Parallax Observations of Local Supergiants

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Currently, ~95% of parallaxes are from HIP and Yale catalogs.

- **GAIA**
- **LSST**
- **Pan-STARR**
- **SkyMapper**

Are there any parallax targets left for SIM?

Yes, stars with \( V < 6.0 \)
This research will focus on local supergiants.
Betelgeous
M2, Iab, 6.56±0.83mas

Mintaka
O9.5, Iab, 4.72±0.58mas

Alnilam
B0, Iab, 1.65±0.44mas

Alnitak
O9.5, Ia, 4.44±0.52mas

Antares, M1.5, Iab, 5.90±1.0mas
Arneb, F0, Ia, 1.47±0.15 mas
Deneb, A2, Ia, 2.29±0.32 mas
Wezen, F8, Ia, 2.02±0.38 mas

van Leeuwen (2007)
V<6
I or I/II
10% + errors

van Leeuwen (2007)
Betelgeous
M2, Ia, 6.56±0.83mas

VLA, 5.07±1.1mas (Harper et al 2008)

Alnilam
B0, Ia, 1.65±0.44mas

Mintaka
O9.5, Ia, 4.72±0.58mas

Alnitak
O9.5, Ia, 4.44±0.52mas

M42, VLBA, 2.42±0.04 mas
Menten et al (2007)

van Leeuwen (2007)
Supergiant’s Science

1. Pinpoint their absolute $M$ on HR diagram

2. Wind-Luminosity Relation (WLR, Kudritzki et al 1999)

\[ \dot{M} v \propto L^{\alpha} \]

13/14 stars have no distances, using memberships and associations instead.


\[ M_{bol} \propto \log \left( \frac{g}{T_{eff}^4} \right) \]

Late B and early A type supergiants in NGC300 and NGC 3621

One of the best public reach program
To do list

Generate master supergiant targets for SIM

• all basic stellar information (coordinates, \( \mu \), metallicity, parallaxes)

• check binarity

• check known supergiant’s radii measured from the ground because nearby cool supergiants may over resolved by SIM or use CHARA to resolve few nearby supergiants