The Age of the Carina Young Association and Potential Membership of HD 95086

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Carina Young Association

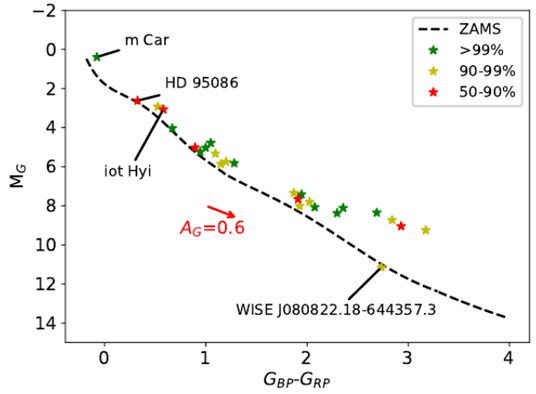
Hipparcos led to the discovery of a multitude of nearby young associations. Torres et al. (2001) identified the Great Austral Young Association. Torres et al. (2008) split this into Tucana-Horologium, Columba and Carina. Carina has smallest number of members, and its membership keeps being revised.

Making use of Gaia DR2 data (Gaia Collaboration 2018) and the BANYAN Sigma code (Gagné et al. 2018), we revisited the proposed members from the literature and determined a revised membership list, shown below. This also includes HD 95086 – a star that has not previously been considered as a Carina member. For more on this star, see the right column.

Name	*Gaia* DR2 ID	v_r km, s^{-1}	v_r source	Prob. (%)
HD 49855	5265670762922792960	20.48±0.27	(Gaia Collaboration et al. 2018)	100.0
UCAC3 53-40215	5297100607744079872	21.17±0.41	(Schneider et al. 2019)	100.0
2MASS J08040534-6316396	5277462269217606400	22.0±0.85	(Schneider et al. 2019)	100.0
2MASS J09315840-6209258	5250988846733325312	19.21±1.24	(Schneider et al. 2019)	99.9
HD 42270	4621305817457618176	16.7±0.6	(Torres et al. 2006)	99.9
2MASS J08063608-7444249	5213934514587912320	17.0±1.04	(Gaia Collaboration et al. 2018)	99.7
HD 37402	4759444786175885824	23.7±0.5	(Gontcharov 2006)	99.7
HD 298936	5356713413789909632	18.4±0.44	(Gaia Collaboration et al. 2018)	99.6
m Car	5251098523021221376	20.0±4.0	(Gontcharov 2006)	99.6
2MASS J06262199-7516404	5261554496328279552	16.45±2.18	(Gaia Collaboration et al. 2018)	99.4
V479 Car	5299141546145254528	19.26±0.92	(Gaia Collaboration et al. 2018)	99.3
HD 44627	5495052596695570816	21.86±0.37	(Gaia Collaboration et al. 2018)	98.9
HD 55279	5208216951043609216	16.44±0.45	(Gaia Collaboration et al. 2018)	98.7
AL 442	5266182443853174784	20.96±1.15	(Schneider et al. 2019)	97.7
2MASS J07441105-6458052	5287415735666649728	19.9±2.7	(Gaia Collaboration et al. 2018)	96.9
2MASS J09180165-5452332	5310606287025187456	25.43±3.12	(Schneider et al. 2019)	96.9
2MASS J07065772-5353463	5491506843495850240	22.57±0.9	(Schneider et al. 2019)	96.2
WISE J080822.18-644357.3	5277096097486882560	22.7±0.5	(Murphy et al. 2018)	95.1
2MASS J07013884-6236059	5286760525517037568	22.57±0.72	(Schneider et al. 2019)	94.6
TYC 8602-718-1	5308164516541067648	22.65±1.4	(Gaia Collaboration et al. 2018)	94.4
HD 83096	5217846851839896704	22.44±0.78	(Gaia Collaboration et al. 2018)	93.6
iot Hyi	4626843786944938880	14.6±0.21	(Gaia Collaboration et al. 2018)	89.6
2MASS J04082685-7844471	4625883599760005760	14.25±0.86	(Gaia Collaboration et al. 2018)	86.3
2MASS J08194309-7401232	5219983787046519168	26.24±1.54	(Schneider et al. 2019)	82.7
HD 95086	5231963962676292224	17.0±2.0	(Moór et al. 2013b)	70.8
TYC 9200-446-1	5219351911459314048	18.01±1.48	(Gaia Collaboration et al. 2018)	57.5

Age of Carina

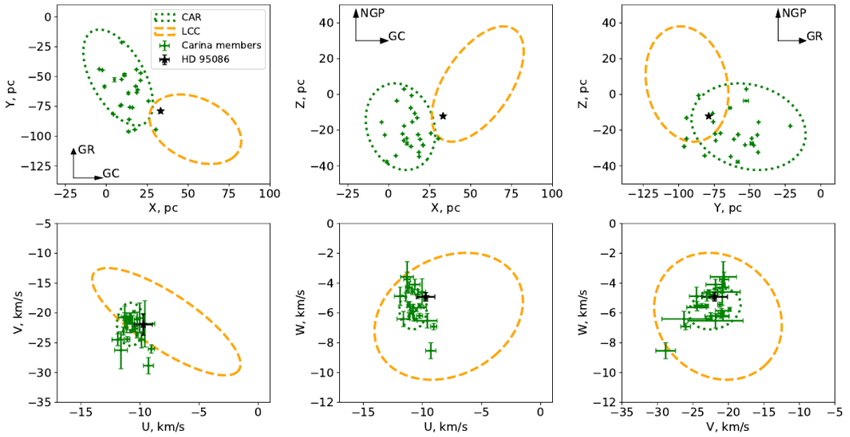
Bell et al. (2015) use isochrone fitting to determine an age for Carina of 45±7 Myr. Their membership list is quite different to ours and the new data from Gaia DR2 may lead to improved ages for individual stars prompting us to re-evaluate the age of the association. The colour-magnitude diagram for our membership list is shown below. It has already been noted by Schneider et al. (2019) that the position of the M stars above the zero-age main sequence (ZAMS) indicates a younger age than previously estimated. Using the Bayesian approach described in del Burgo & Allende Prieto (2018) we infer an age for the association of 13±1 Myr based on the most-likely members (>99% probability).



HD 95086

HD 95086 is an A8 star that is known to host a planet discovered through direct imaging. It also hosts a massive debris disc. Booth et al. (2019) also reported a tentative detection of CO gas in the disc consistent with that expected from collisional models. The radial velocity of this gas signature was also consistent with the radial velocity of the star as given by Madsen et al. (2002). However it was inconsistent with that given by Móor et al. (2013).

The Madsen et al. (2002) radial velocity is a predicted velocity based on the assumption that the star is a member of LCC. We find that, based on the latest data, it is more likely to be a member of Carina (demonstrated by the close match in the velocities shown in the plot below) and the spectroscopic radial velocity from Móor et al. (2013) is consistent with this, ruling out the CO detection We also infer an age for HD 95086 of 15±4 Myr. This is consistent with previous estimates of the age and so does not affect the mass of the planet.



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