

Jeremy Jones, GSU

Russel White (adviser)

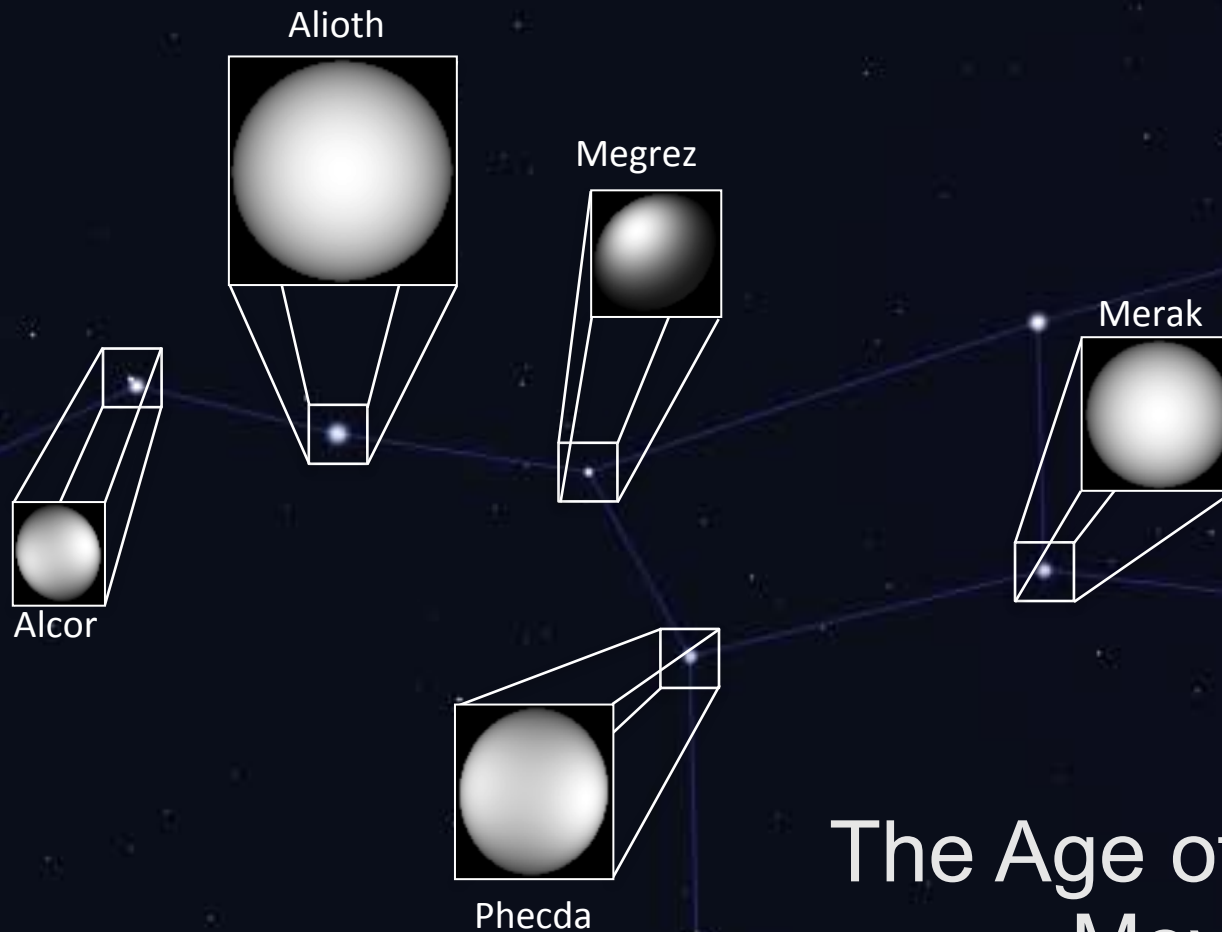
Tabetha Boyajian

Gail Schaefer

Ellyn Baines

Mike Ireland

The CHARA Team



The Age of the Ursa Major Moving Group



Year 11 CHARA Meeting, 3/18/15

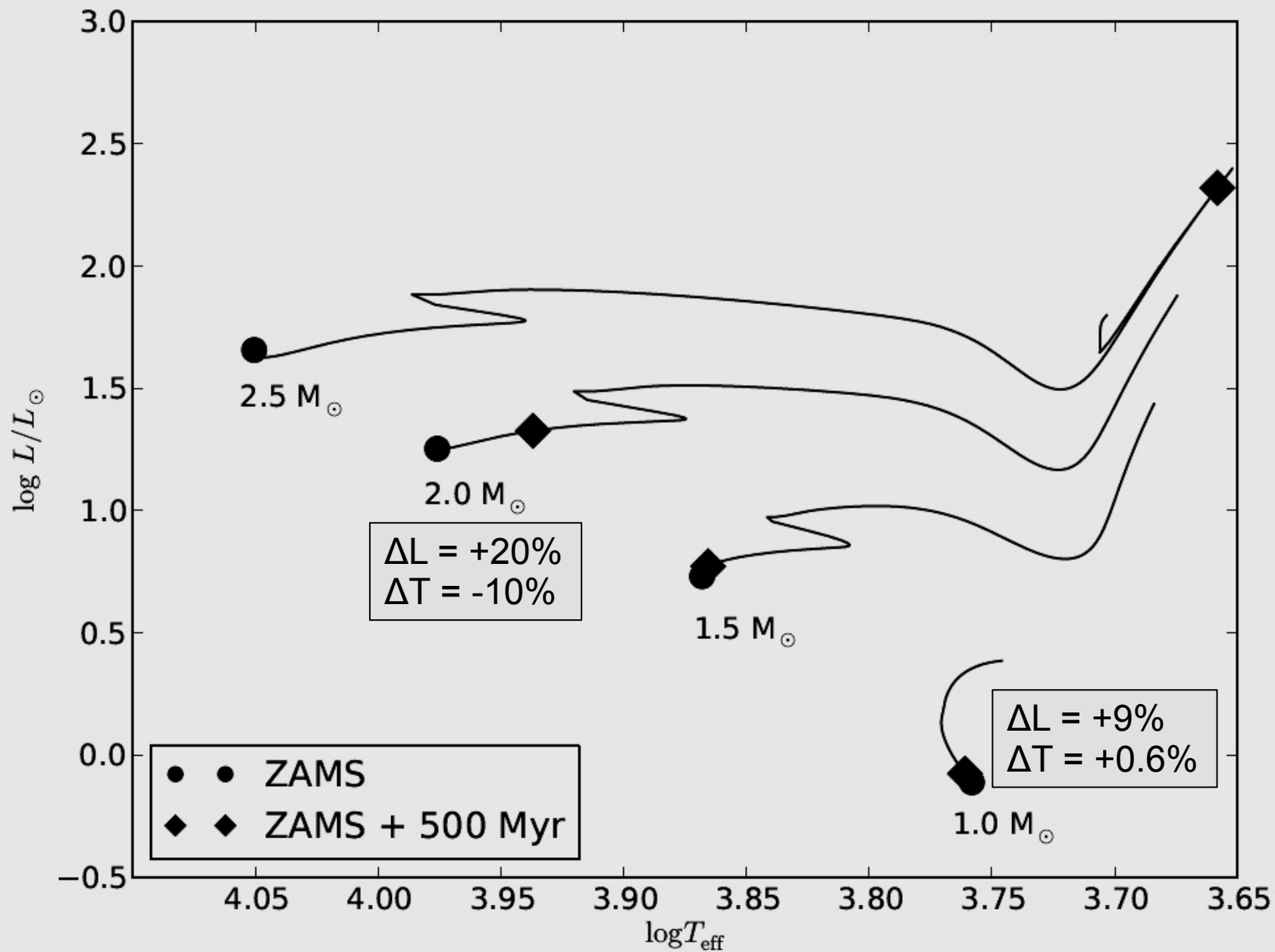
The Ursa Major Moving Group



Fun Facts:

- 25 parsecs away
- 62 Stars (15 in Nucleus, 47 in Stream)
- Age Estimates:
 - 200 Myr – König et al. (2002)
 - 300 Myr – Soderblom & Mayor (1993)
 - 500 Myr – King et al. (2003)
 - 600 Myr – King & Schuler (2005)
 - 496 ± 39 Myr – This Work

Why A-Stars?

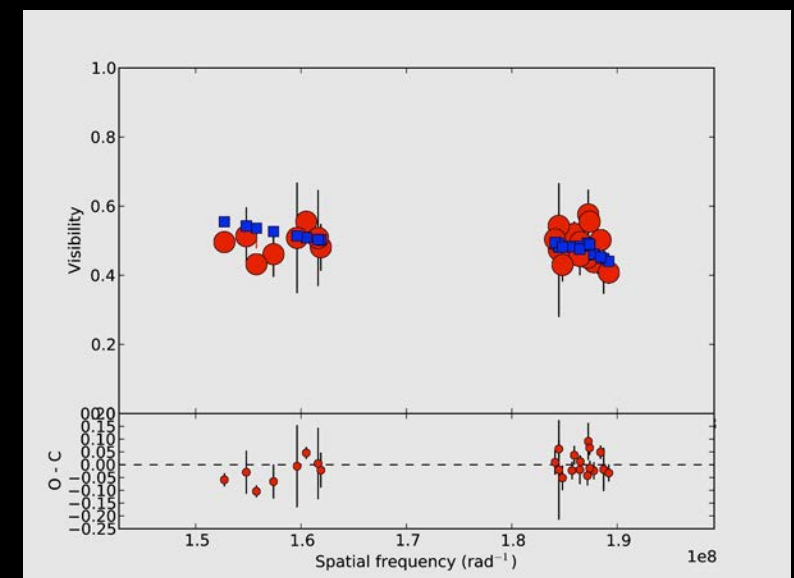
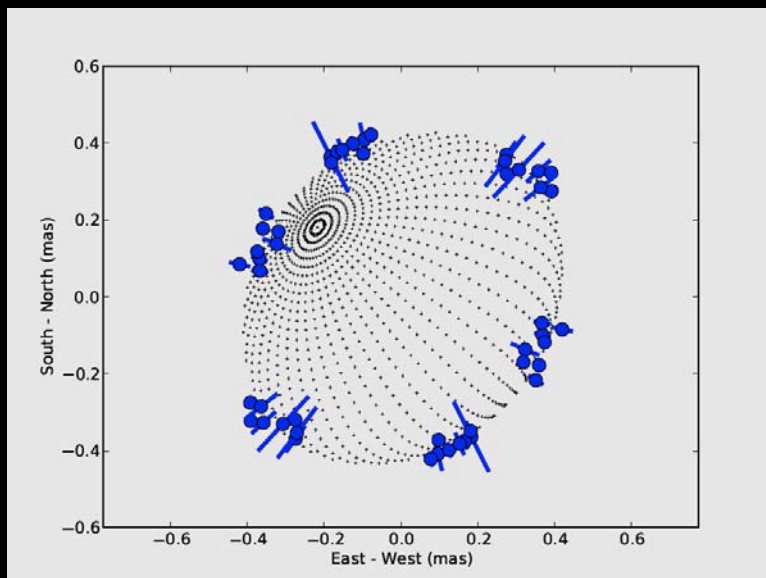
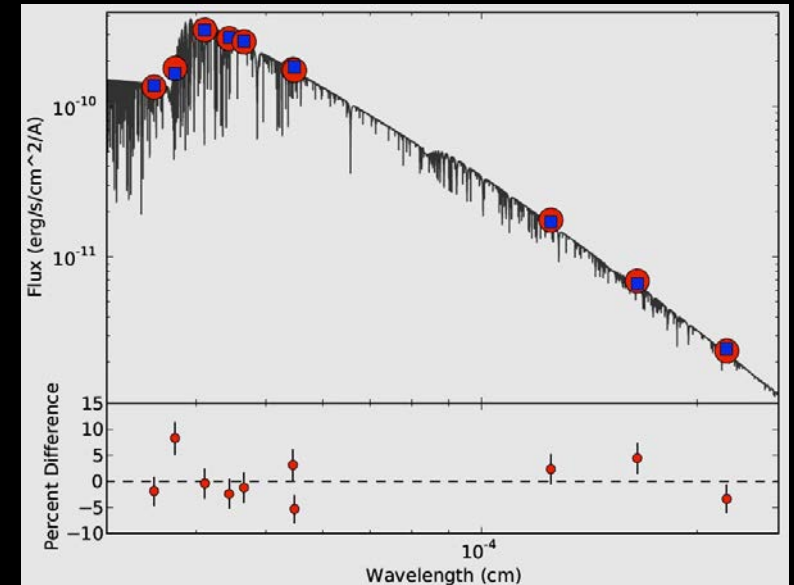


The CHARA Array

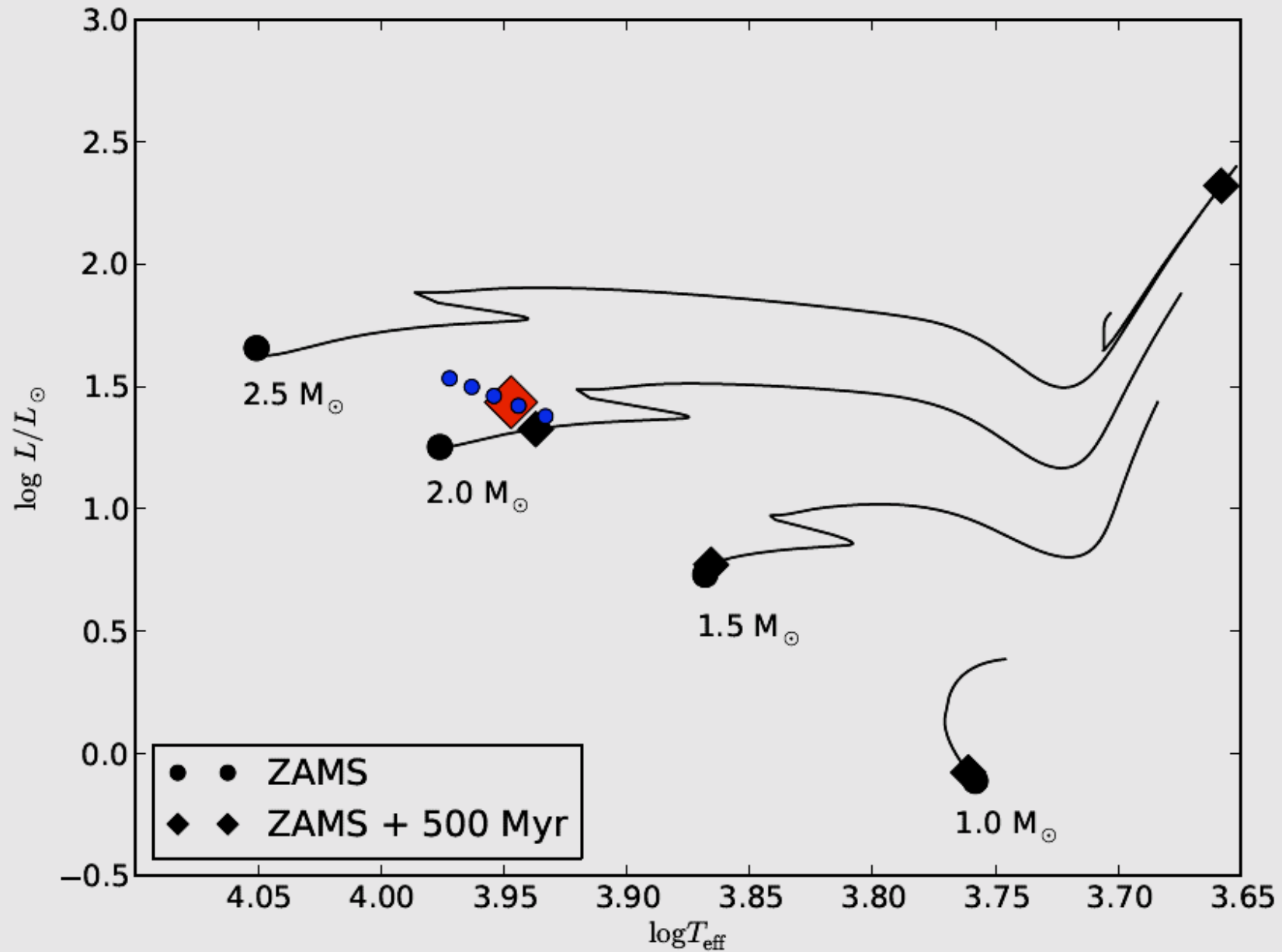


5-Parameter Rapid Rotator Model

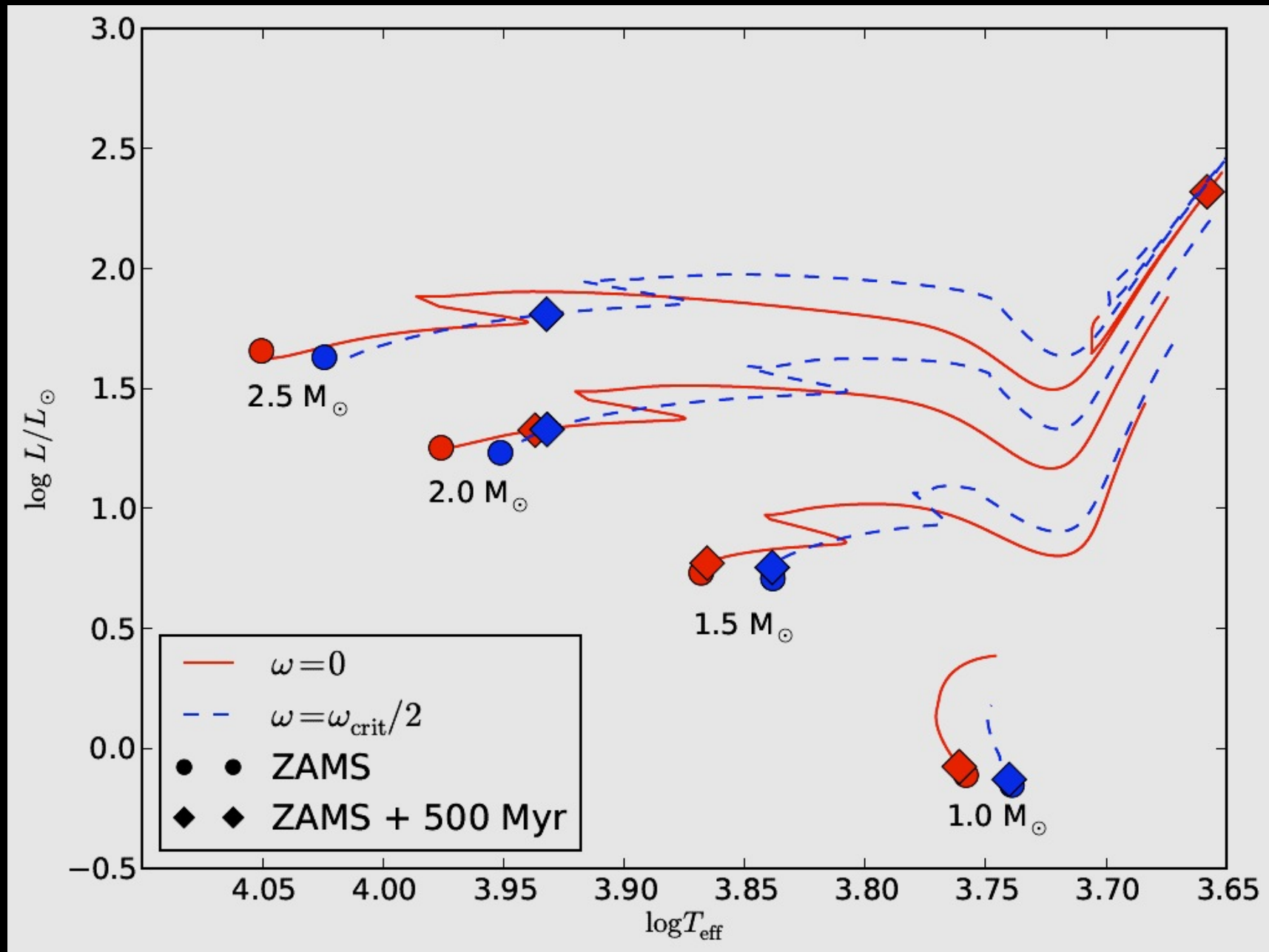
- Radius
- Rotation Velocity
- Inclination
- Temperature
- Position Angle



HRD Placement of Rapid Rotators

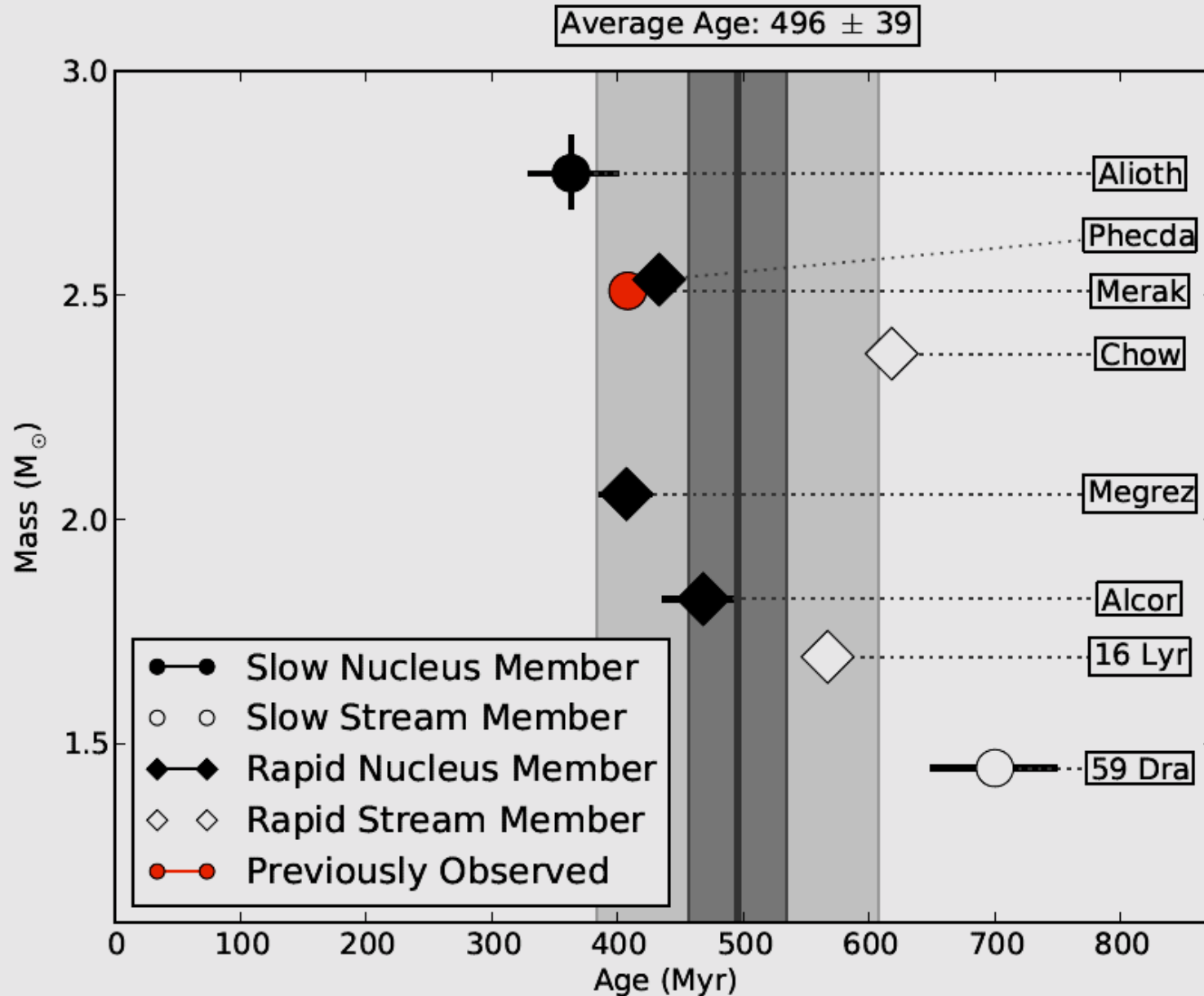


Evolution of Rapid Rotators



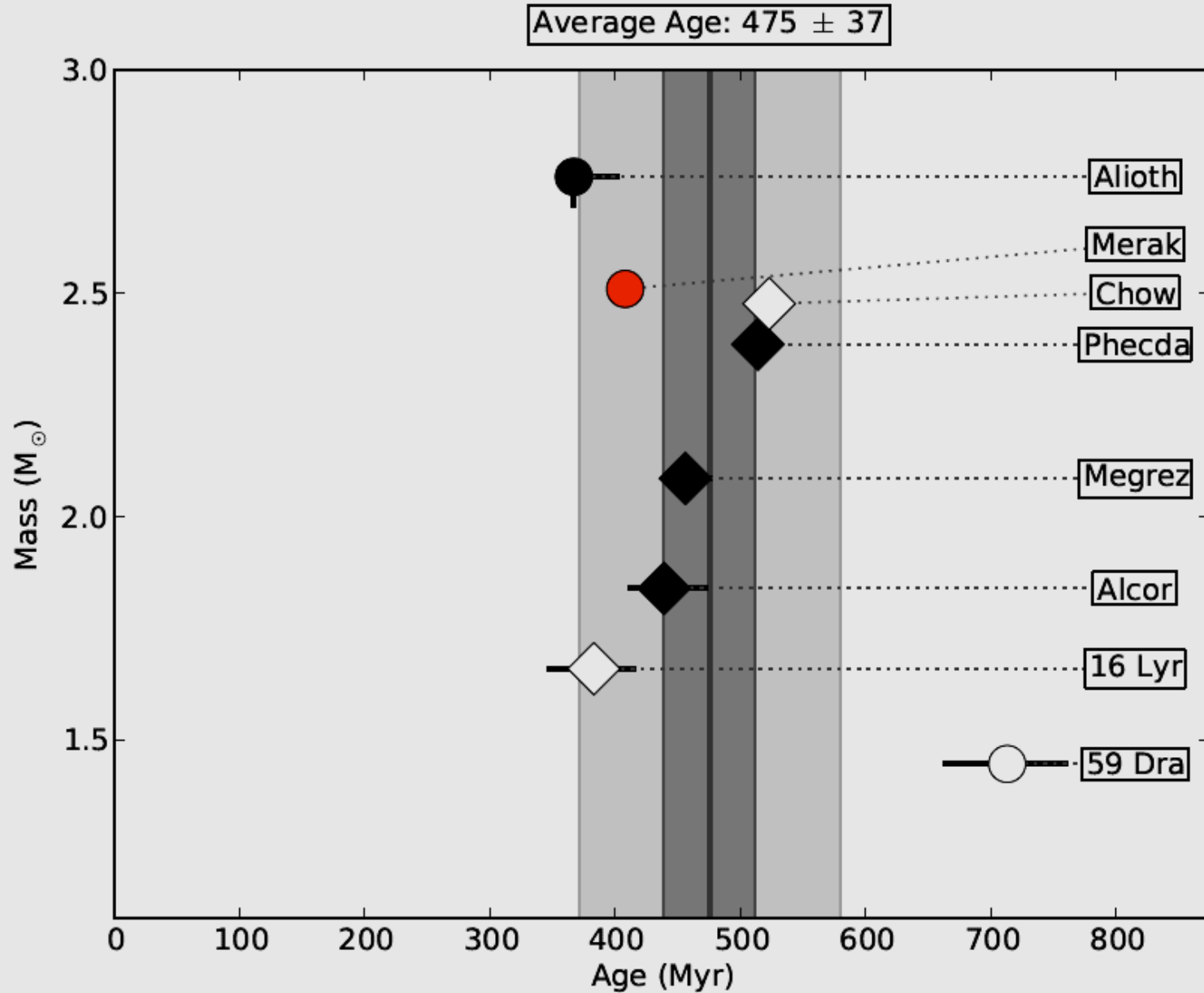
How Old is UMa?

(Gravity Darkening from Espinosa Lara & Rieutord (2011))

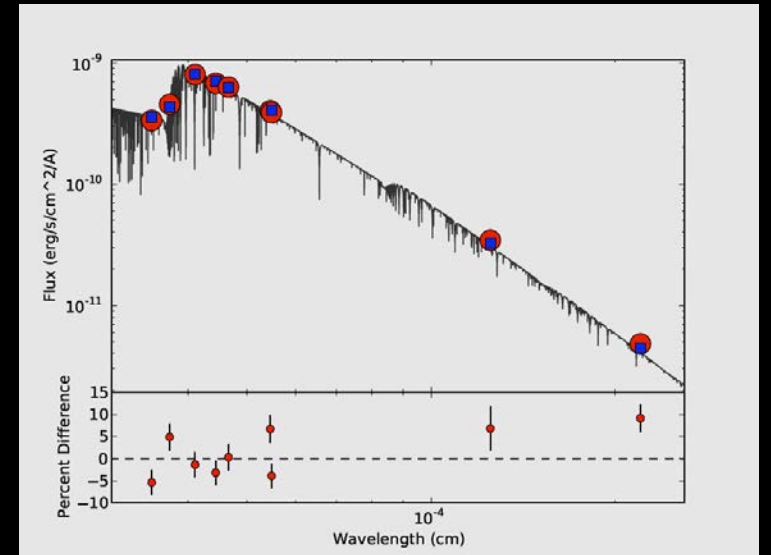
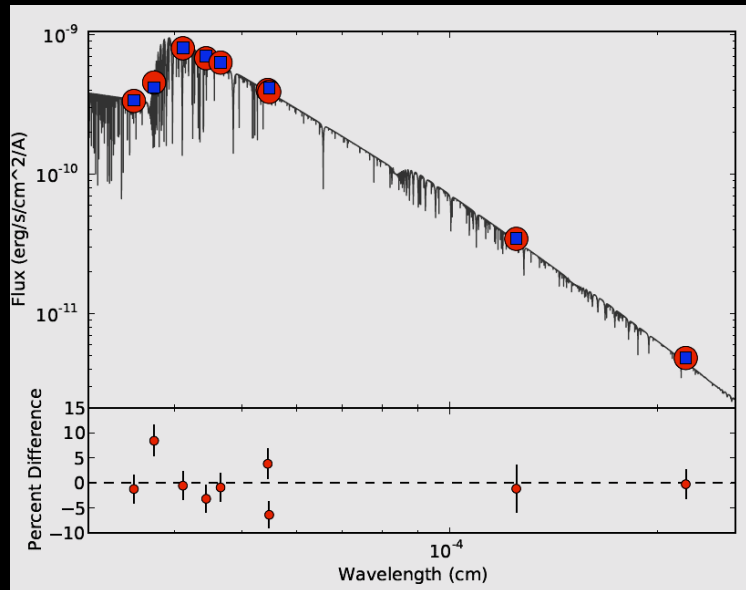
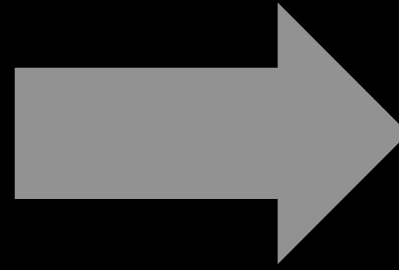
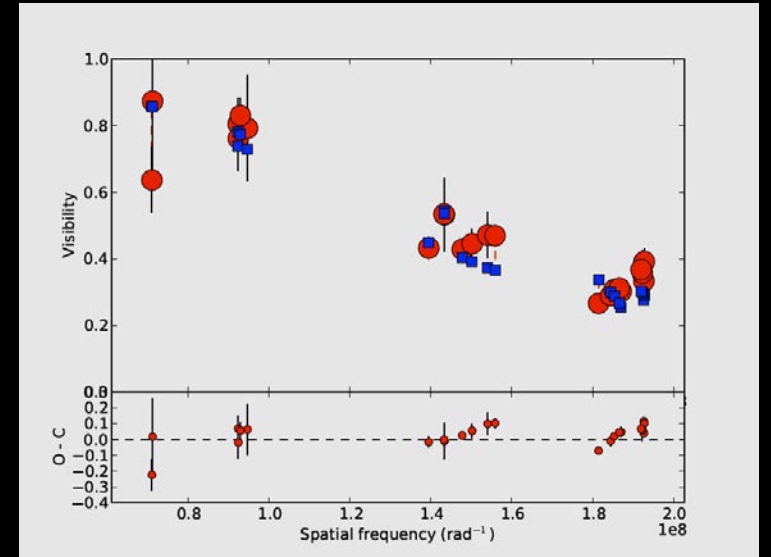
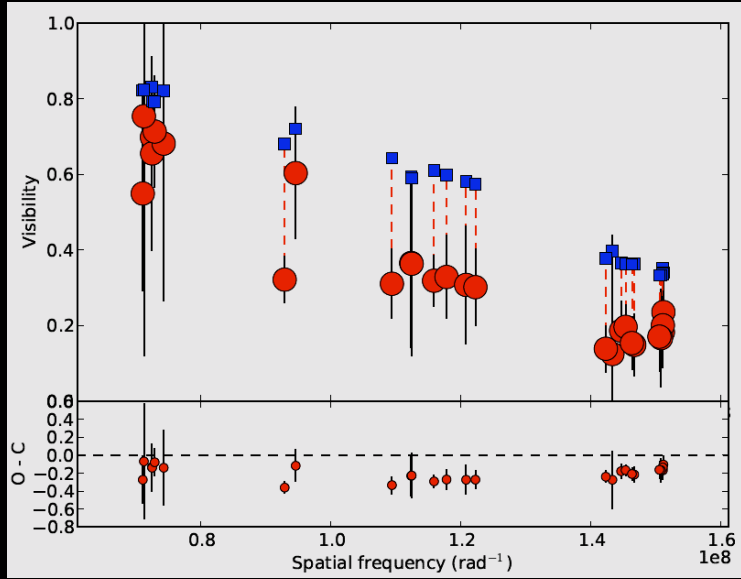


How Old is UMa?

(Gravity Darkening from von Zeipel (1924))



Phecda



Jeremy Jones, GSU

Russel White (adviser)

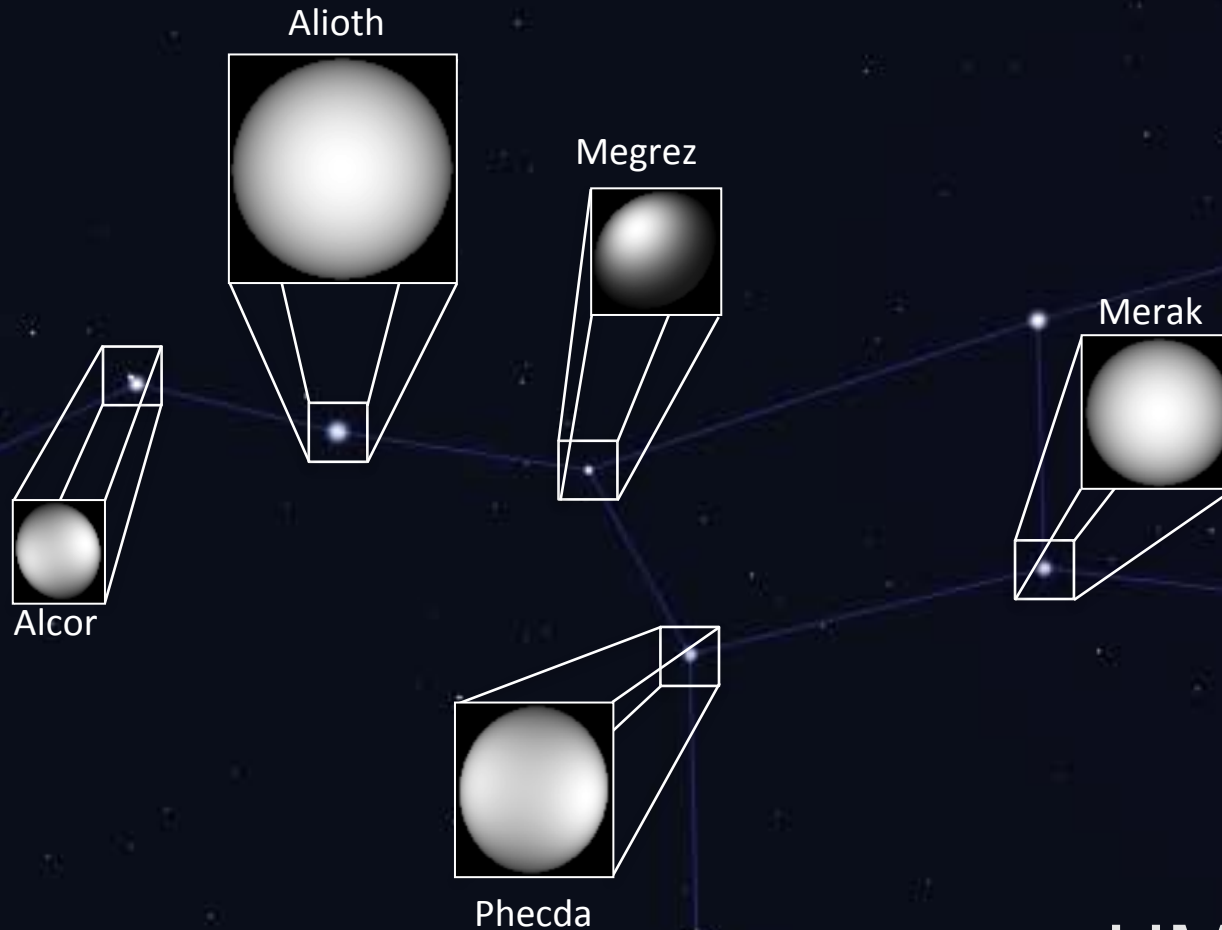
Tabetha Boyajian

Gail Schaefer

Ellyn Baines

Mike Ireland

The CHARA Team



UMa Summary

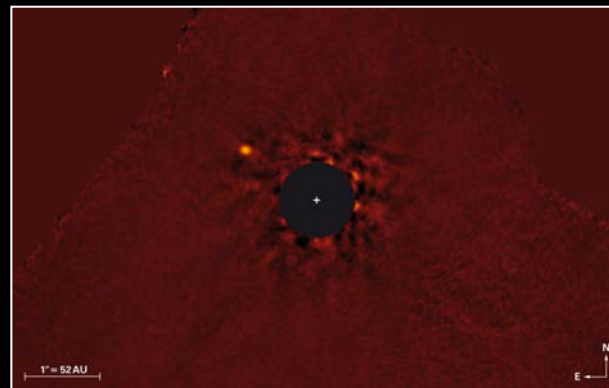
- New Technique Works
- Determined 8 A-Star Ages
- We Account for Rotation
- Average Age: 496 Myr



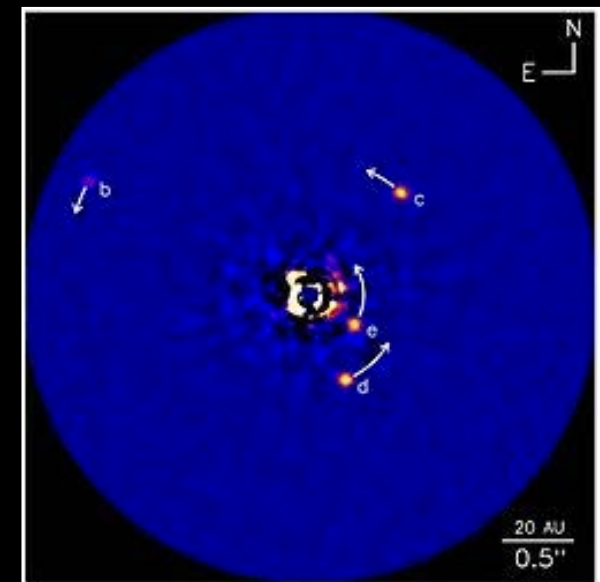
Beyond Ursa Major

Hyades (APOD)

- **Other Clusters/Moving Groups**
 - **Hyades: 12 stars**
 - **Argus, AB Dor, β Pic: 4 stars**
- **λ Boo Stars**
 - λ Boo, HD 192640, HR 8799, 7 Ori, ρ Vir
- **A-Stars with Directly Imaged Companions**
 - HR 8799 – 33 Myr (Baines et al. 2012)
 - κ And – ~60 Myr



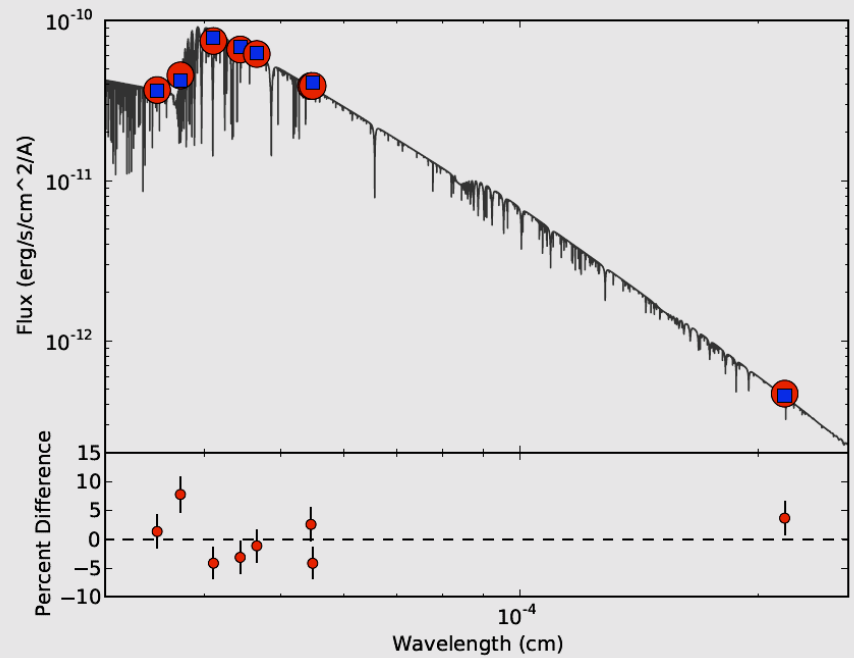
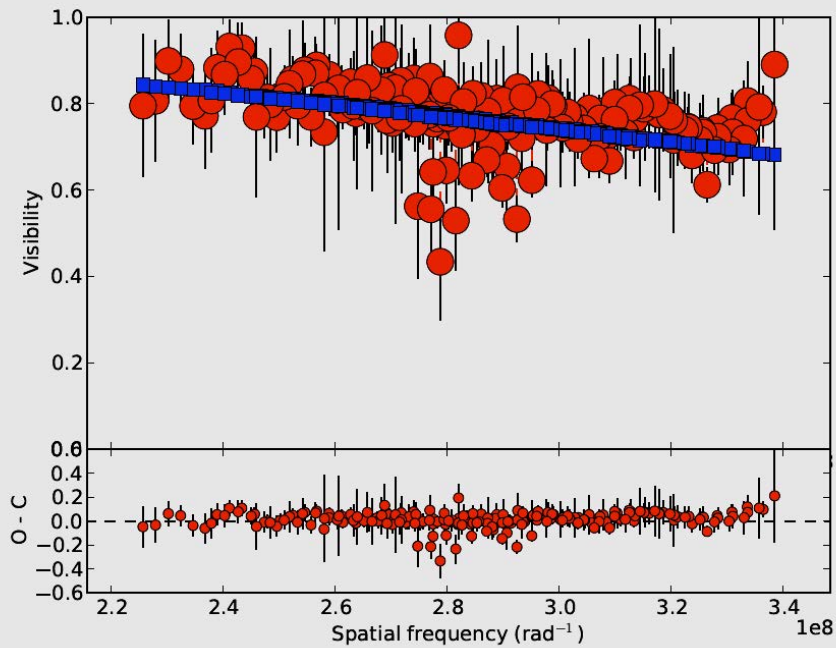
κ And b (Carson et al. 2013)



HR 8799 b,c,d,e (Marois et al. 2010)

HD 220825

AB Dor Member

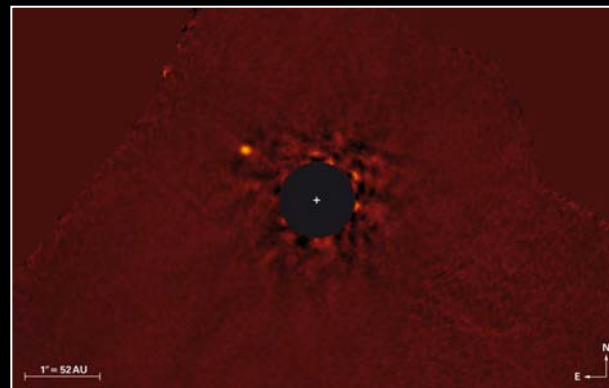


Age: 60 Myr
Mass: 2.12 M_⊙
AB Dor Age: ~50 Myr

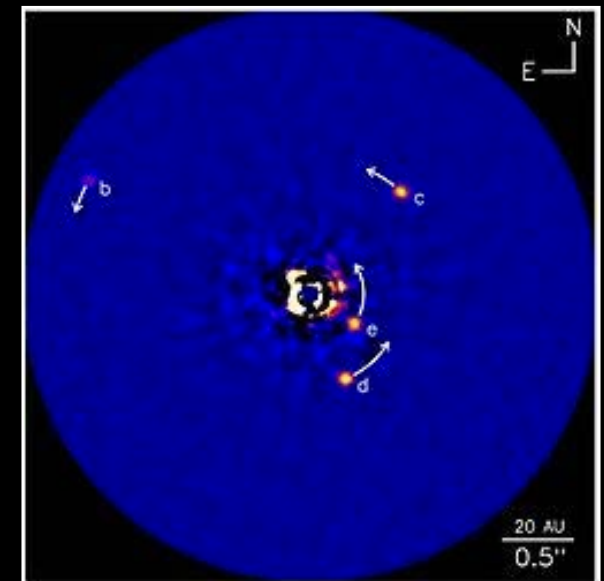
Beyond Ursa Major

Hyades (APOD)

- Other Clusters/Moving Groups
 - Hyades: 12 stars
 - Argus, AB Dor, β Pic: 4 stars
- **λ Boo Stars**
 - λ Boo, HD 192640, HR 8799, 7 Ori, ρ Vir
- A-Stars with Directly Imaged Companions
 - HR 8799 – 33 Myr (Baines et al. 2012)
 - κ And – ~60 Myr



κ And b (Carson et al. 2013)

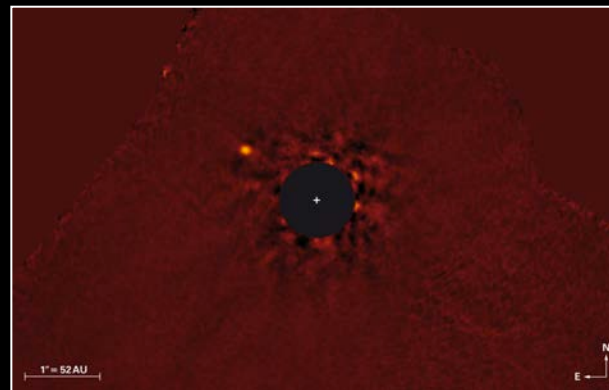
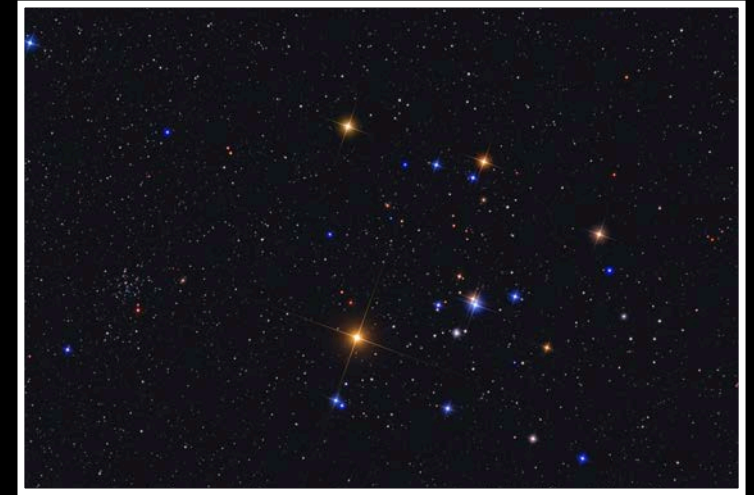


HR 8799 b,c,d,e (Marois et al. 2010)

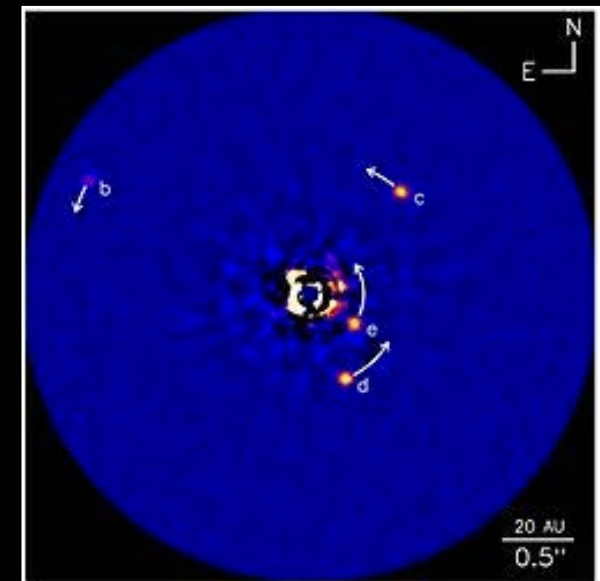
Beyond Ursa Major

Hyades (APOD)

- Other Clusters/Moving Groups
 - Hyades: 12 stars
 - Argus, AB Dor, β Pic: 4 stars
- λ Boo Stars
 - λ Boo, HD 192640, HR 8799, 7 Ori, ρ Vir
- **A-Stars with Directly Imaged Companions**
 - **HR 8799 – 33 Myr (Baines et al. 2012)**
 - **κ And – ~50 Myr**

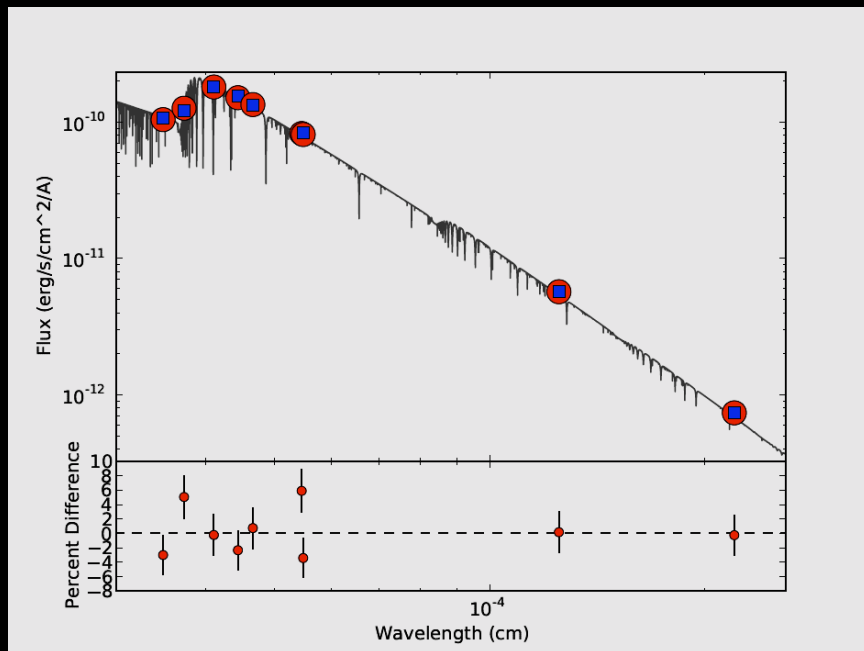
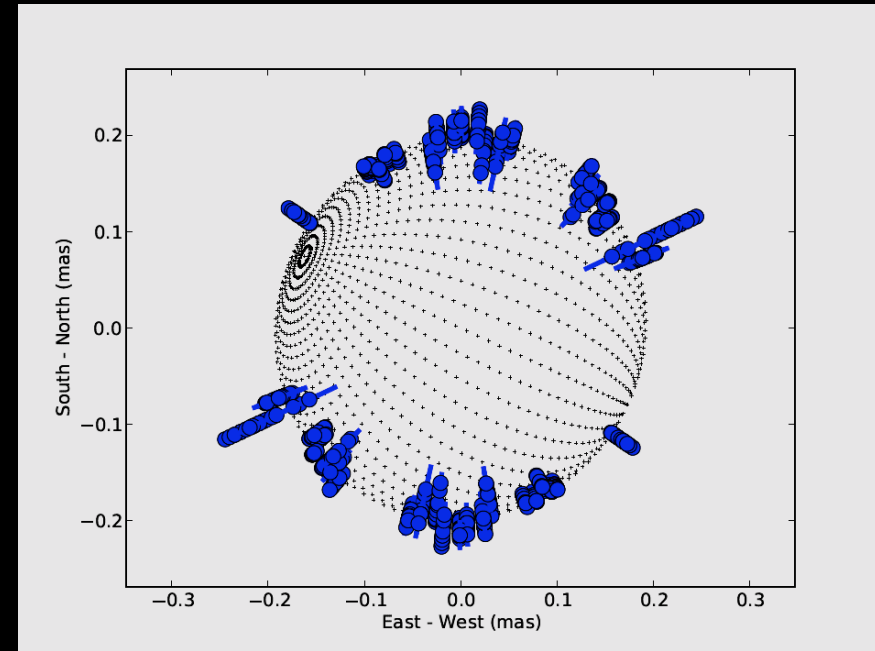
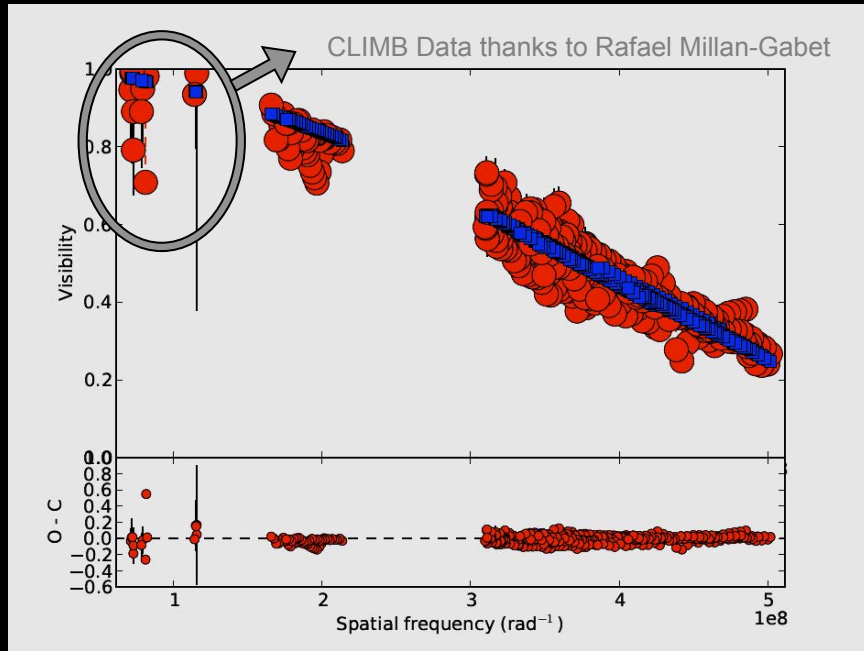


κ And b (Carson et al. 2013)



HR 8799 b,c,d,e (Marois et al. 2010)

κ Andromeda



- B9-A0 IV-V
- Distance: 51.6 pc
- v_{ini} : 161.6 km/s
- $i \sim 70^\circ$
- $V_E \sim 170$ km/s
- Age: 48 Myr
- Mass: 2.95 M_\odot

A-Star Sample Status

Within	Observed	Total	Complete
25 pc	10	10	100%
30 pc	20	26	77%
35 pc	24	38	63%
40 pc	30	56	54%
45 pc	36	76	47%
50 pc	45	110	41%

Jeremy Jones, GSU

Russel White (adviser)

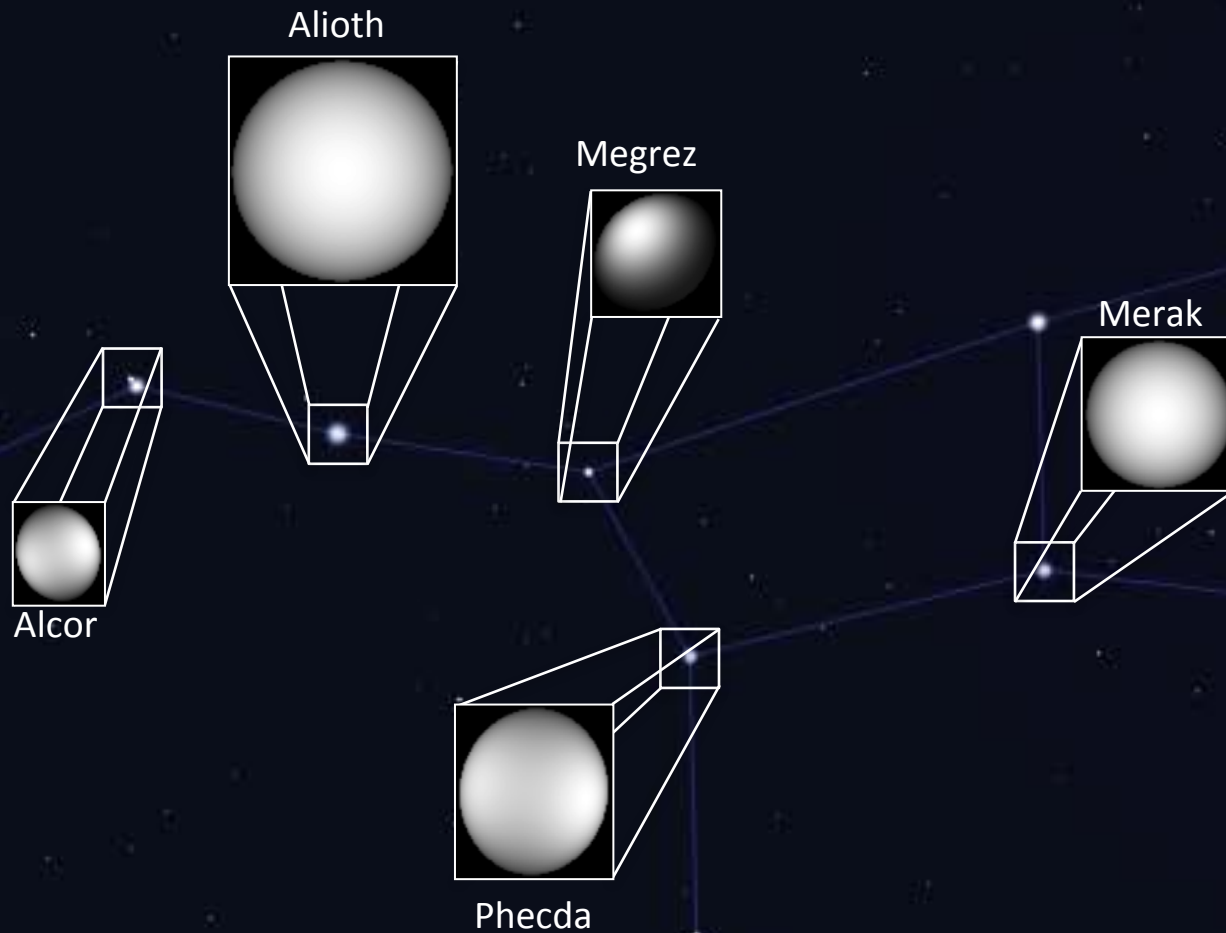
Tabetha Boyajian

Gail Schaefer

Ellyn Baines

Mike Ireland

The CHARA Team



Questions?

