

Stellar Paternity Tests: Matching High-Latitude B Stars to the Open Clusters of their Birth

Speaker: Brandon Schweers

bks224@lehigh.edu

In collaboration with Dr. M. Virginia McSwain
Lehigh University

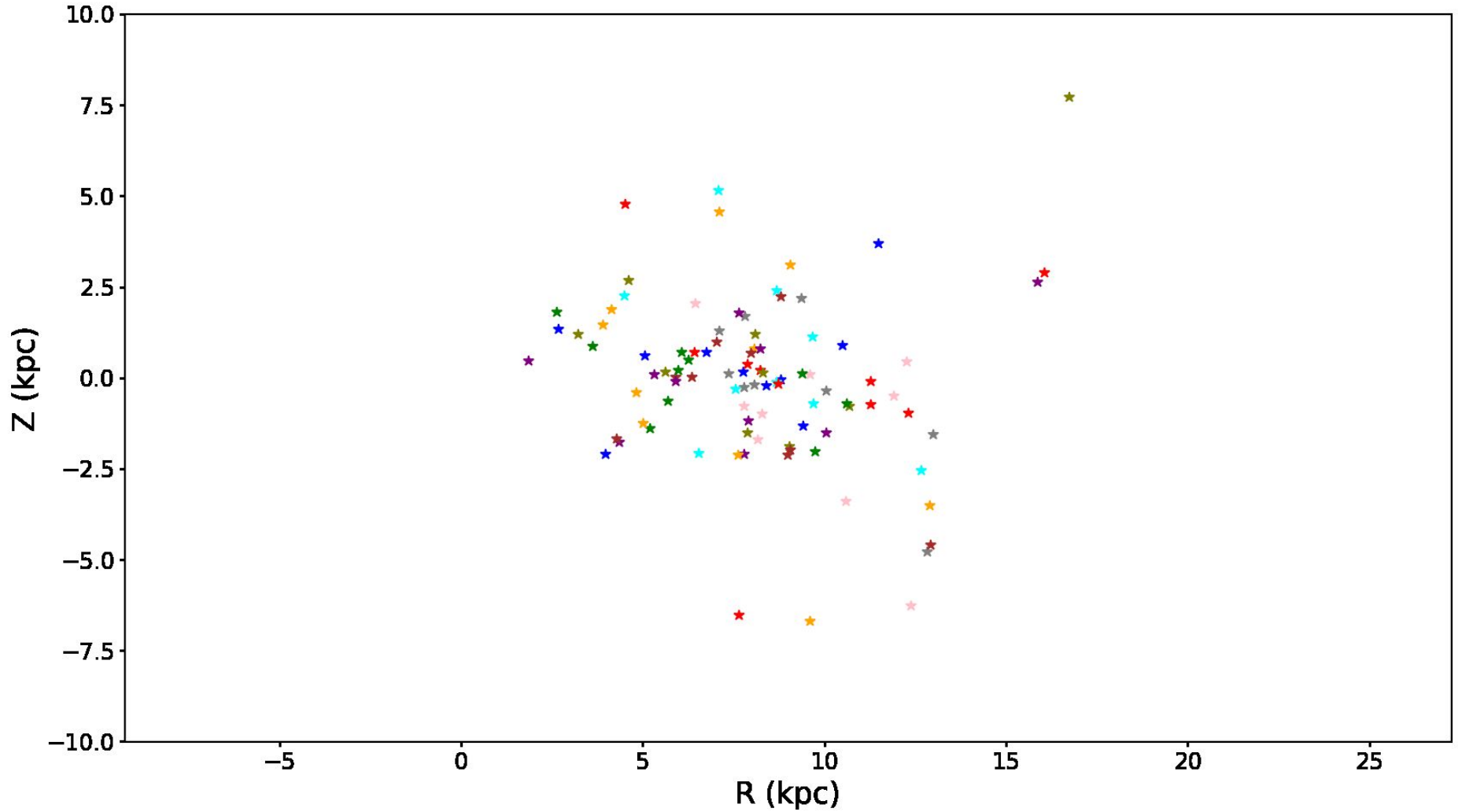
Introduction

- Star formation primarily occurs in the thin disk
- Most stars found at high altitudes are older, Pop II
- Young, B-type stars in our study have wandered far from their birth clusters
- Our objective is to identify the parent cluster for each of these orphan stars

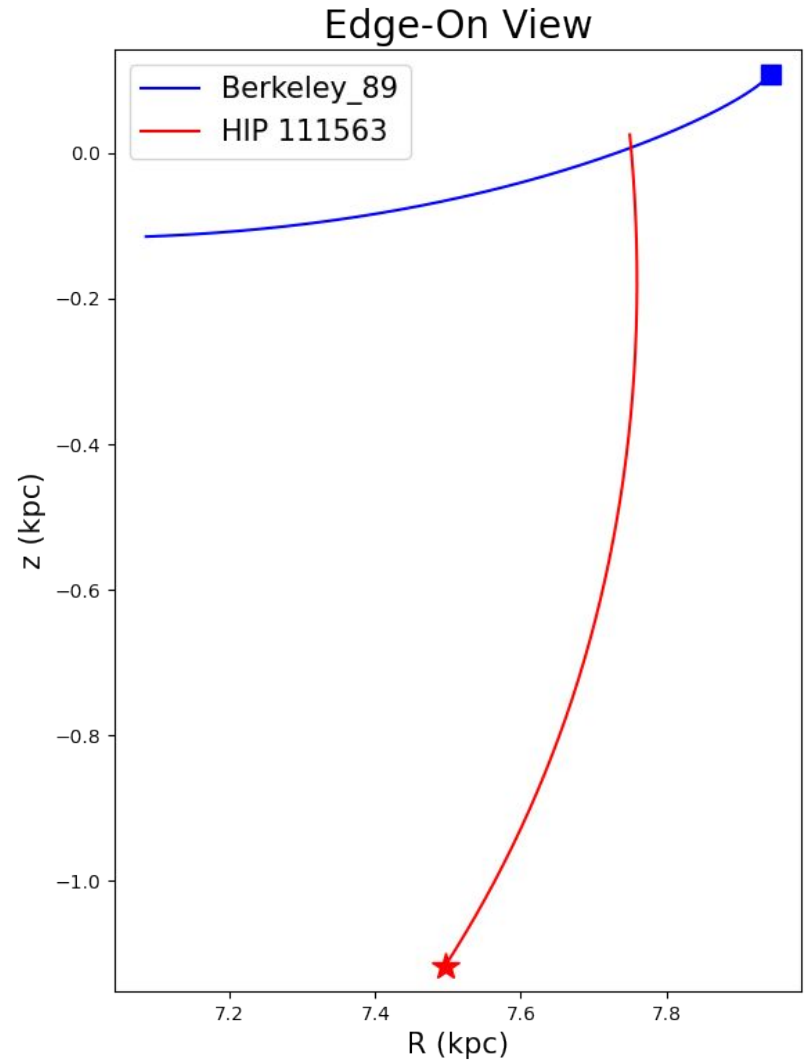
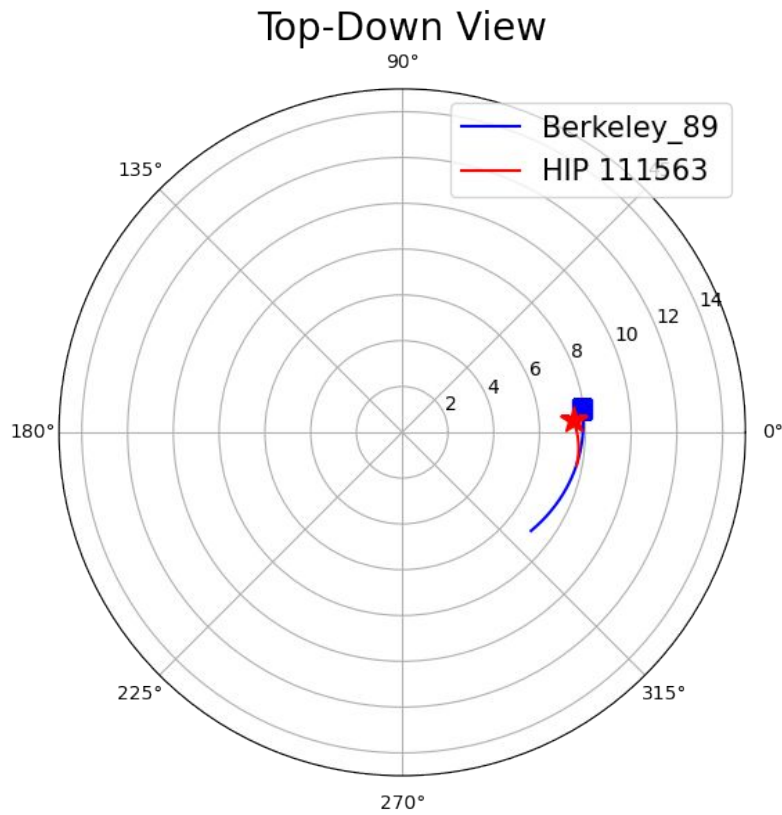


Image: iStock

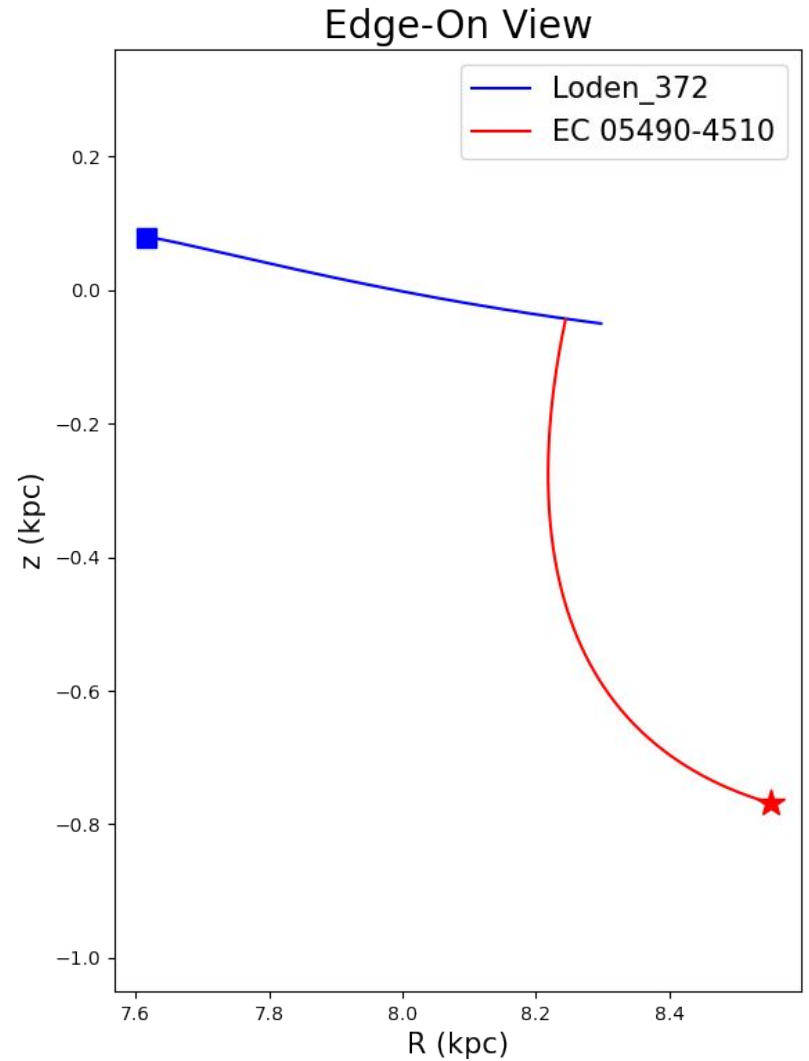
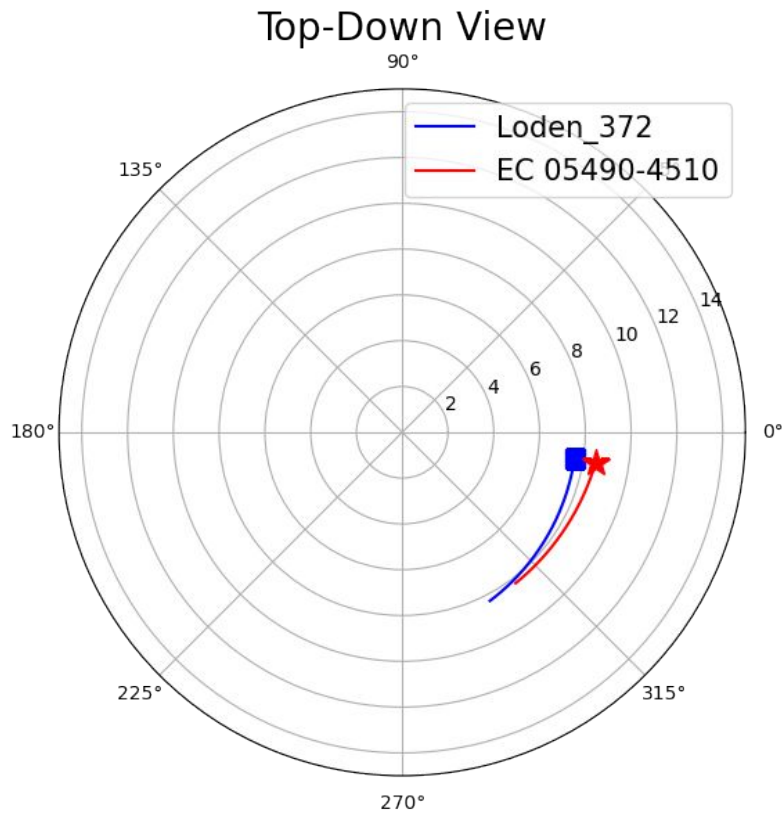
Stellar Trajectories



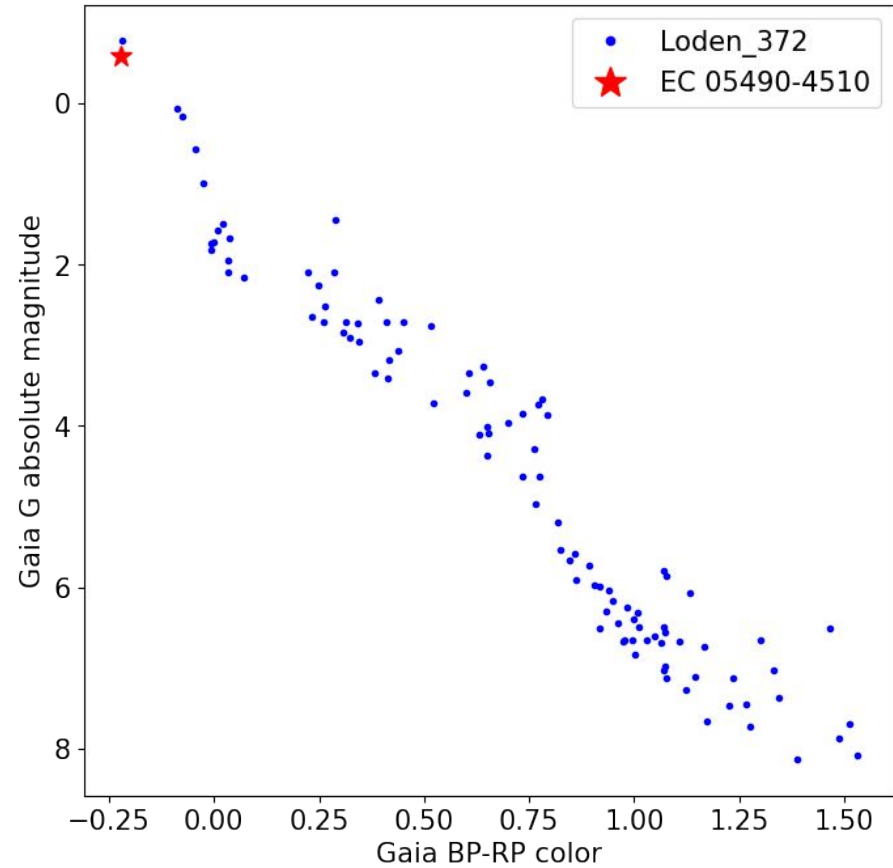
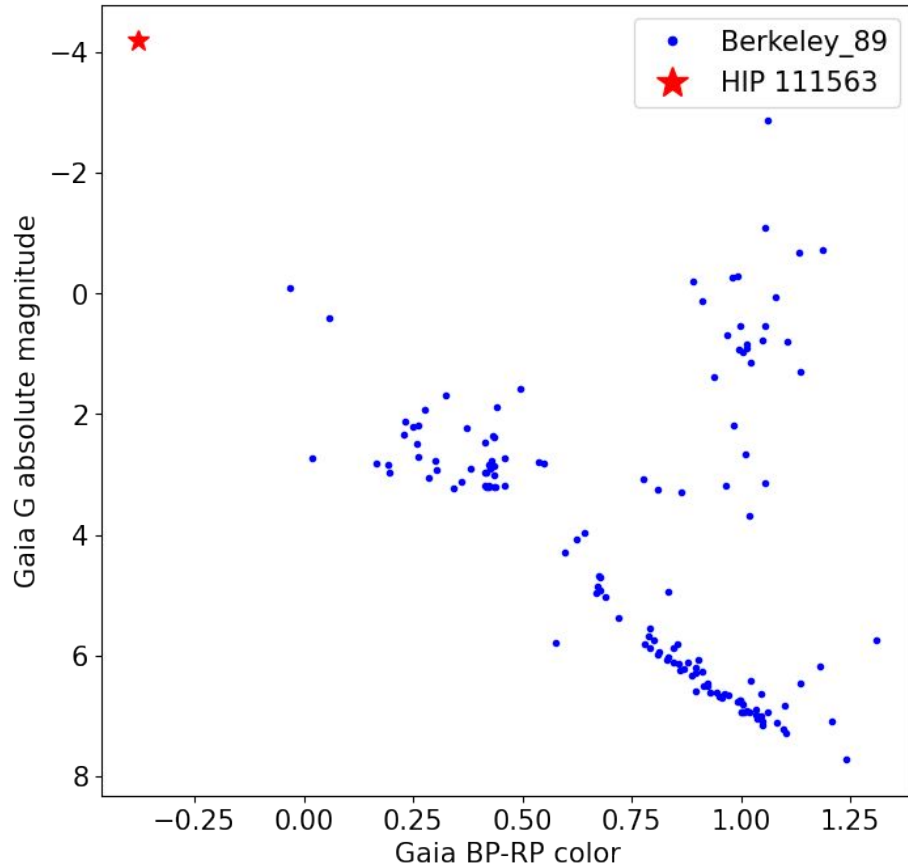
Intersecting Trajectories



Intersecting Trajectories



Color-Magnitude Test



Cluster Density Analysis



Stock 8



NGC 3293

High-Latitude Star	Open Cluster	Ejection Time (Myr)	Closest Separation (pc)	Ejection Velocity (km/s)	Ejection Mechanism
BD +36 2242	Alessi 9	-30.00	83.74	59.0	Dynamical Interaction
EC 03462-5813	NGC 5381	-11.85	9.43	94.3	Dynamical Interaction
EC 05490-4510	Loden 372	-25.56	29.75	52.5	Dynamical Interaction
EC 10087-1411	BH 140	-28.97	39.54	66.8	Dynamical Interaction
EC 19337-6743	NGC 6192	-20.29	63.35	28.1	Dynamical Interaction
EC 20089-5659	Mamajek 4	-30.00	52.09	50.9	Dynamical Interaction
EC 20104-2944	Koposov 53	-26.96	39.85	158.3	Dynamical Interaction
HIP 109051	IC 4725	-23.33	33.32	125.2	Dynamical Interaction
HIP 115347	FSR 0686	-24.89	66.66	62.0	Dynamical Interaction
HIP 115729	IC 2602	-23.49	51.04	68.0	Dynamical Interaction
HIP 1241	Alessi 31	-30.00	38.86	39.5	Dynamical Interaction
HIP 16130	NGC 2455	-30.00	94.29	48.7	Dynamical Interaction
HIP 37903	King 14	-16.82	38.22	133.9	Dynamical Interaction
HIP 55051	FSR 1315	-5.54	93.01	218.3	Supernova Ejection
PHL 159	NGC 457	-17.25	14.63	132.3	Dynamical Interaction

Conclusions

- We found 15 stars that appear to have been ejected from open clusters in the thin disk
- Dynamical interactions eject stars more frequently than supernovae
- Not all orphan stars matched with a parent cluster
- Could be evidence for star formation at high galactic latitudes

References

- Bovy, J. 2015, ApJS, 216, 29, doi: 10.1088/0067-0049/216/2/29
- Cantat-Gaudin, T., Jordi, C., Vallenari, A., et al. 2018, A&A, 618, A93, doi: 10.1051/0004-6361/201833476
- Gaia Collaboration, Prusti, T., de Bruijne, J. H. J., et al. 2016, A&A, 595, A1, doi: 10.1051/0004-6361/201629272
- Gaia Collaboration, Vallenari, A., Brown, A. G. A., et al. 2023, A&A, 674, A1, doi: 10.1051/0004-6361/202243940
- King, I. 1962, AJ, 67, 471, doi: 10.1086/108756
- Perets, H. B., & Subr, L. 2012, ApJ, 751, 133, doi: 10.1088/0004-637X/751/2/133
- Portegies Zwart, S. F. 2000, ApJ, 544, 437, doi: 10.1086/317190
- Silva, M. D. V., & Napiwotzki, R. 2011, MNRAS, 411, 2596, doi: 10.1111/j.1365-2966.2010.17864.x