Parallax Observations of Local Supergiants

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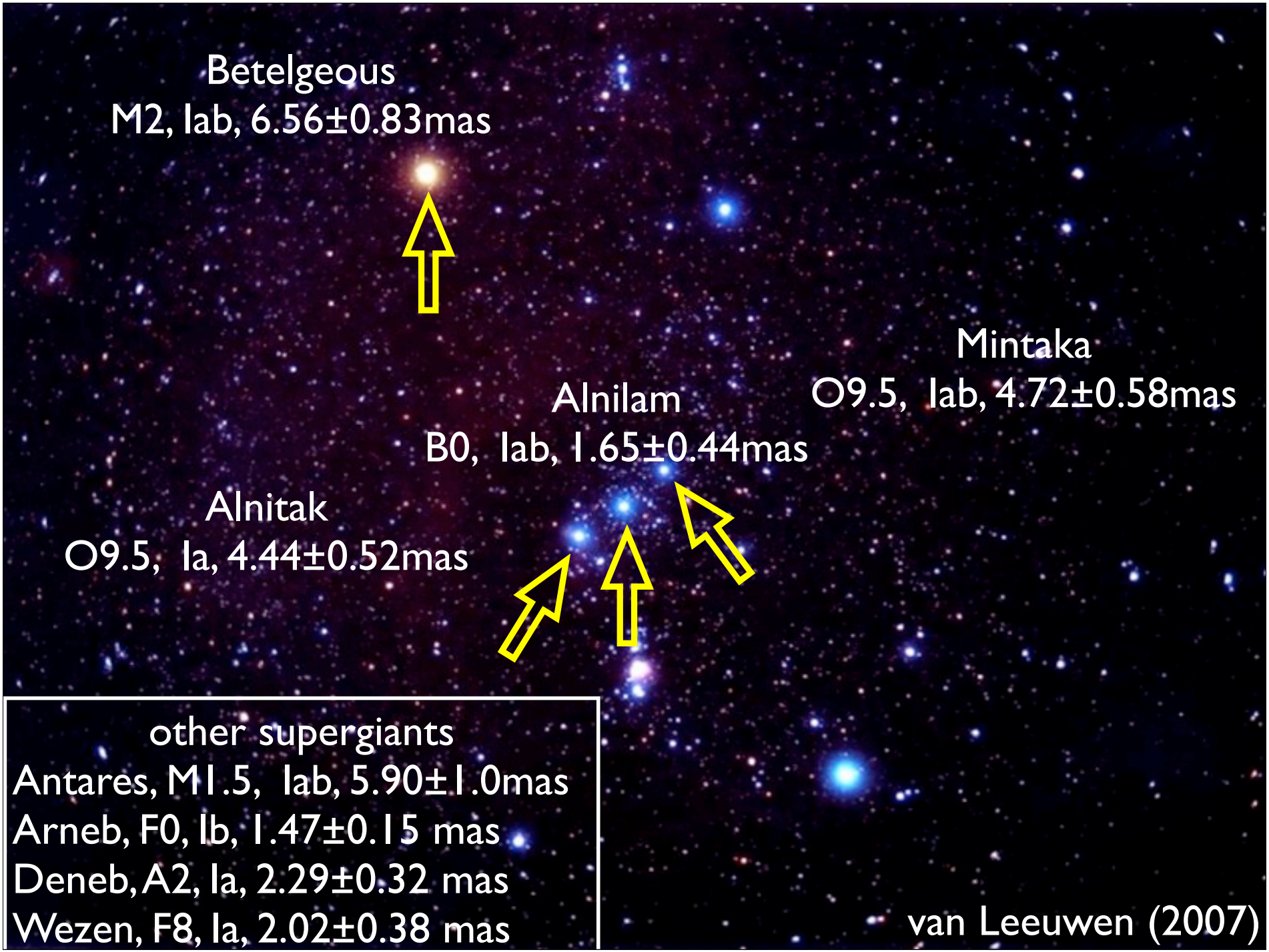
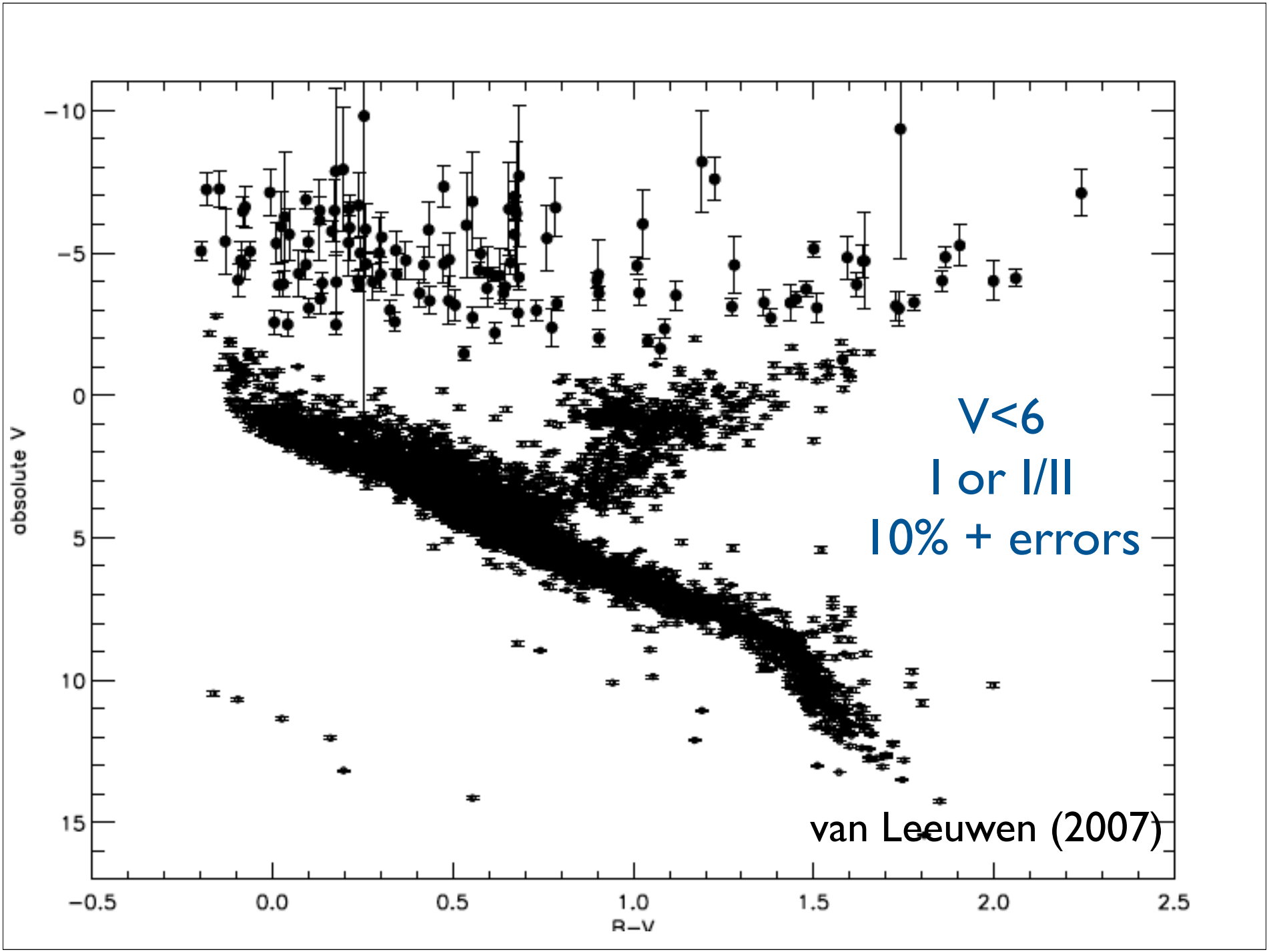
Currently, ~95% of parallaxes are from HIP and Yale catalogs.

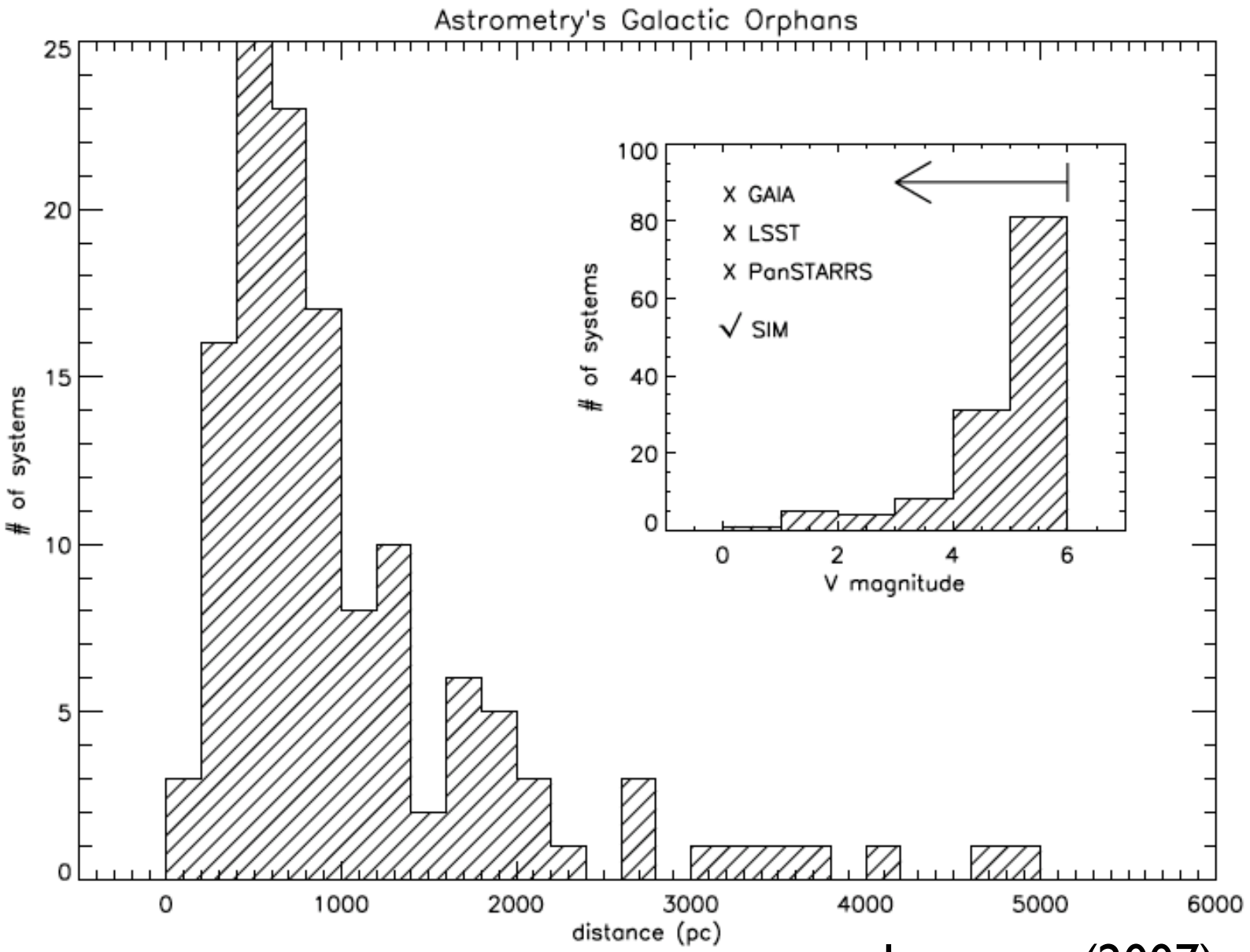
GAIA
LSST
Pan-STARR
SkyMapper

Are there any parallax targets left for SIM?

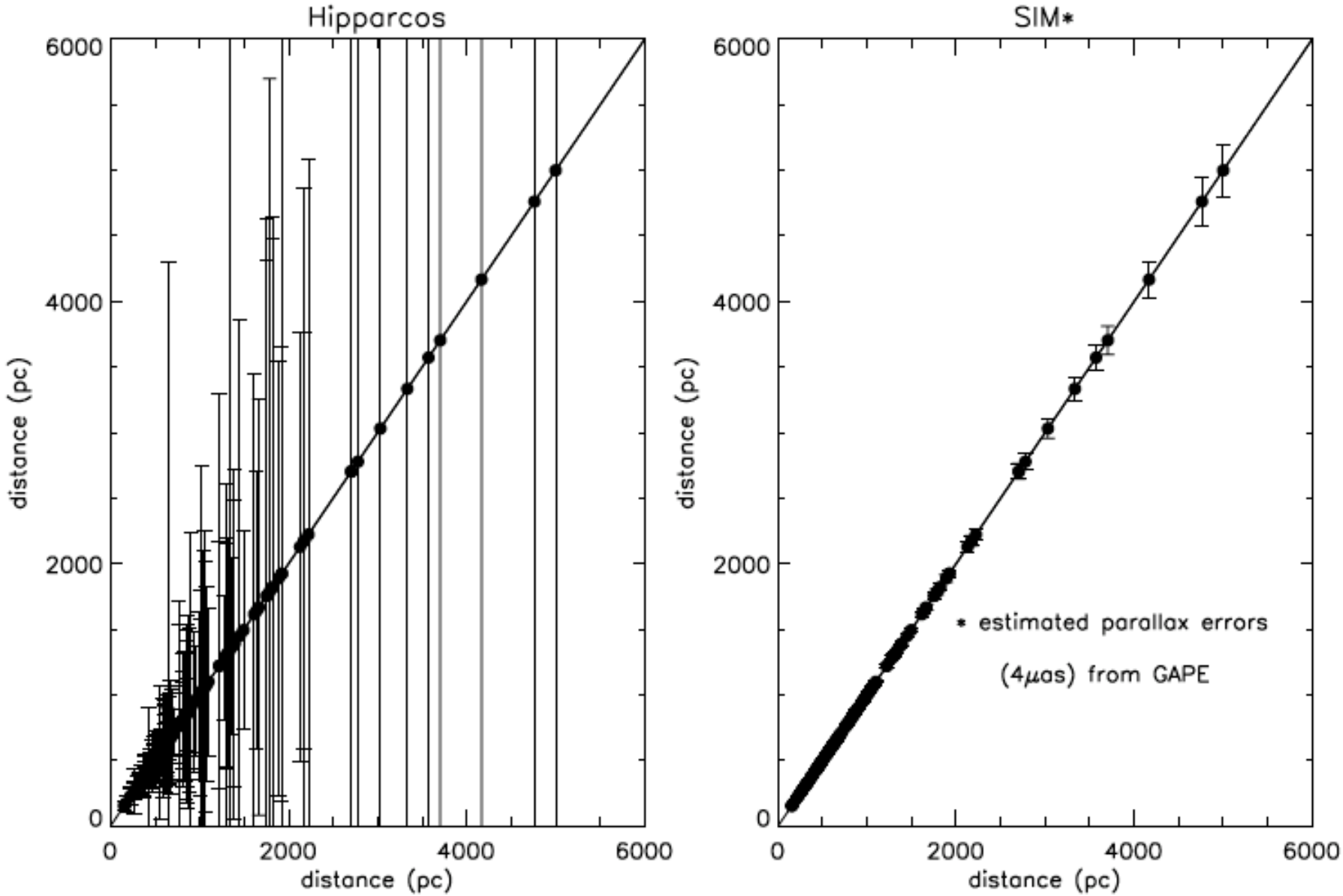
Yes, stars with V < 6.0
This research will focus on local supergiants.

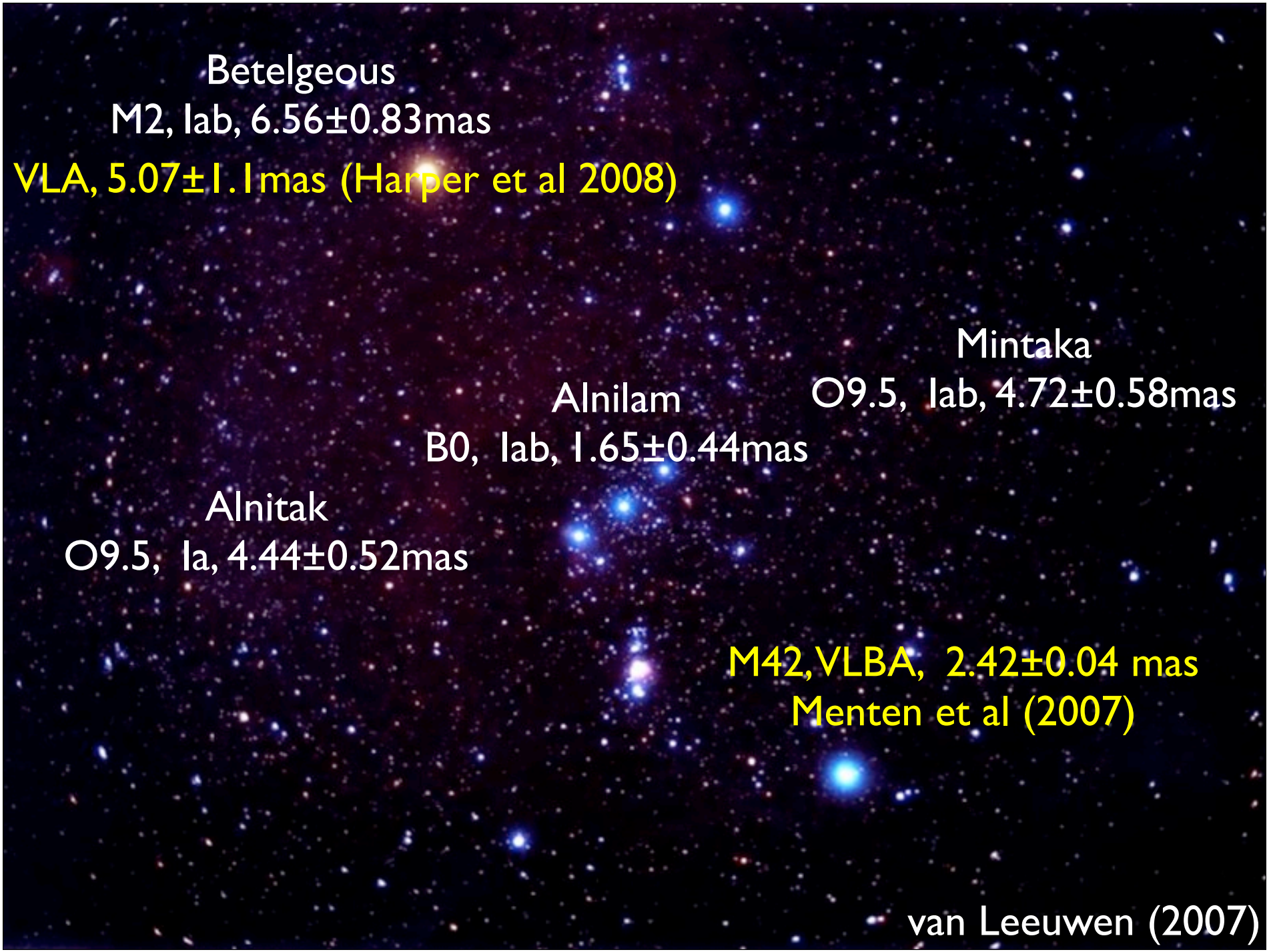

Betelgeous
M2, Iab, 6.56±0.83mas
Mintaka
O9.5, Iab, 4.72±0.58mas
Alnilam
B0, Iab, 1.65±0.44mas
Alnitak
O9.5, Ia, 4.44±0.52mas
other supergiants
Antares, M1.5, Iab, 5.90±1.0mas
Arneb, F0, Ib, 1.47±0.15 mas
Deneb, A2, Ia, 2.29±0.32 mas
Wezen, F8, Ia, 2.02±0.38 mas
van Leeuwen (2007)


V<6
I or I/II
10% + errors
van Leeuwen (2007)
absolute V
B−V
−10
−5
0
5
10
15
−0.5
0.0
0.5
1.0
1.5
2.0
2.5



van Leeuwen (2007)


Hipparcos
SIM*
distance (pc)
0
2000
4000
6000
* estimated parallax errors
(4μas) from GAPE


Betelgeous
M2, Iab, 6.56±0.83mas
VLA, 5.07±1.1mas (Harper et al 2008)
Mintaka
O9.5, Iab, 4.72±0.58mas
Alnilam
B0, Iab, 1.65±0.44mas
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)

$$\dot{M}v \propto L^{\alpha}$$

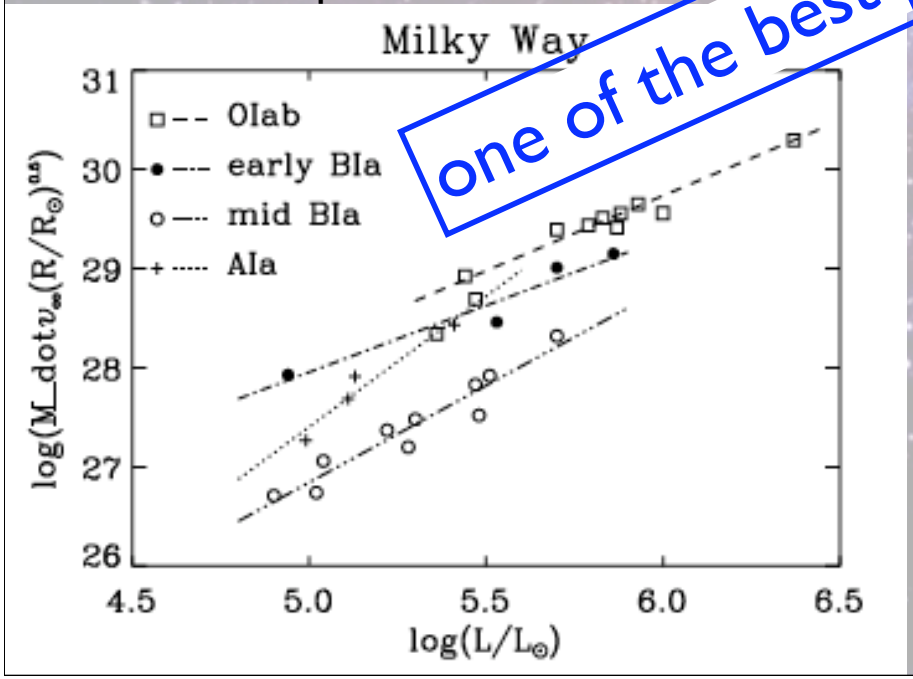
13/14 stars have no distances, using memberships and associations inste

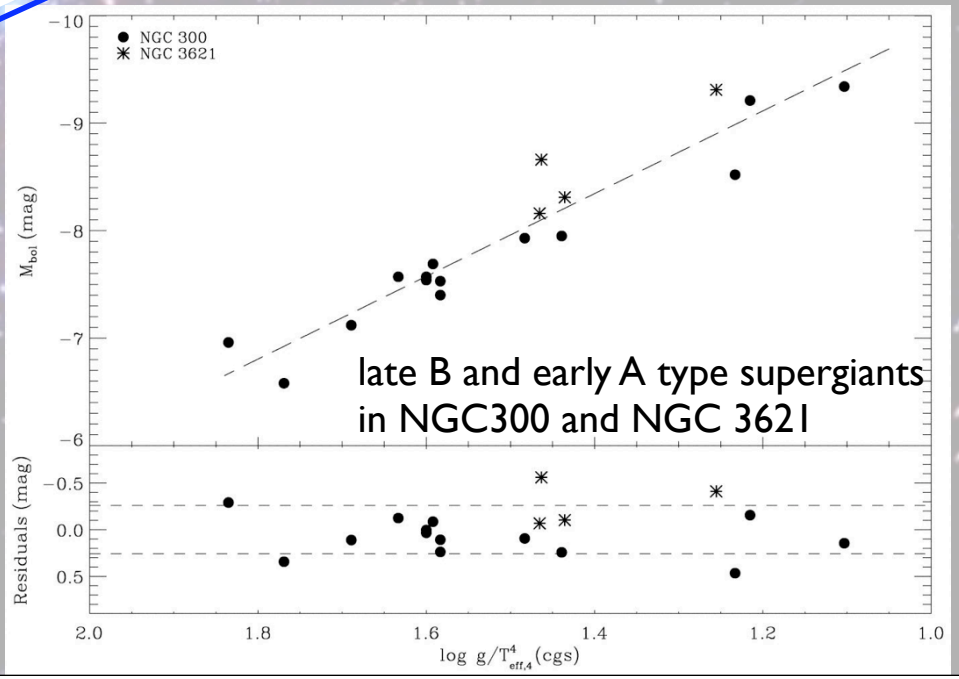
3. flux-weighted gravity-luminosity relation (FGLR, Kud zki et al 2003)

$$M \propto \log(g/T_{eff}^4)$$

ragalactic Distance Determination Method

one of the best public reach program





To do list

Generate master supergiant targets for SIM

- all basic stellar information (coordinates, μ, 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