



# PAVO Science Update

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# PAVO/CHARA papers

Bazot et al. (2009), A&A	Asteroseismology
Derekas et al. (2011), Science	Eclipsing Binary
Huber et al. (2012), MNRAS	Asteroseismology
Huber et al. (2012), ApJ	Exoplanet Hosts
<i>Baines et al. (2012), ApJ</i>	<i>Exoplanet Hosts</i>
White et al. (2013), MNRAS	Asteroseismology
Maestro et al. (2013), MNRAS	Massive stars
<i>Johnson et al. (2014), ApJ</i>	<i>Asteroseismology</i>
<i>Boyajian et al. (2015), ApJ</i>	<i>Exoplanet Hosts</i>

*non Sydney-PI papers*



# PAVO/CHARA Update

- 2T data reduction is routine; software tools available. Check for updates!
- 3T bias issues: not enough manpower to make progress; *we strongly welcome external collaborators willing to contribute to reduction efforts (chopper data available)*
- New: Calibrated PAVO output to OIFITS (Guillaume Schworer)



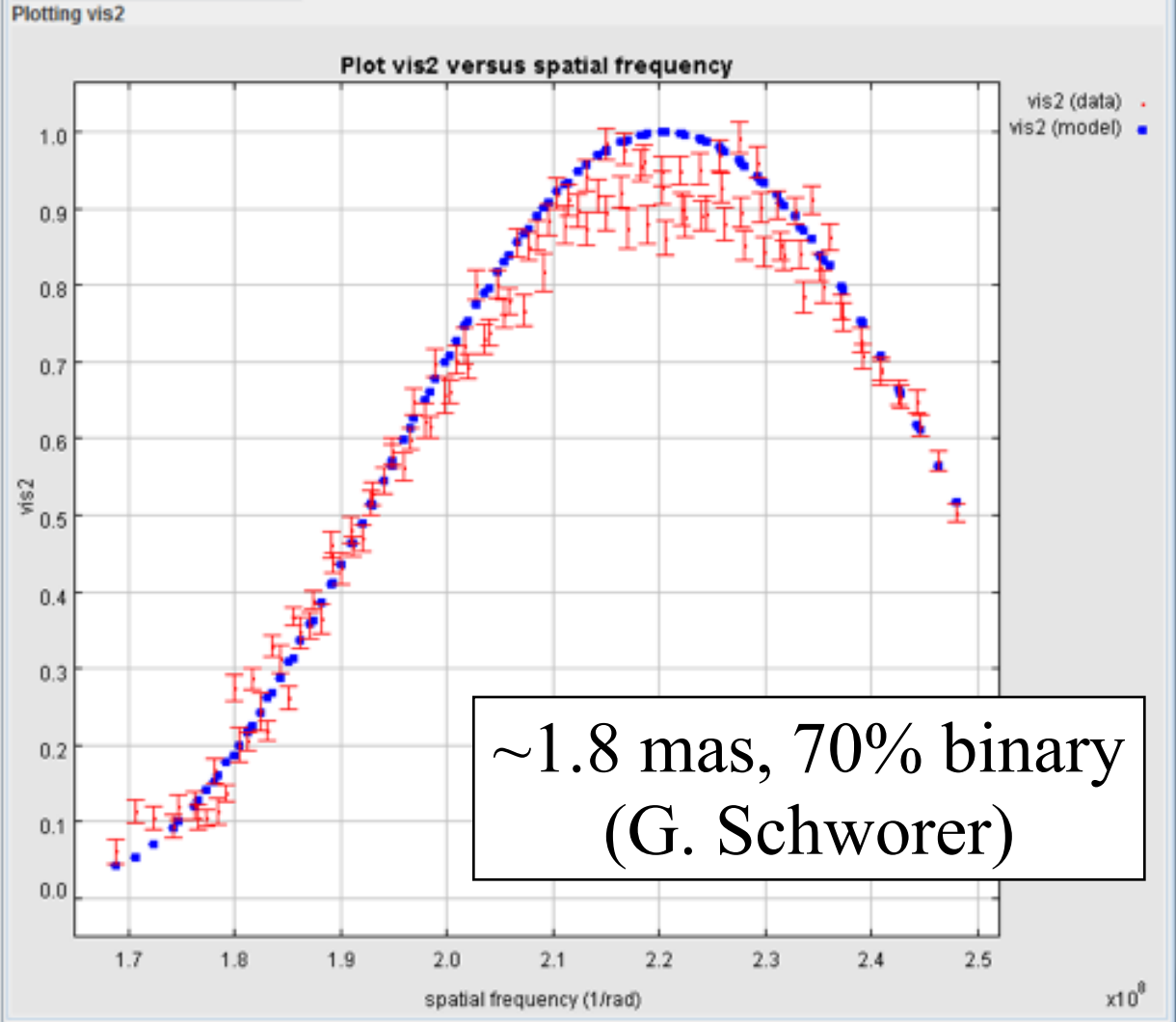
Untitled.litprox

Settings tree

- Settings
  - Files
    - File[HD12140-W2E2.bt\_old.oifits.gz]
  - Targets
    - Target[HD\_12140]
      - File[HD12140-W2E2.bt\_old.oifits]
      - punct1
      - punct2
  - Shared parameters[0]
  - Results
    - Fit Result 2015-03-12 12:11:50
      - Plotting plotBaselines
      - Plotting plotUVCoverage
      - Plotting vis2
      - Plotting vis2 residuals
  - Plots

Frame panel

Attach/Detach frame    Untitled.tsv    Save as ...

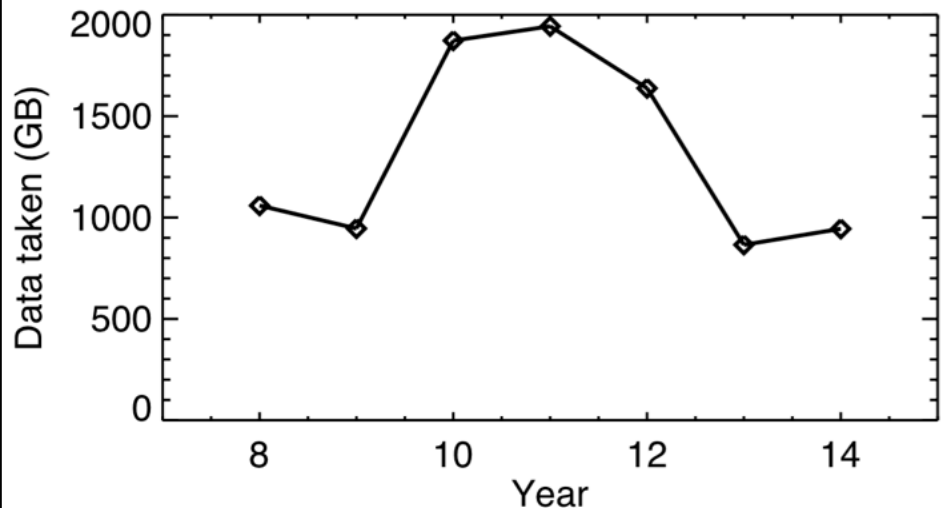
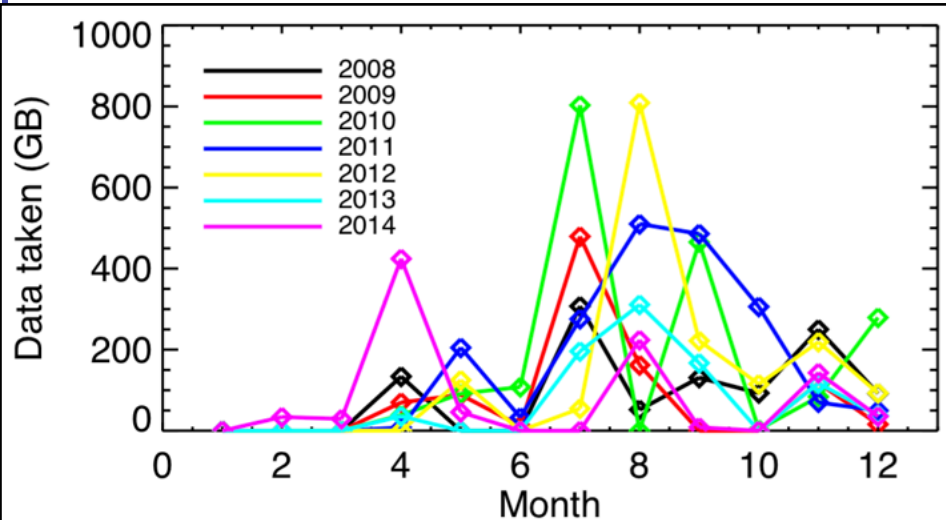


~1.8 mas, 70% binary  
(G. Schworer)

Run fit

Use max iterations  \_\_\_\_\_

# PAVO Data Archive



- ~ 260 nights, ~ 9.3 (compressed) TB from 2008-2014

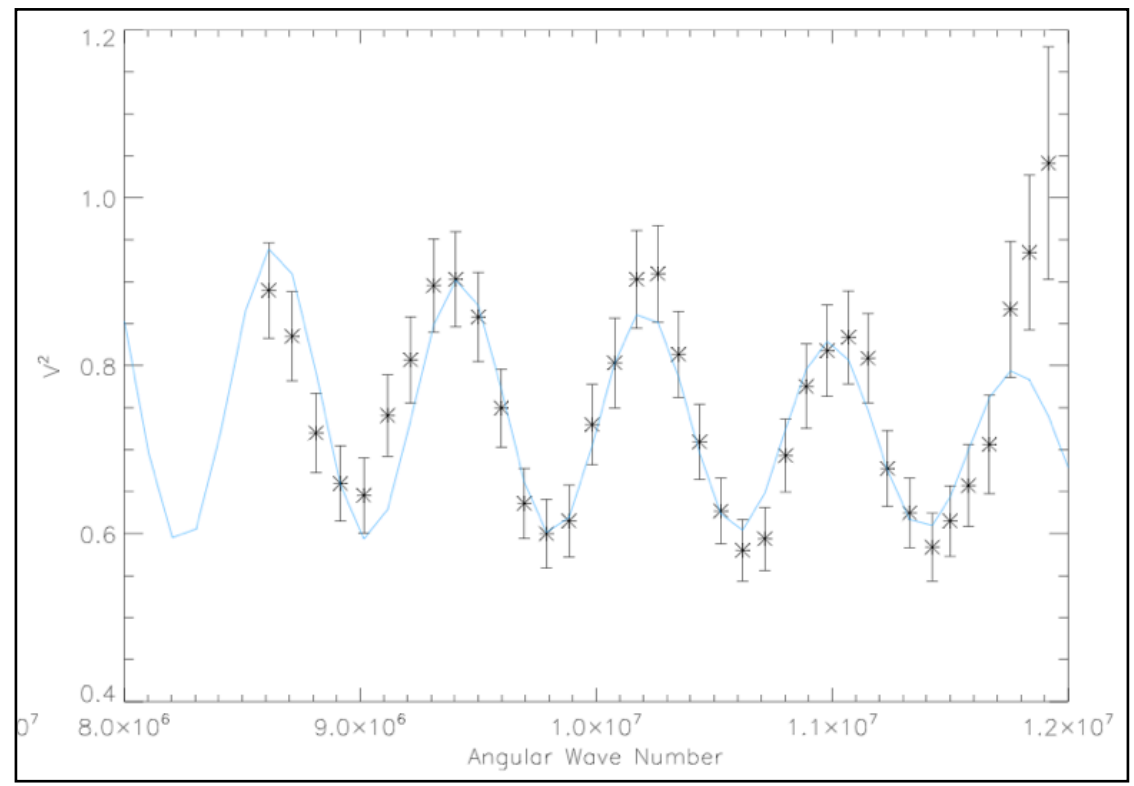
- Homogeneous reduction + centralized directory planned

- *PAVO data on your science may already exist!*



# PAVO/SUSI

- PAVO/SUSI operations are currently on best effort basis
- ~20 nights of observations in 2014
- 4 ongoing science projects



Rizzuto et al. (2013)



# *PAVO/CHARA Science: Astero-seismology*



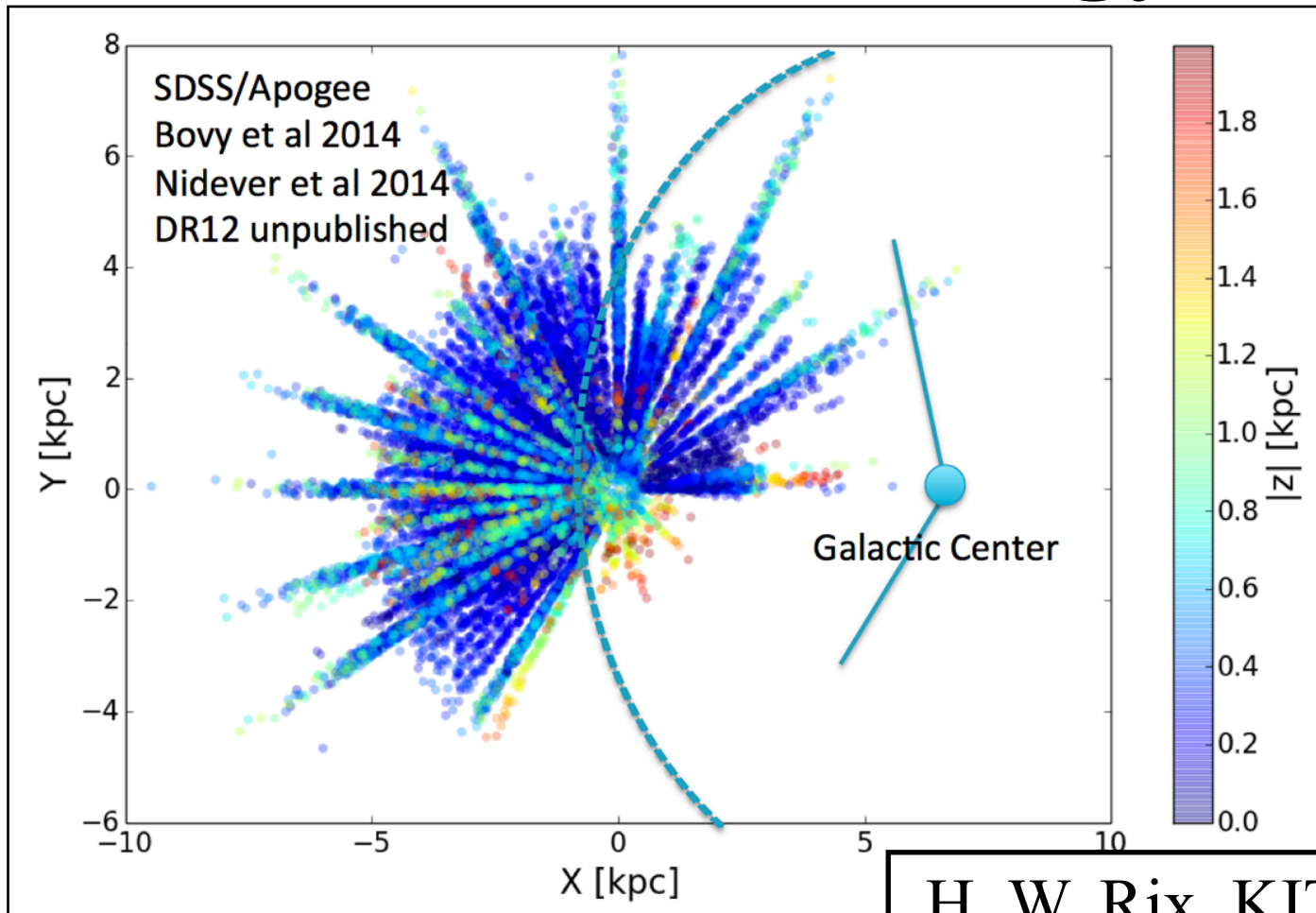
Tim White

(+ Huber, Boyajian, Creevey, Silva Aguirre, Bedding)





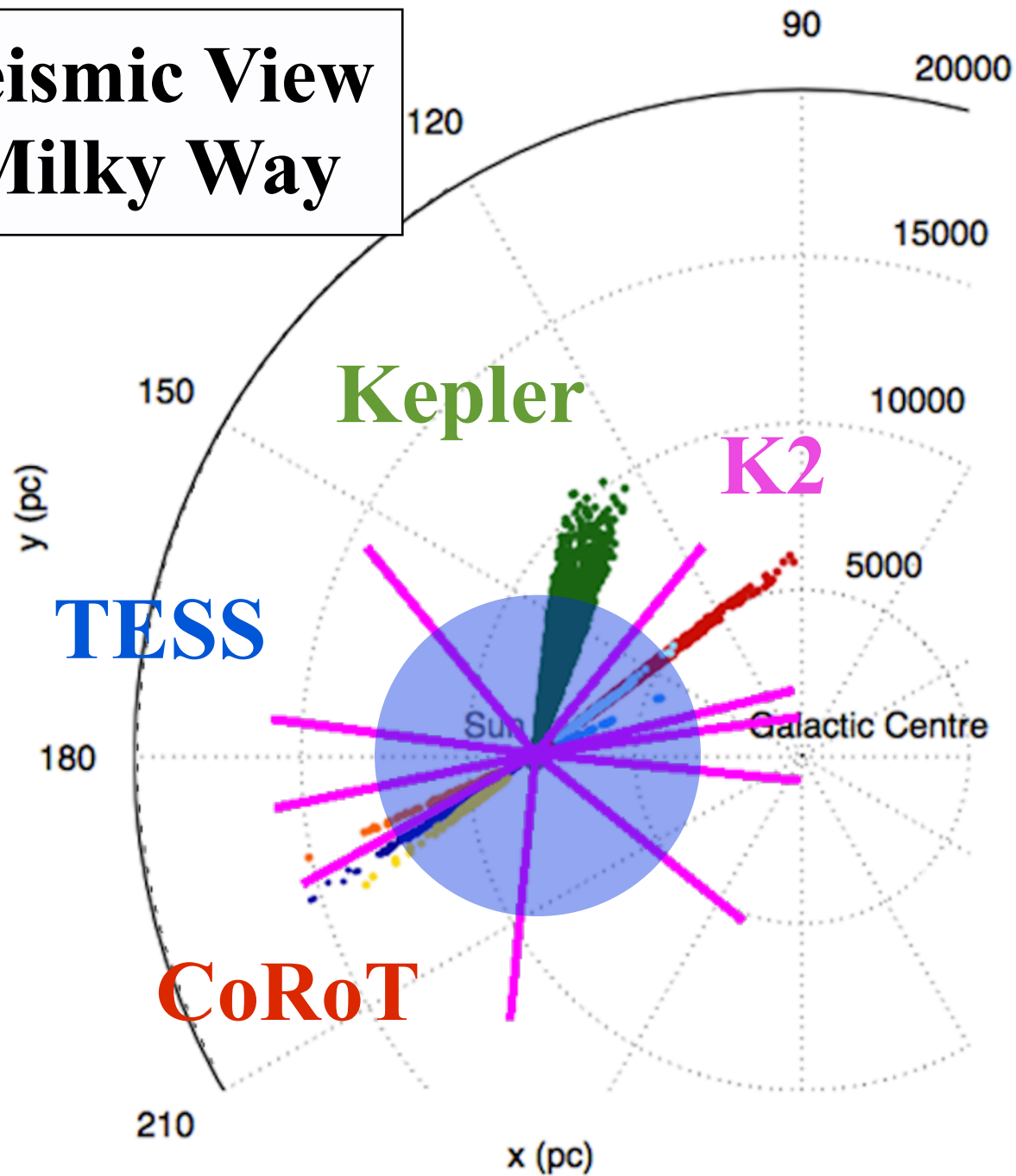
# Galactic Archeology



major efforts underway to determine chemo-dynamical history of Milky way → APOGEE, GALAH, LAMOST, Gaia-ESO, ...



# Asteroseismic View of the Milky Way





10 Gyr

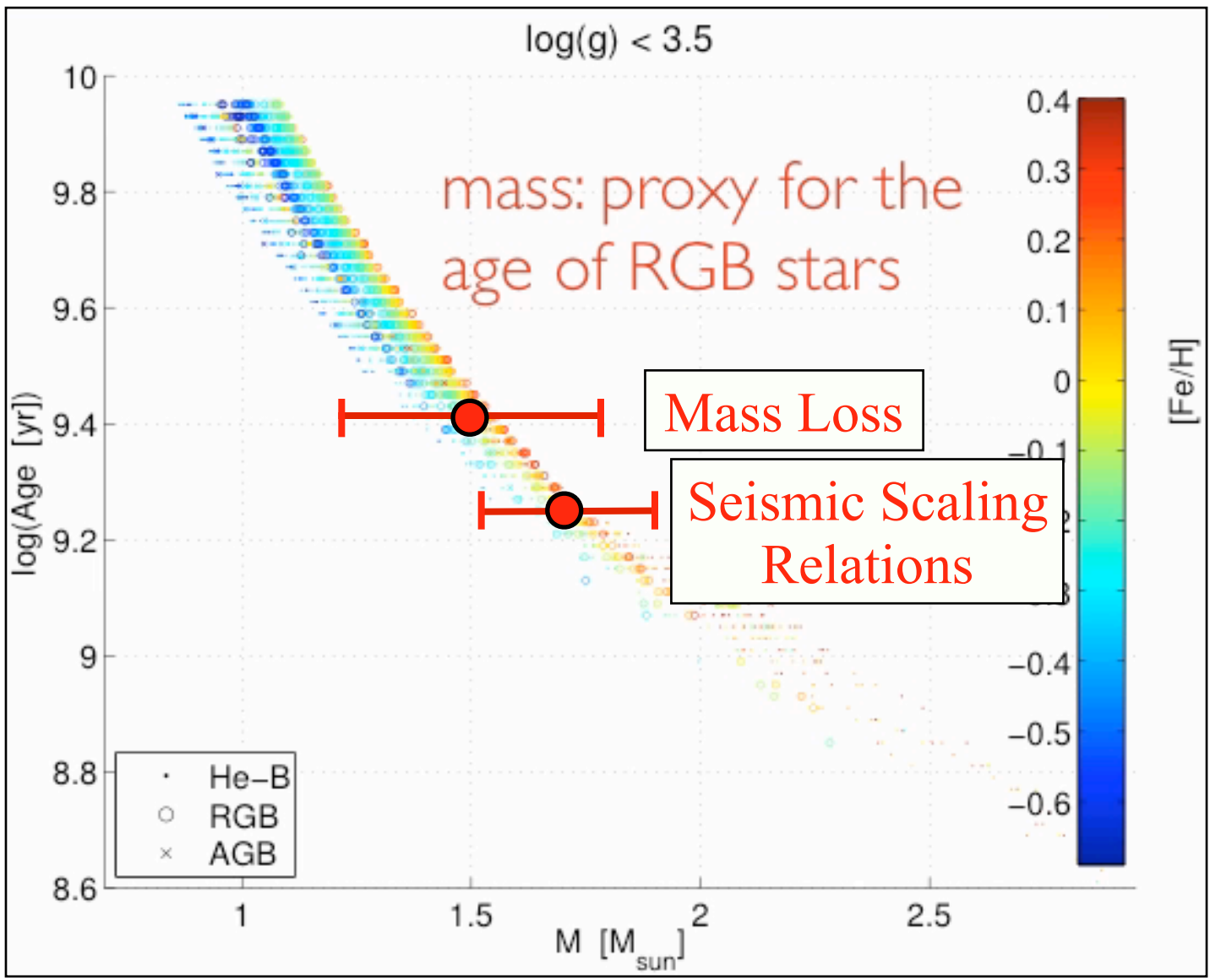
6.3 Gyr

4 Gyr

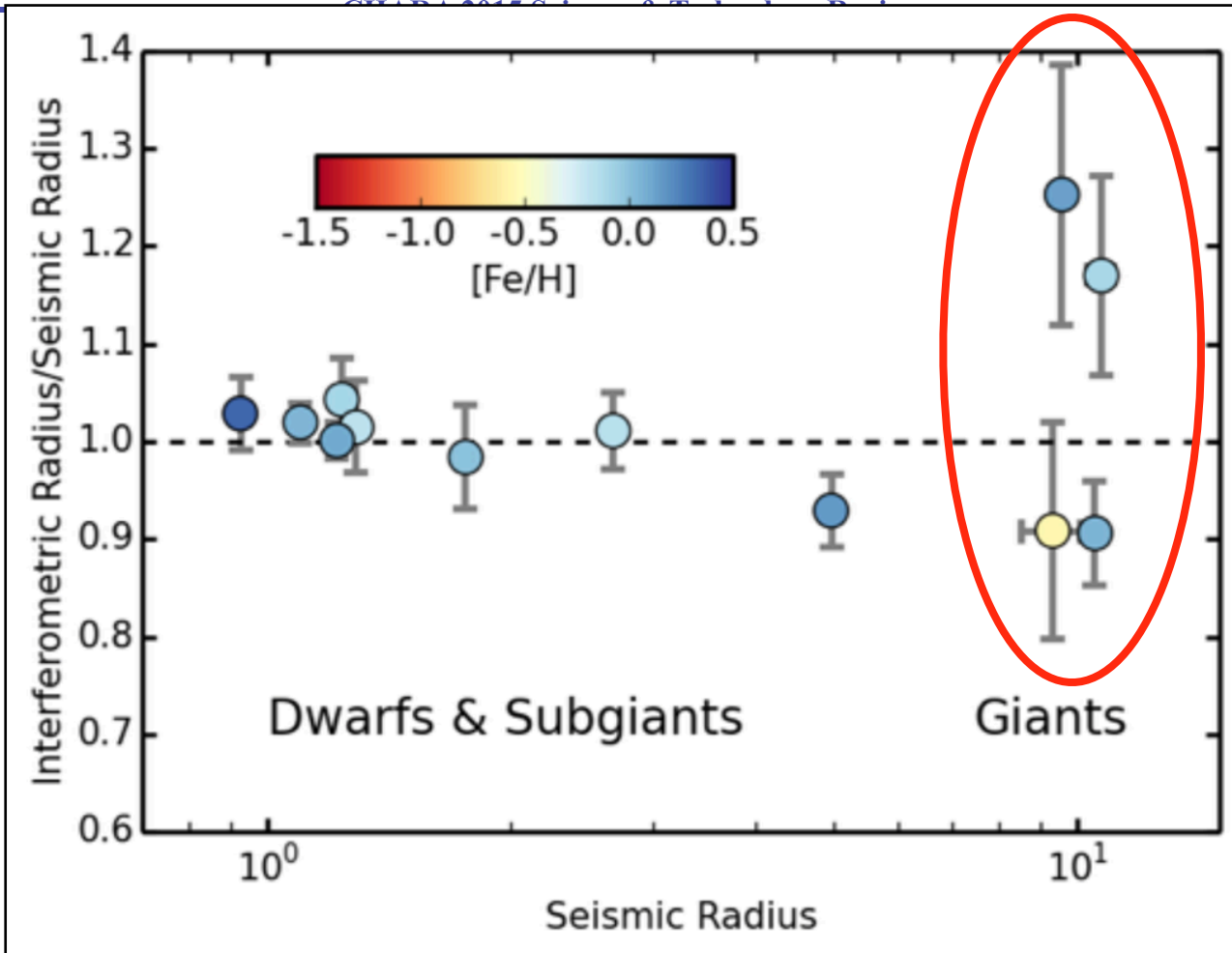
2.5 Gyr

1.6 Gyr

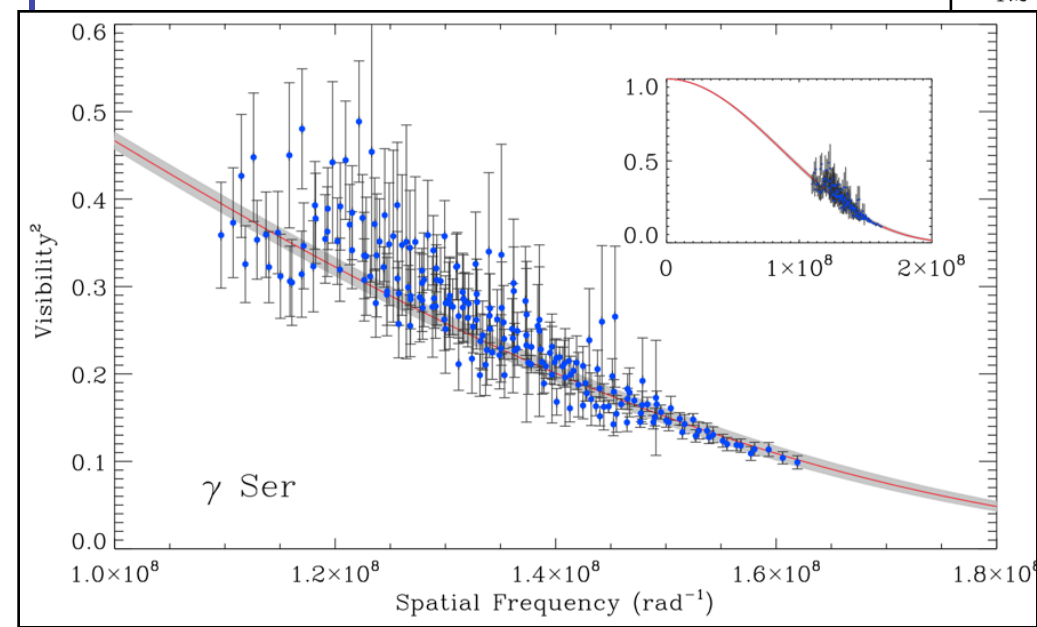
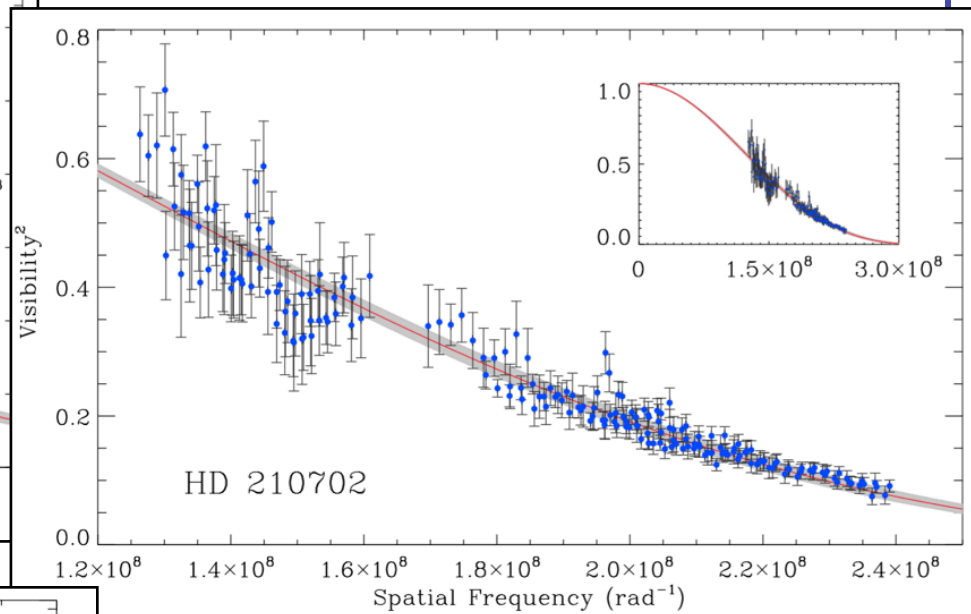
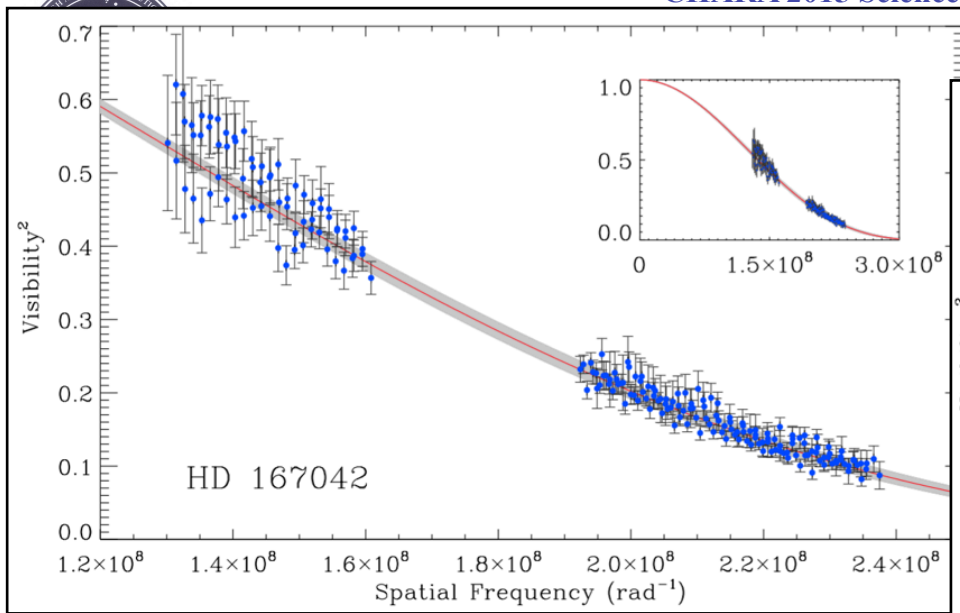
1 Gyr



from asteroseismology



*Interferometric calibration of red-giant asteroseismology across  $[Fe/H]$  & evolutionary states is crucial for the success of galactic archeology!*



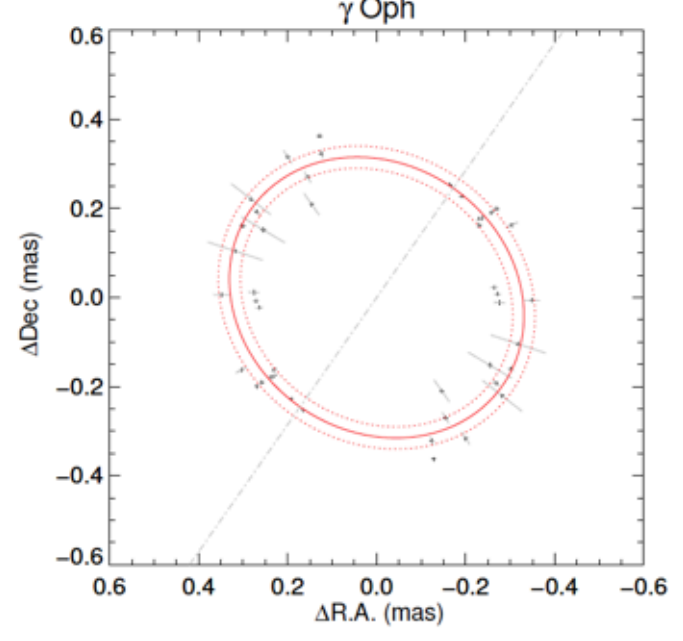
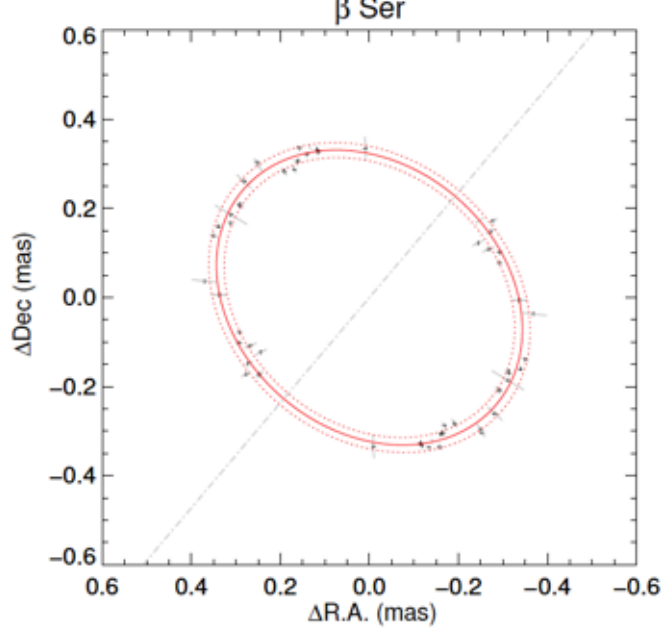
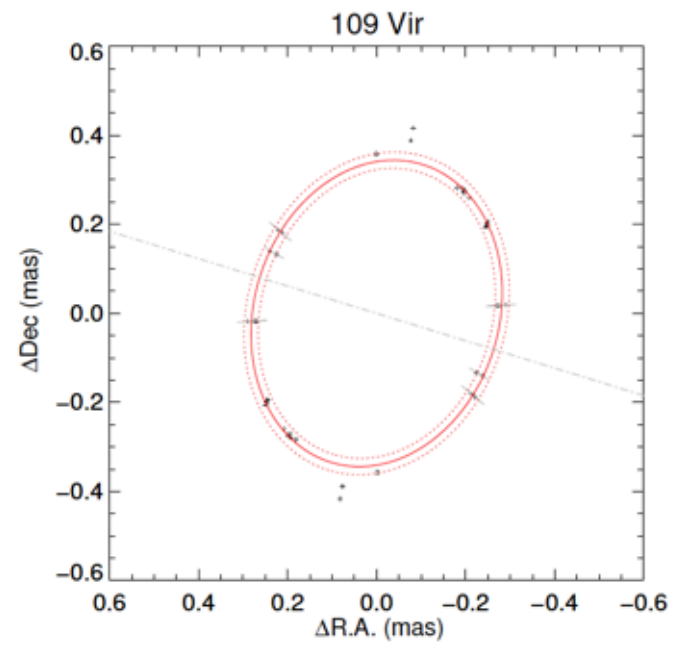
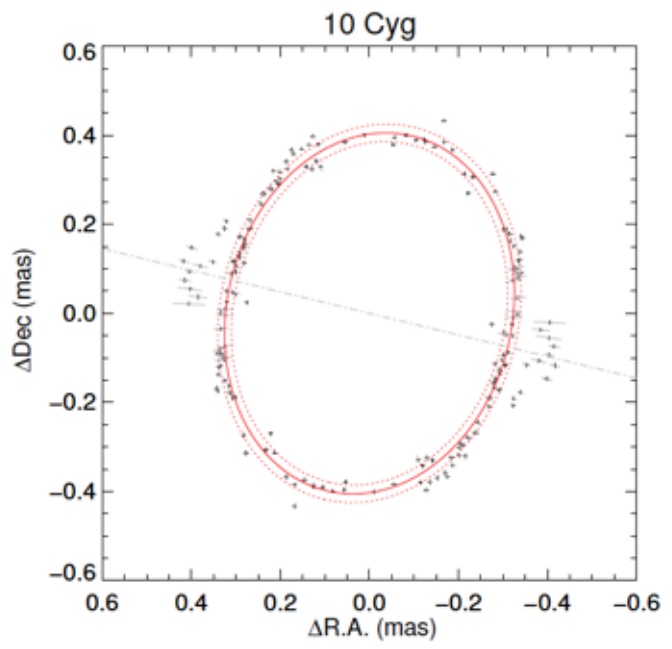
~ 0.6 - 1.2 mas  
*work in progress ...*



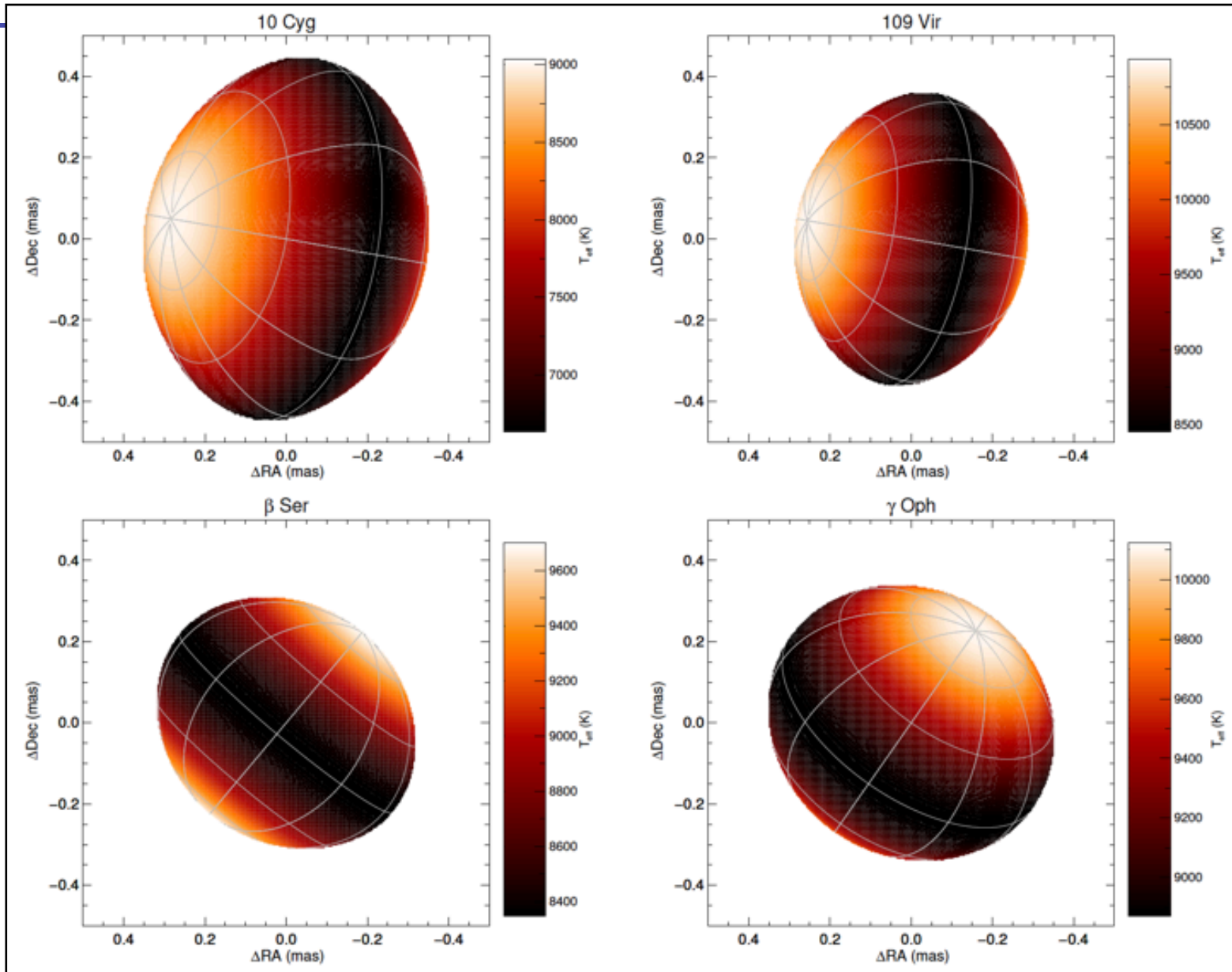
# *PAVO/CHARA Science: Rapid Rotators*



Vicente Maestro  
(+ Tuthill & Ireland)





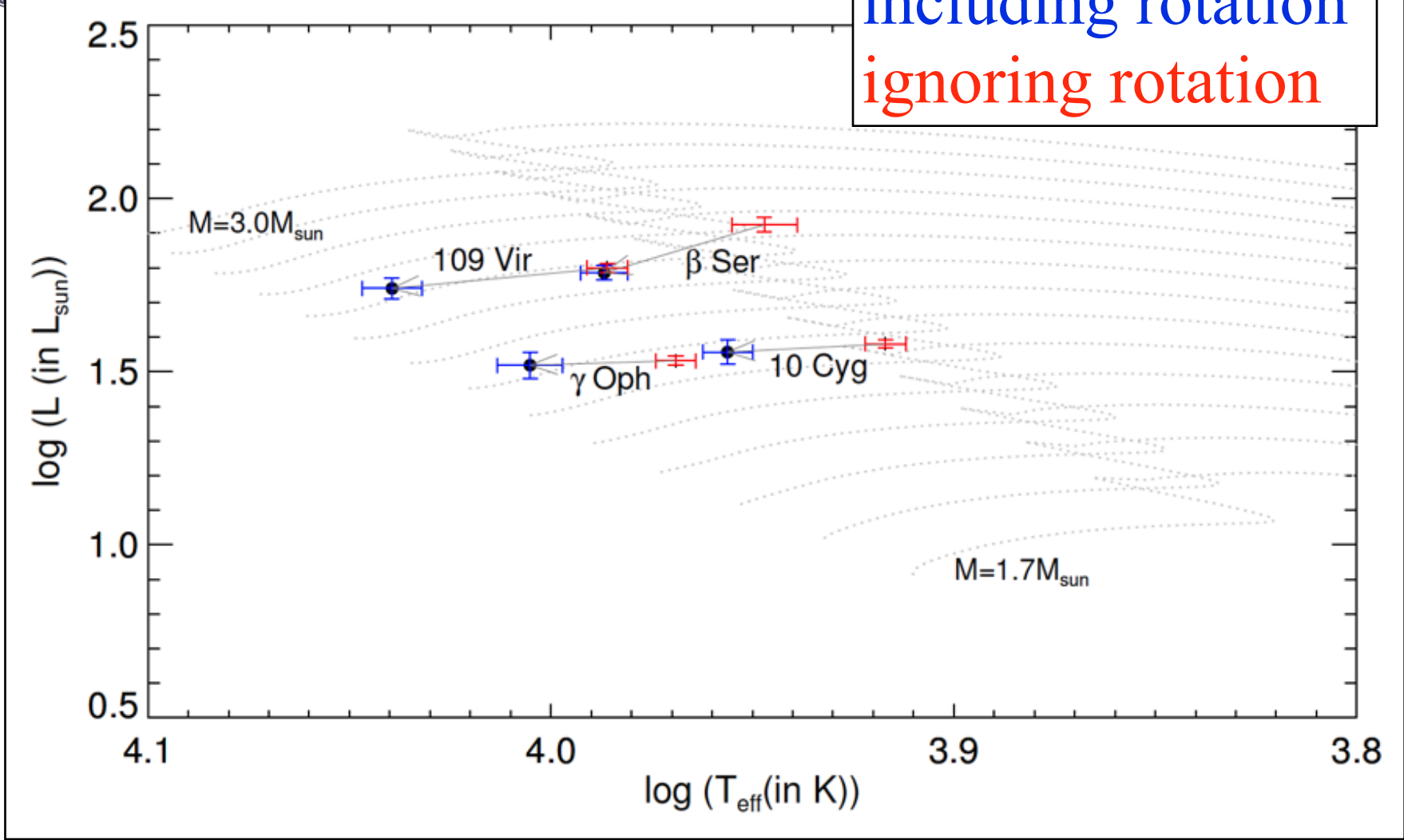


self-consistent 2D interior model (ESTER) + SED fit

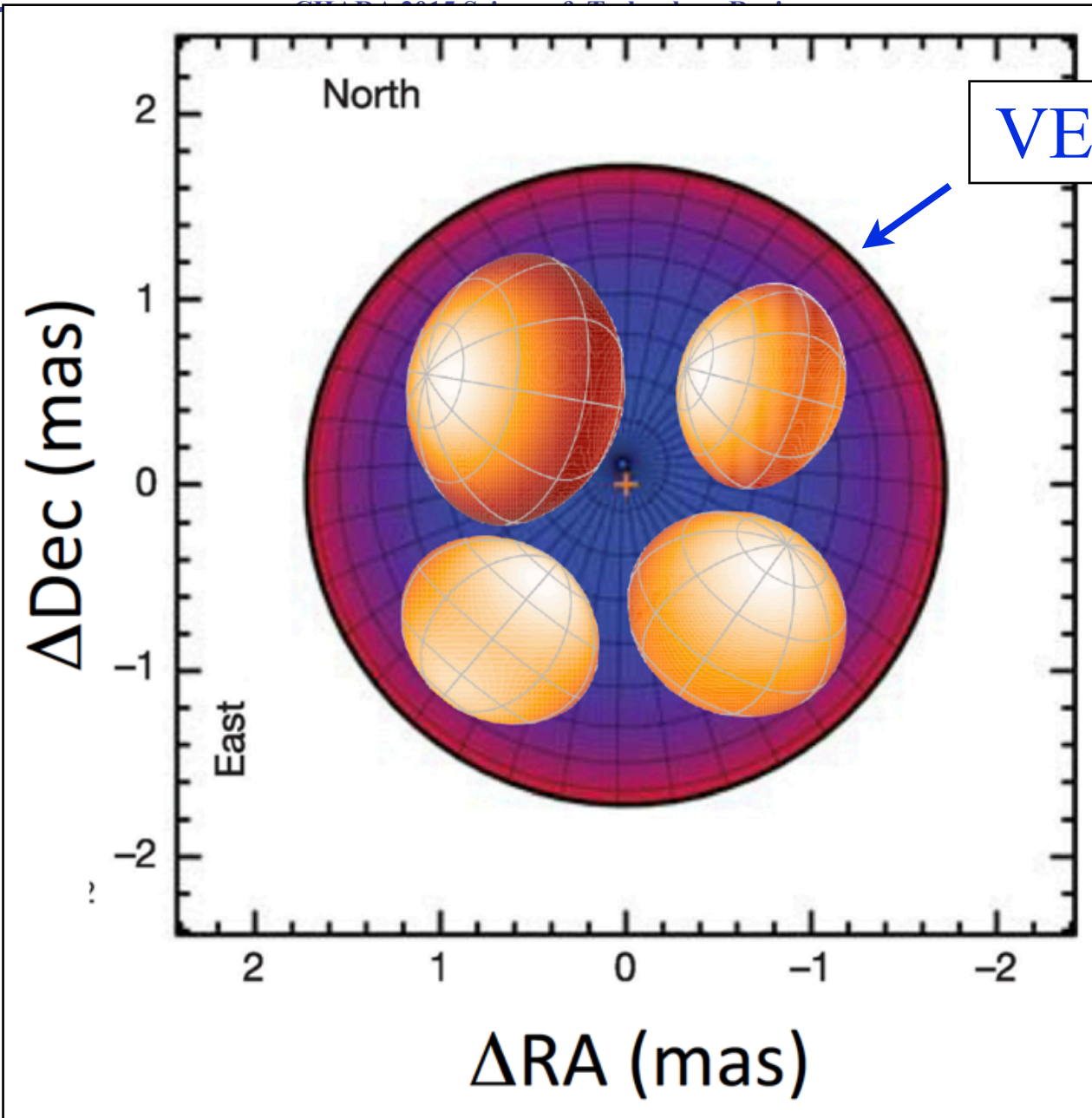




including rotation  
ignoring rotation



Vicente Maestro (2014, PhD Thesis)



Vicente Maestro (2014, PhD Thesis)



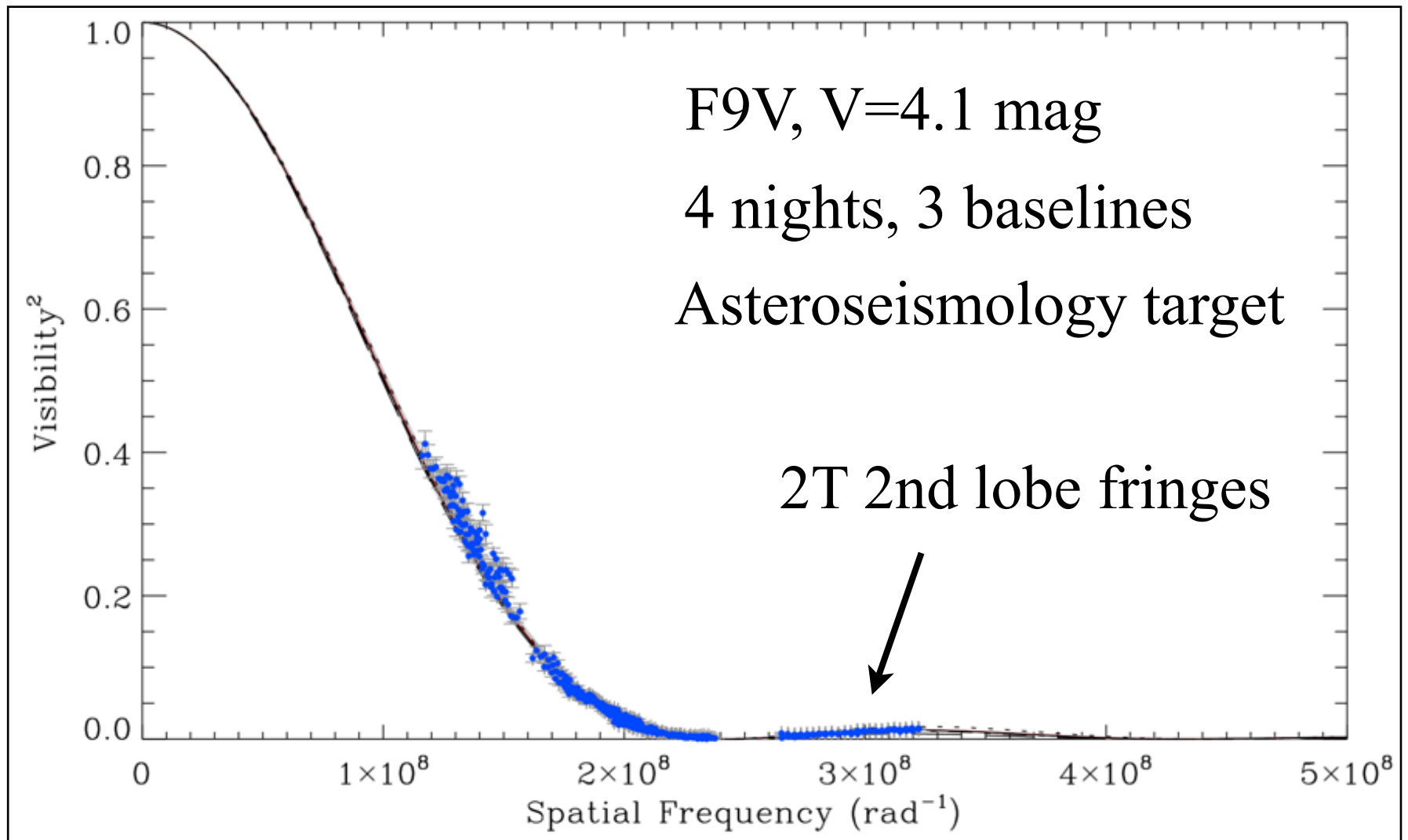
# *PAVO/CHARA Science: Limb Darkening*



Tim White  
(+ Huber, Ireland, Tuthill, Bedding)



# ups And

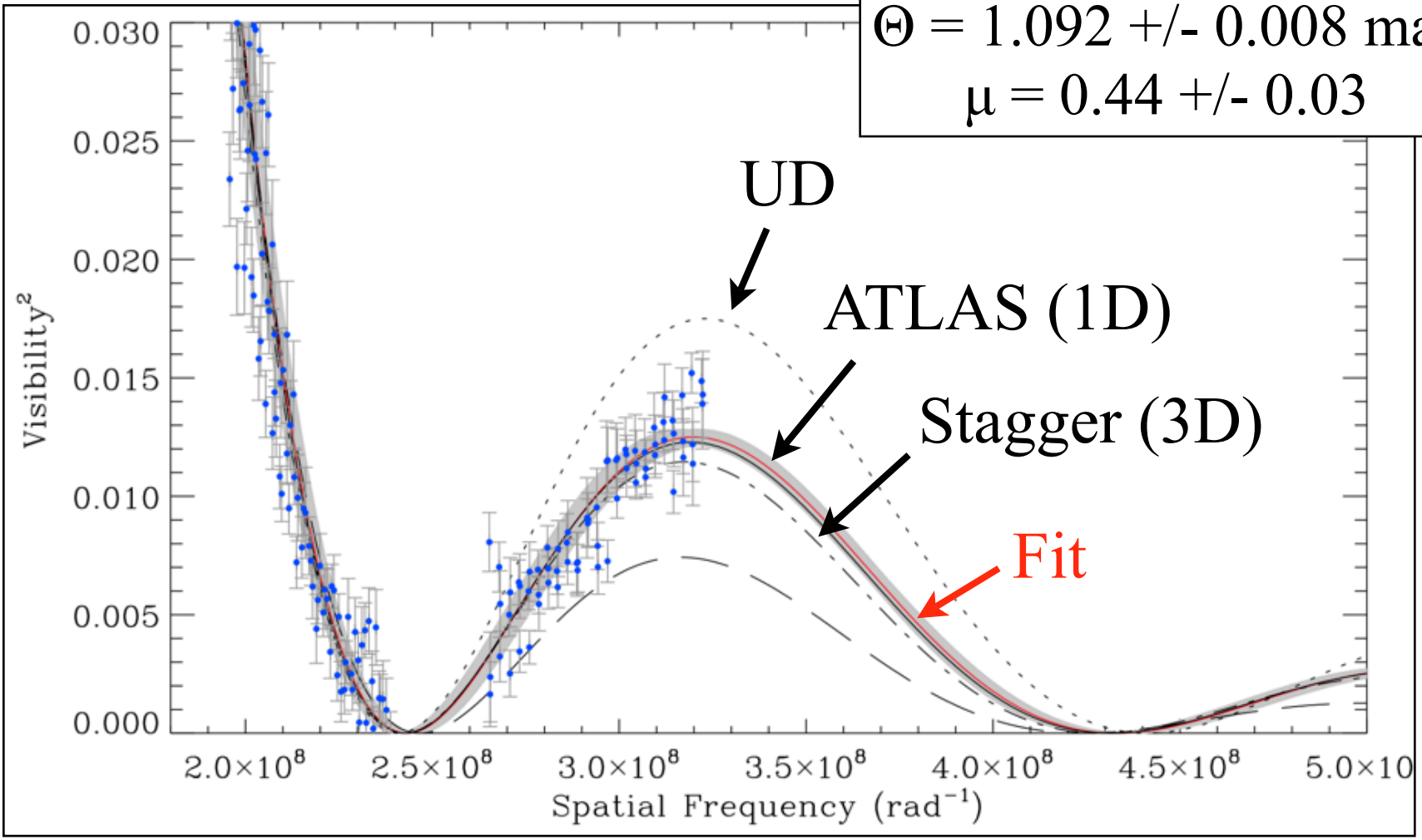


Tim White et al., in prep

# ups And

$$\Theta = 1.092 \pm 0.008 \text{ mas}$$

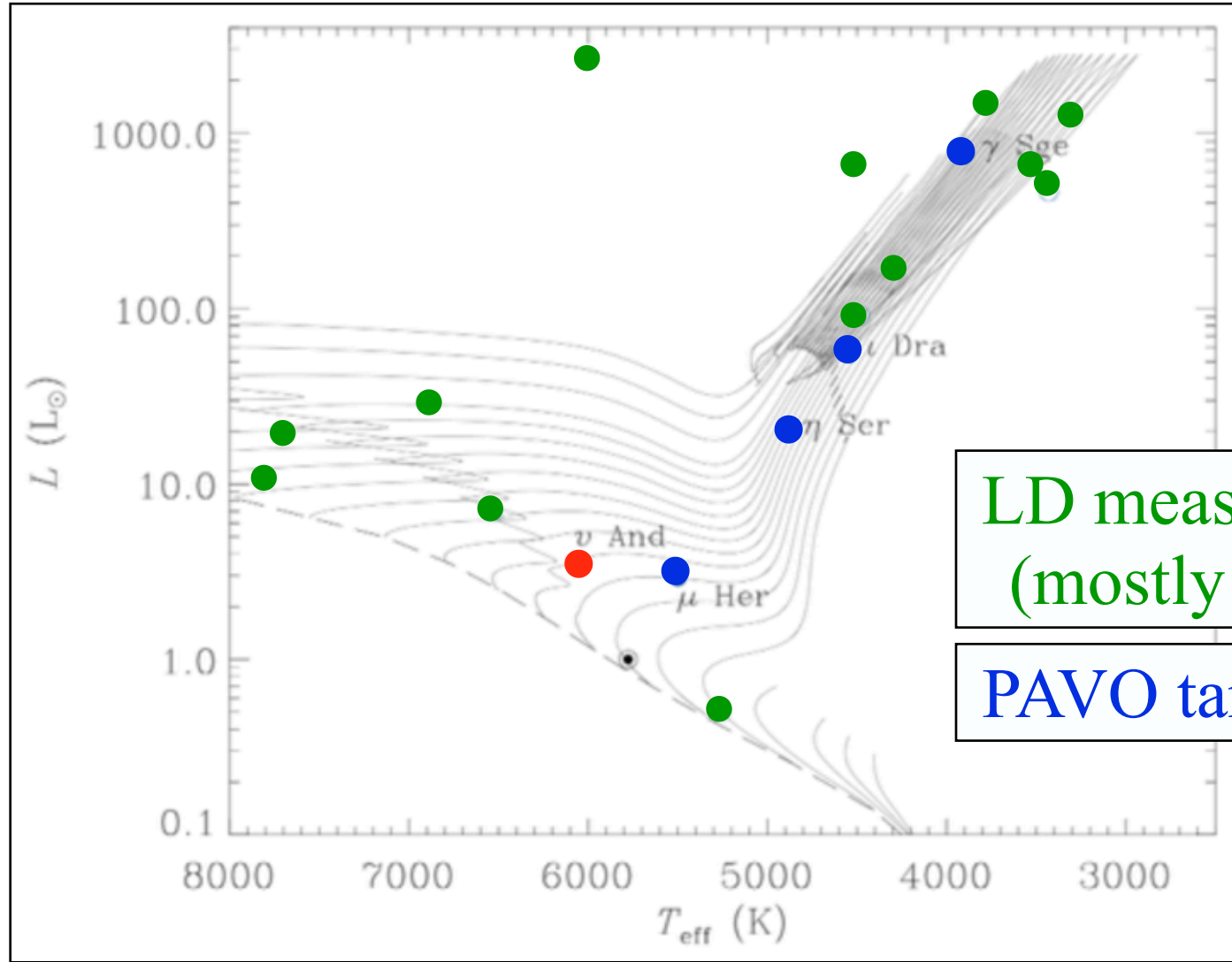
$$\mu = 0.44 \pm 0.03$$



Tim White et al., in prep



# 2T LD Pilot Study



LD measured  
(mostly IR)

PAVO targets





# Summary

- 2T PAVO/CHARA is producing routine science output, 3T progress stalled by lack of manpower
- PAVO/SUSI operated on best effort basis
- Current Key PAVO Science in Sydney:
  - Asteroseismology (T. White)
  - Rapid Rotators (V. Maestro)
  - Limb Darkening (T. White)
  - YSO's (G. Schworer)