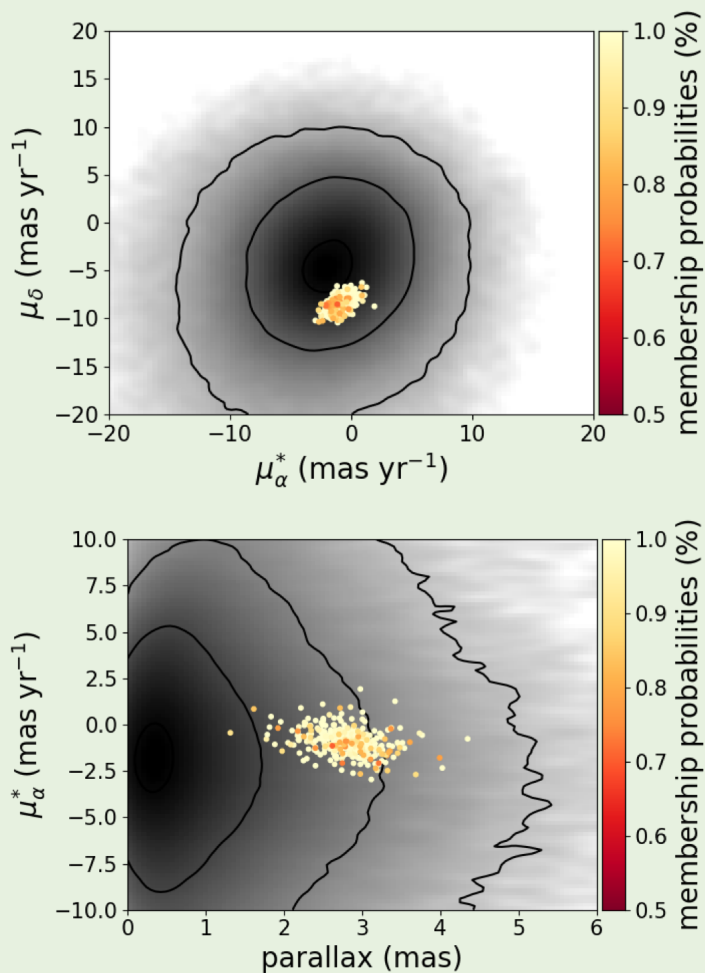


Figure 4. Vector point diagram of the IC4665 open cluster. The members of the cluster are color coded according to their membership probability. The kernel density estimation of the field is represented in the background. We note we have contamination from the field, specially for the low-mass stars. We are working on improve the performance of the membership analysis.

Conclusions

We find **484 members** in IC 4665 using the *Gaia* DR2 catalogue, 193 of which are new members.

Future work

- Refine membership analysis to reduce contamination from the field.
- Extend the study to the ground based DANCe catalog, reaching $\sim 15 M_J$.

References

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- [2] Cantat-Gaudin, T., Jordi, C., Vallenari, A., et al. 2018, ArXiv e-prints, arXiv:1805.08726
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- [5] Lodieu, N., de Wit, W.-J., Carraro, G., et al. 2011, A&A, 532, A103
- [6] Sarro, L. M., Bouy H., Berihuete, A. et al. 2014, A&A, 563, A45