Interferometric Study to Determine A-star Ages using CHARA (ISAAC)

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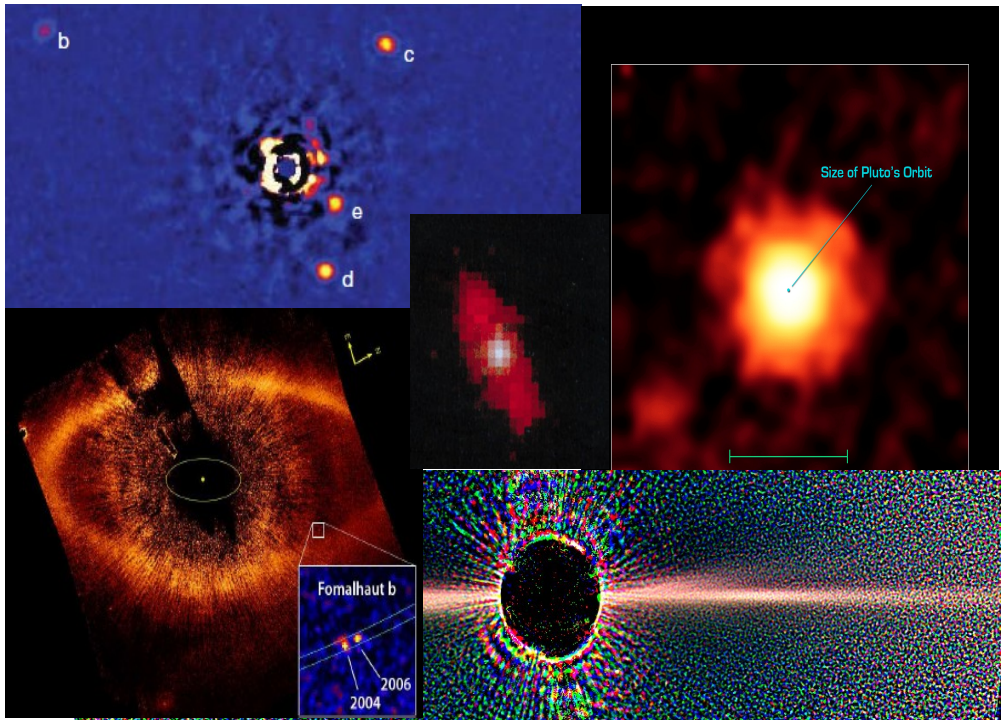
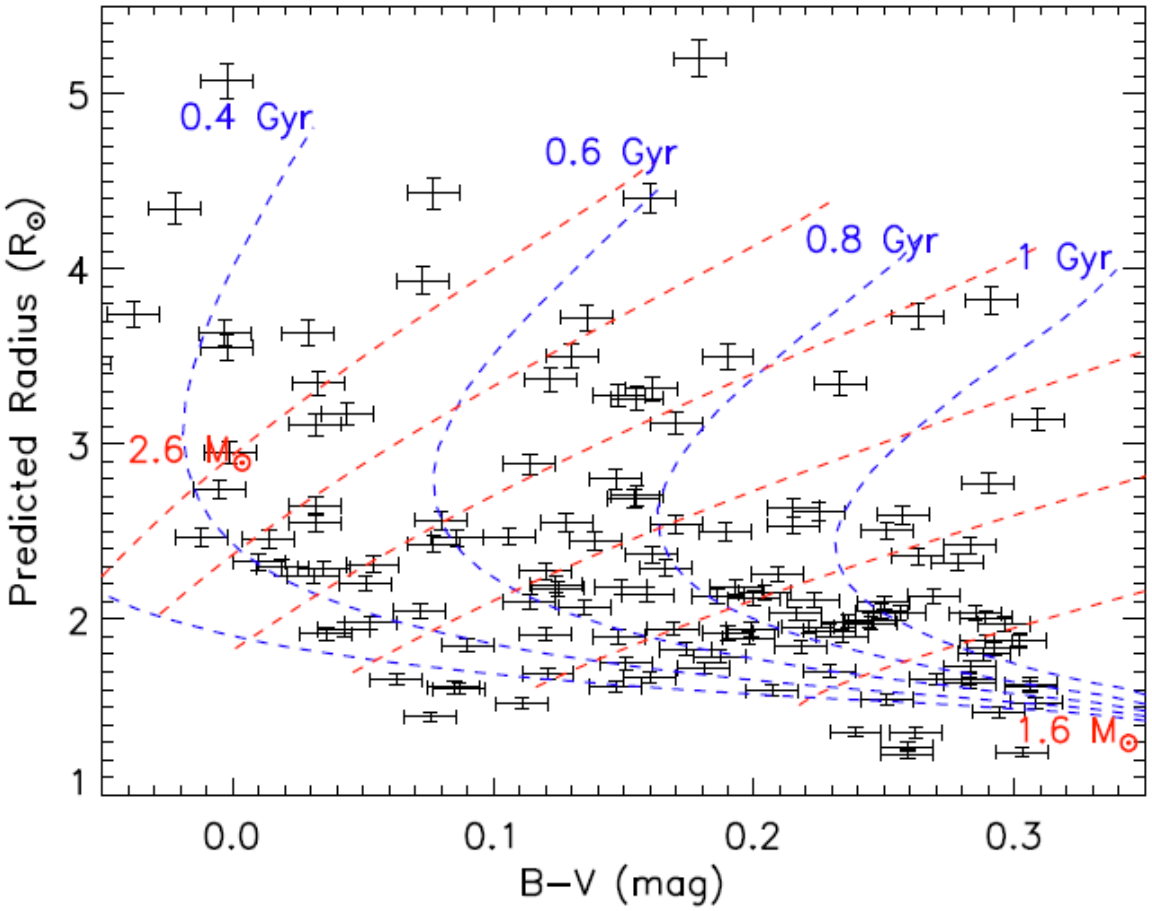
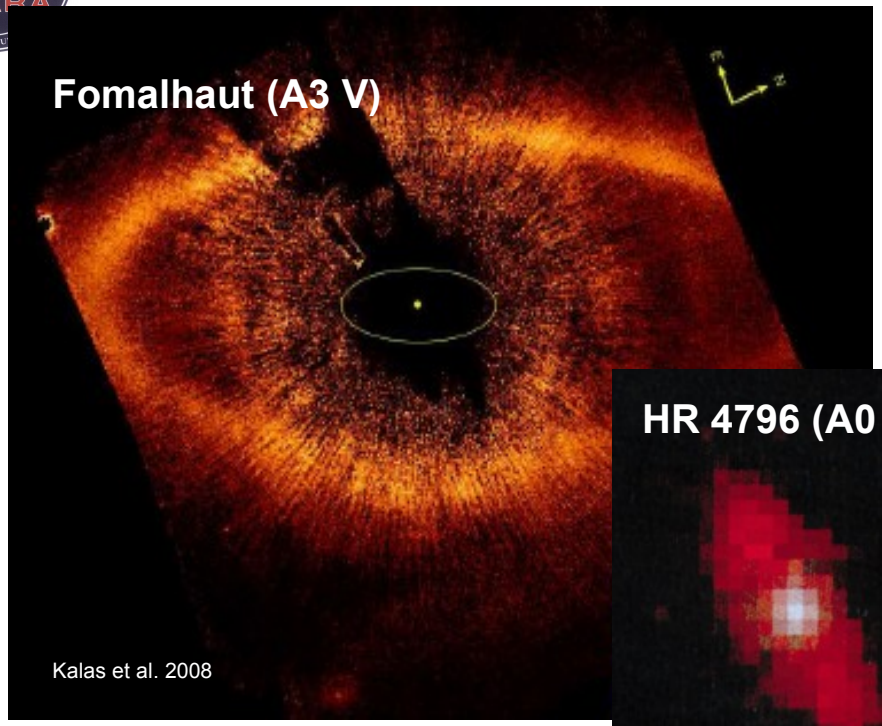


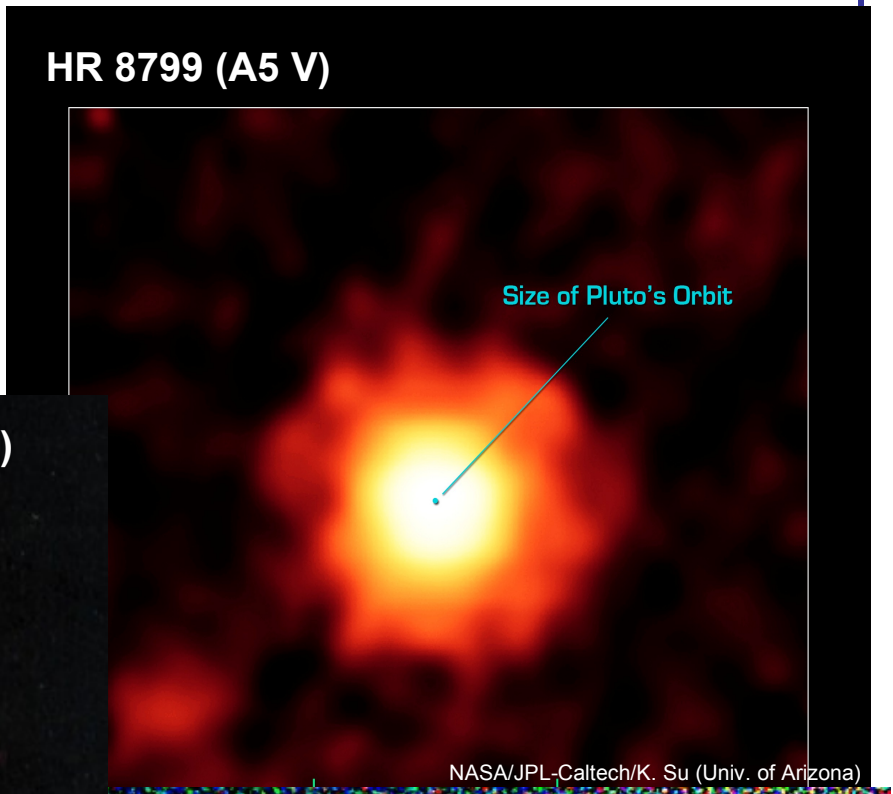
ISAAC in a Nutshell

- Measure radii of nearby A-stars
- Determine ages from evolutionary models

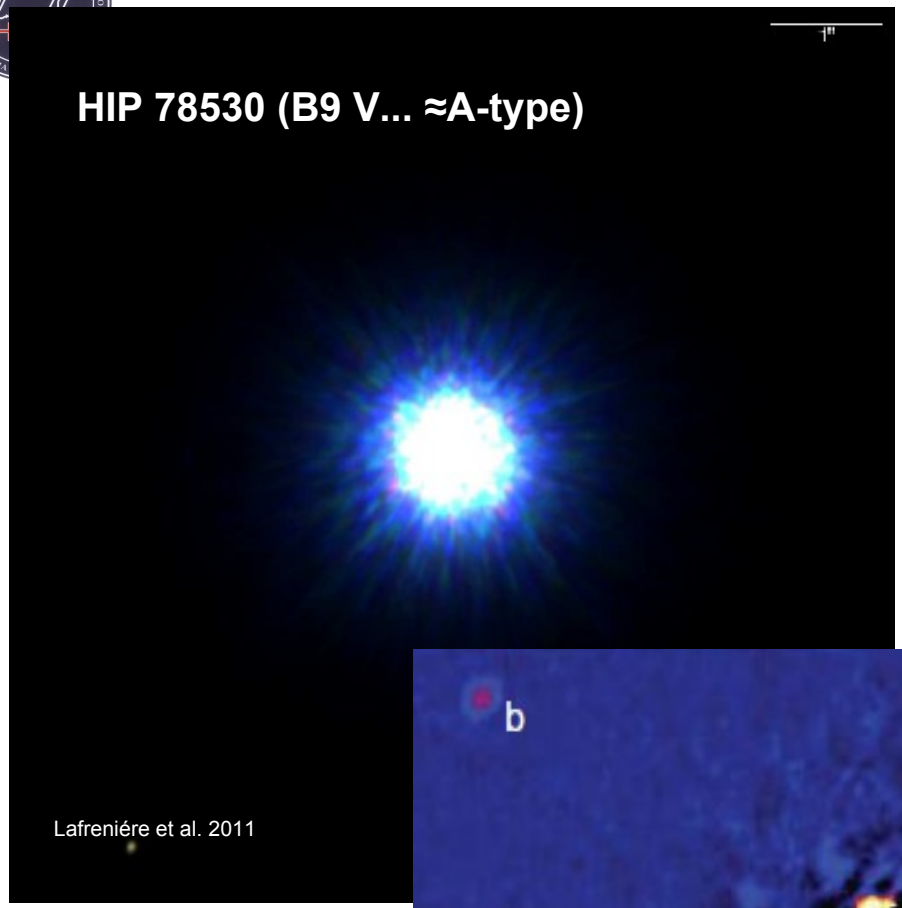


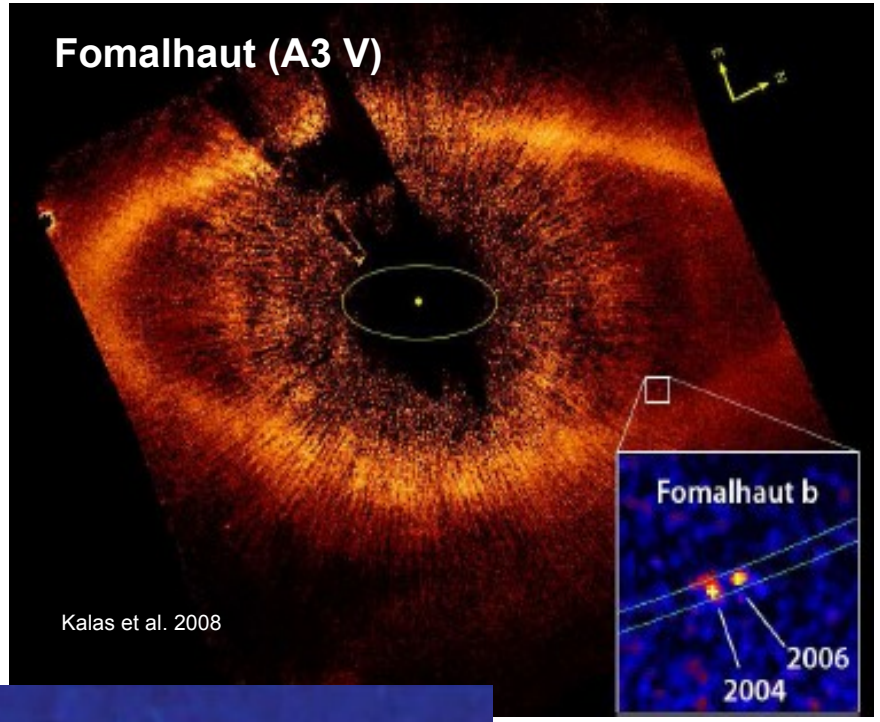

Fomalhaut (A3 V)
Kalas et al. 2008

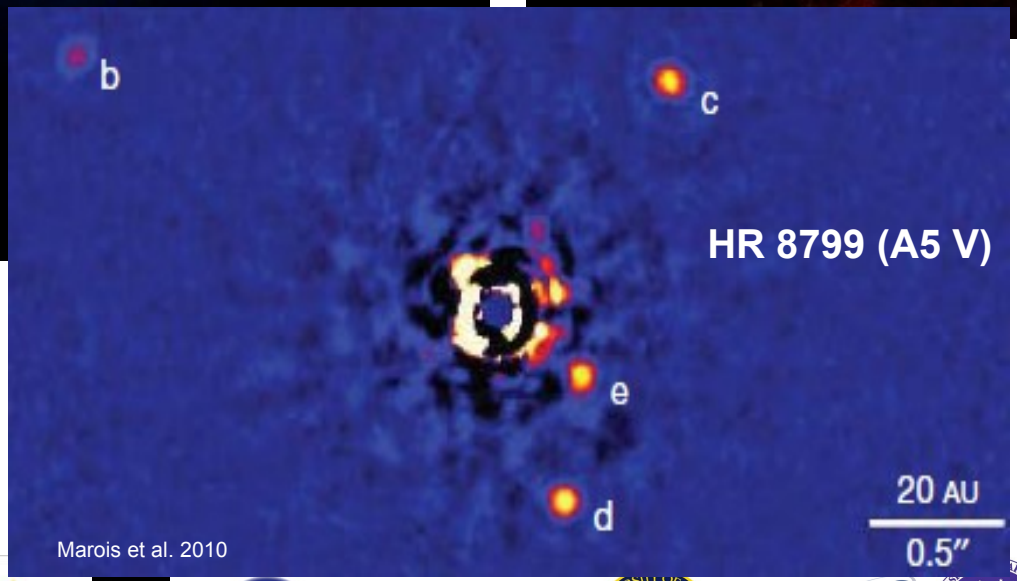
HR 4796 (A0 V)
Koerner et al. 1998

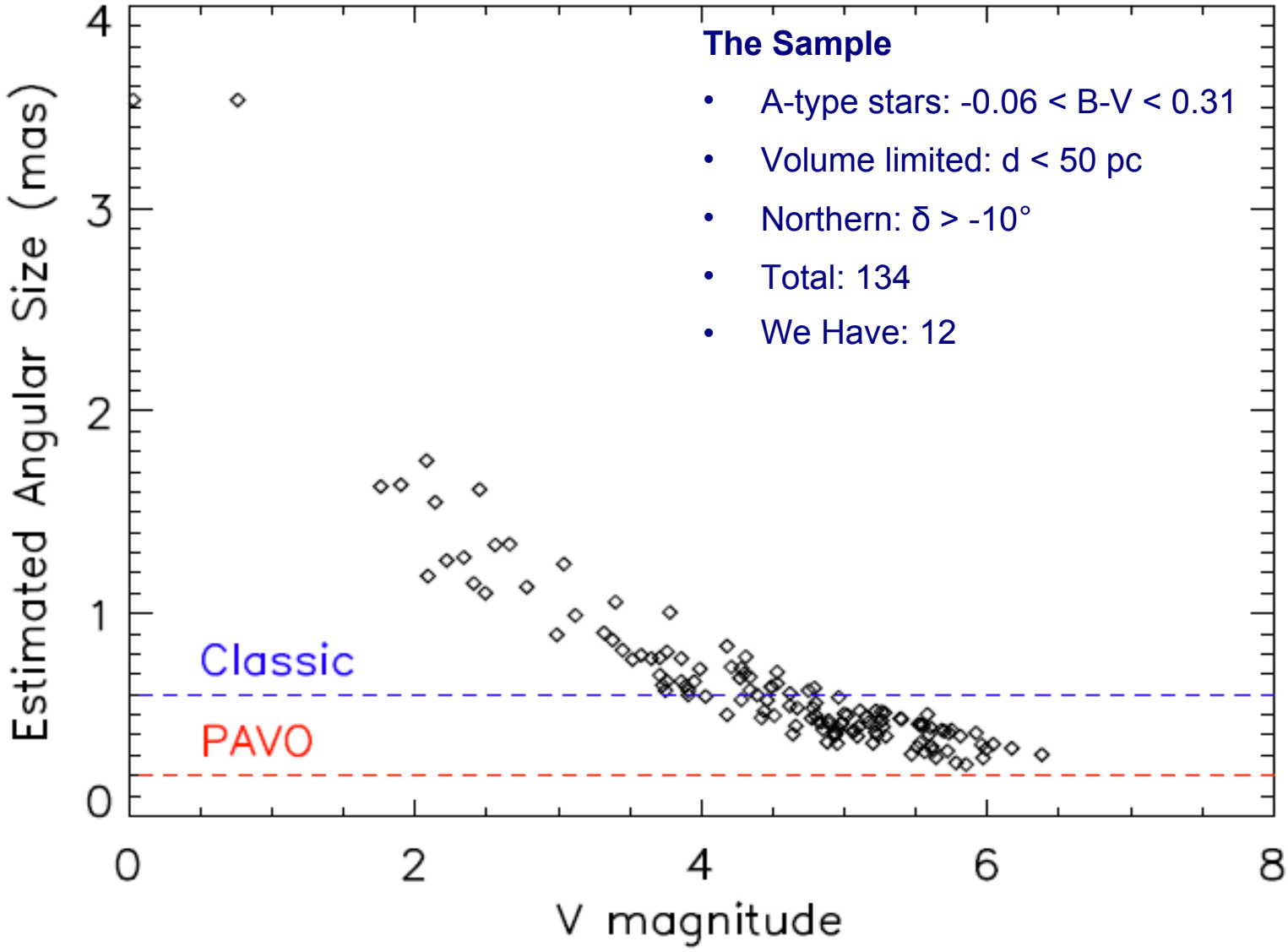

HR 8799 (A5 V)
Size of Pluto's Orbit
NASA/JPL-Caltech/K. Su (Univ. of Arizona)


β Pictoris (A6 V)
NASA, ESA, D. Golimowski (Johns Hopkins University), D. Ardila (IPAC), J. Krist (JPL), M. Clampin (GSFC), H. Ford (JHU), and G. Illingworth (UCO/Lick) and the ACS Science Team


HIP 78530 (B9 V... ≈A-type)
Lafreniére et al. 2011

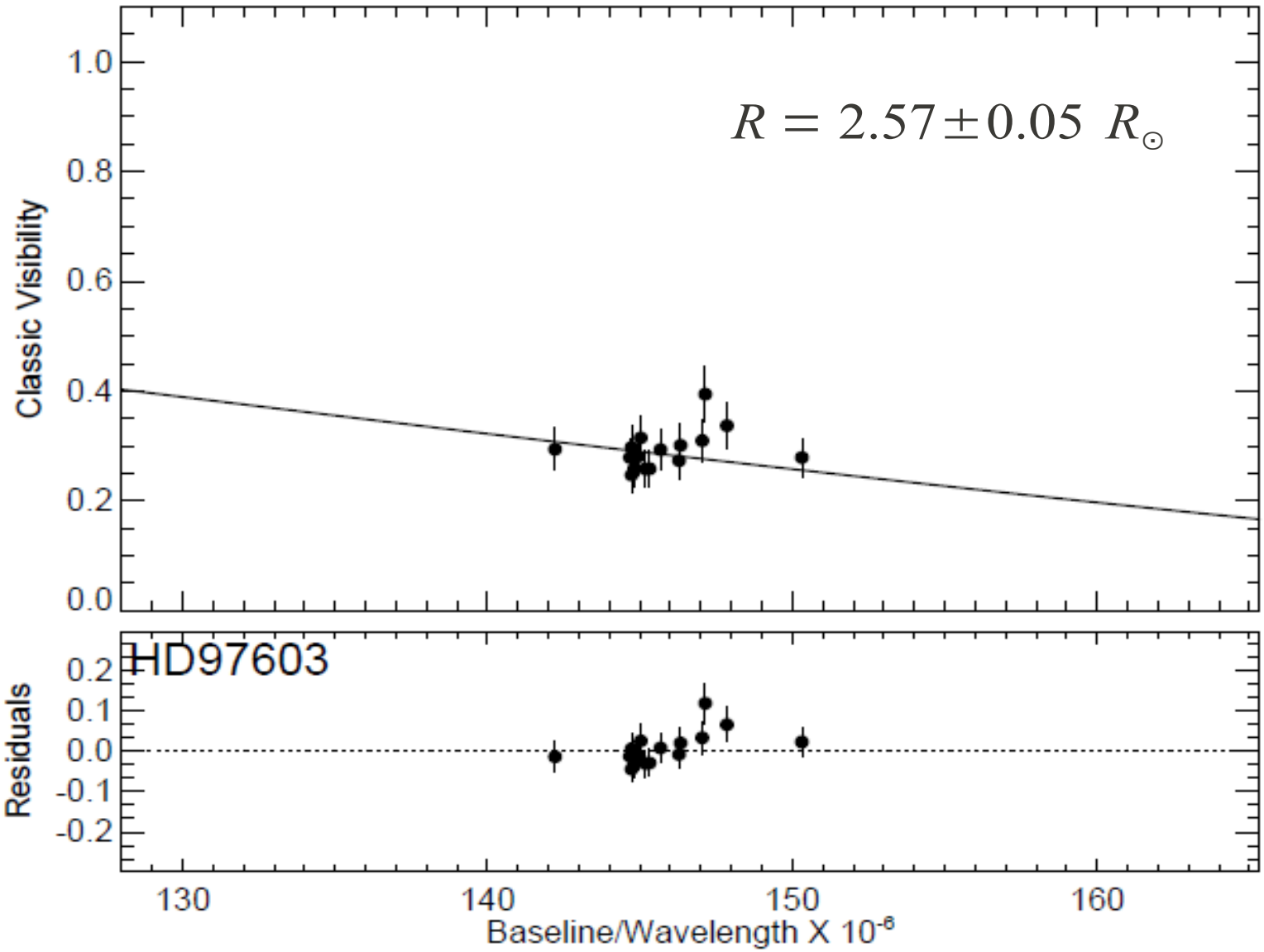

Fomalhaut (A3 V)
Fomalhaut b
2006
2004
Kalas et al. 2008


b
c
e
d
HR 8799 (A5 V)
20 AU
0.5″
Marois et al. 2010

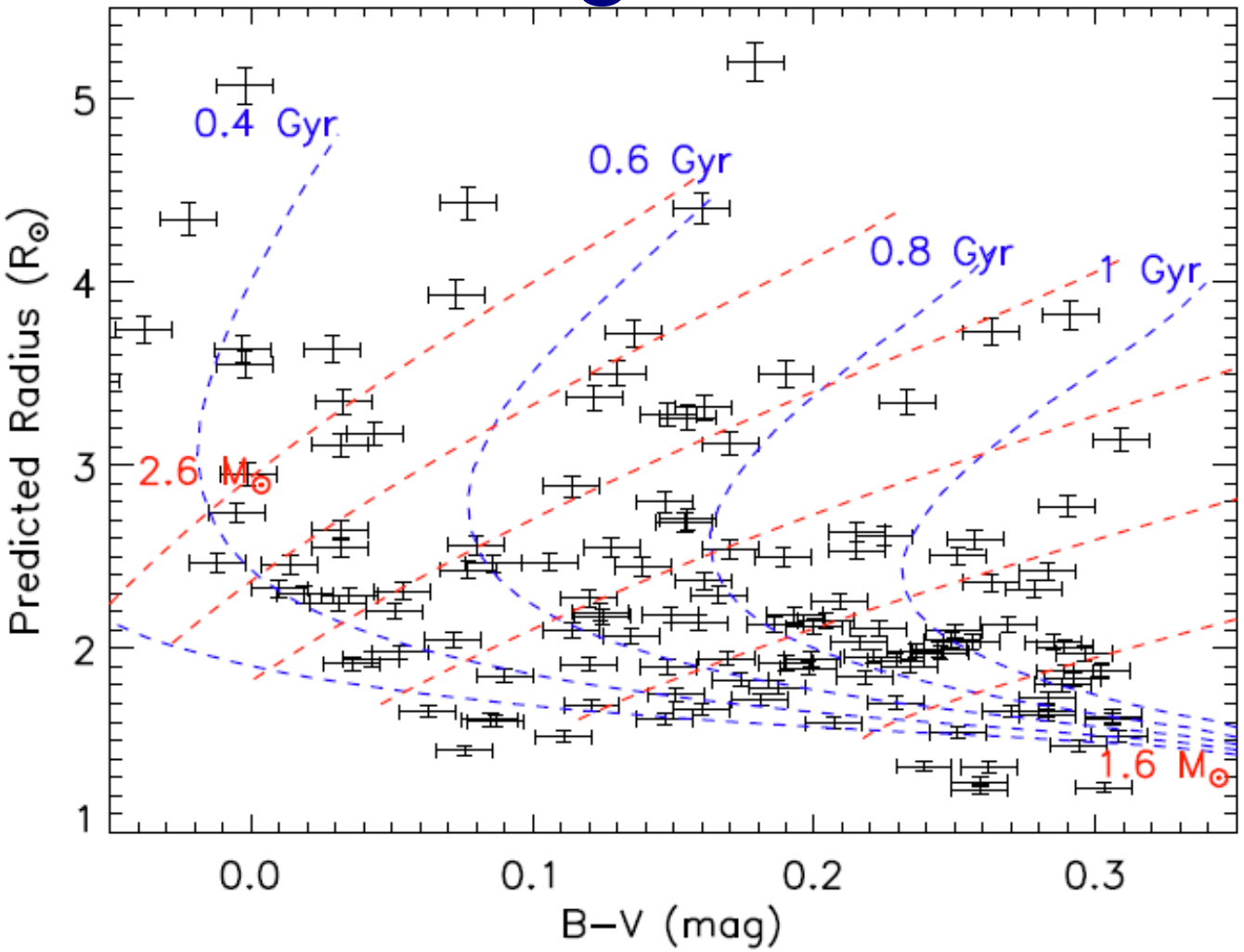


The Sample

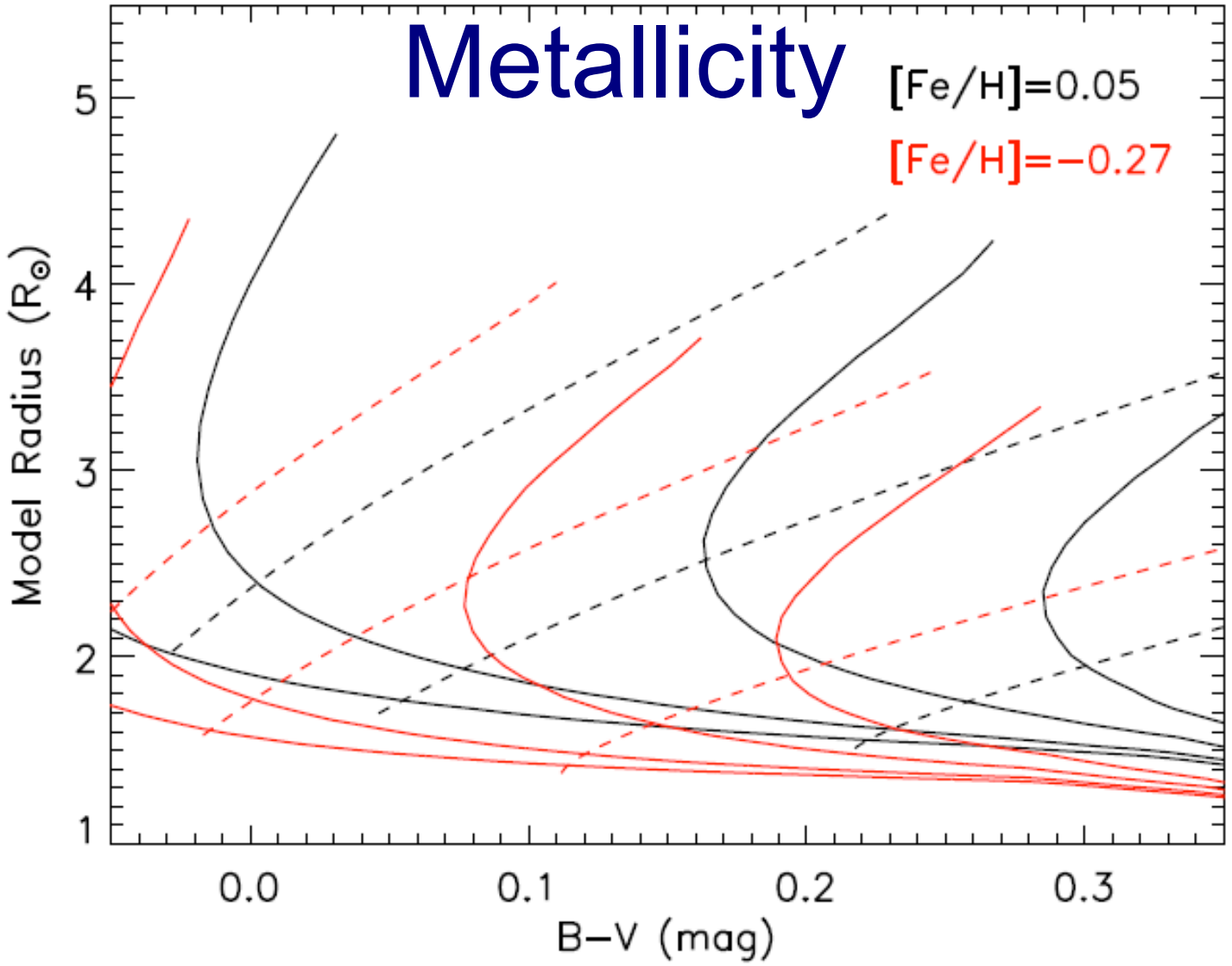
- A-type stars: -0.06 < B-V < 0.31
- Volume limited: d < 50 pc
- Northern: δ > -10°
- Total: 134
- We Have: 12


$R = 2.57 \pm 0.05\ R_\odot$
HD97603
Classic Visibility
Residuals
Baseline/Wavelength X 10^{-6}
1.0
0.8
0.6
0.4
0.2
0.0
0.2
0.1
0.0
-0.1
-0.2
130
140
150
160

Ages

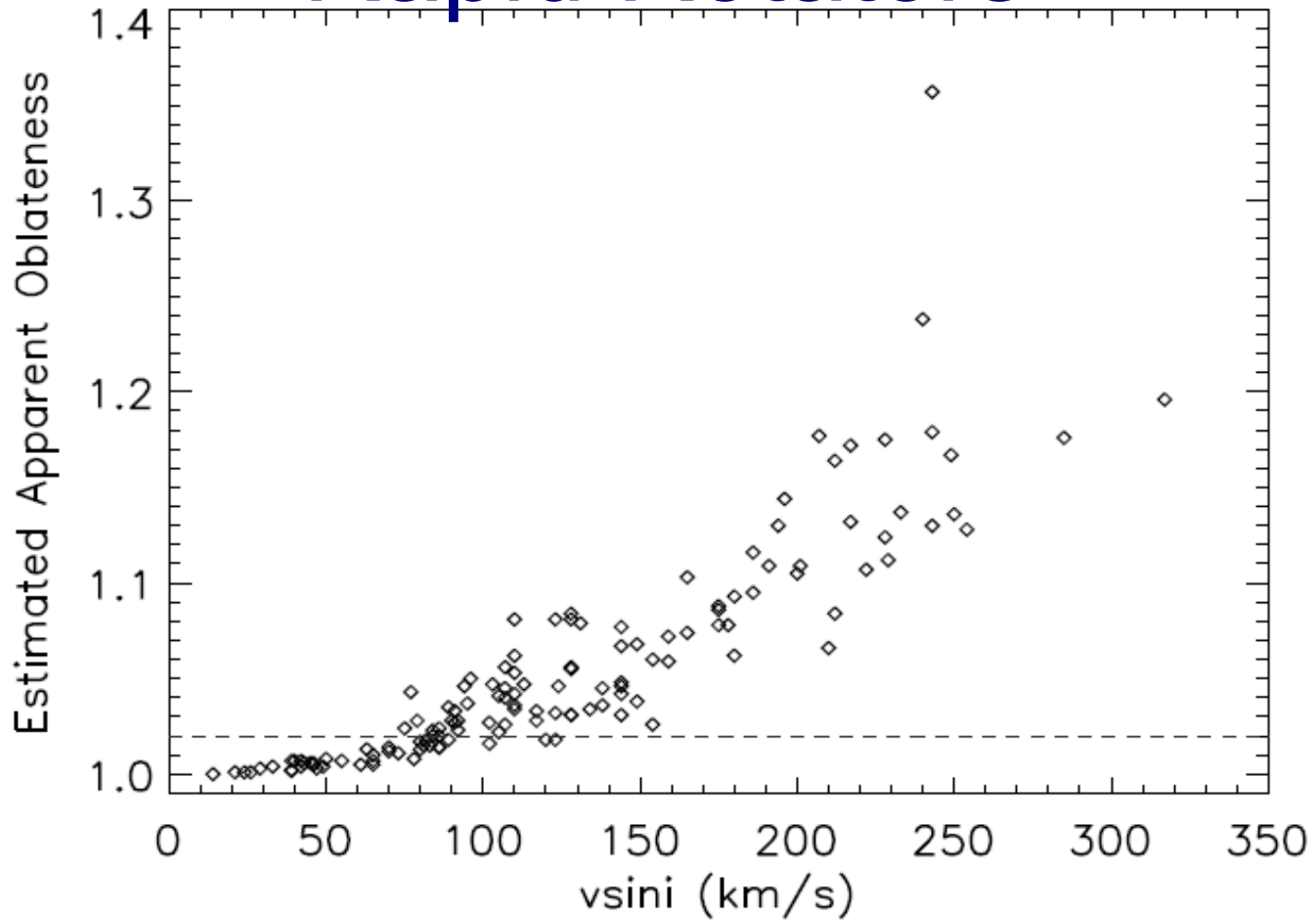

0.4 Gyr
0.6 Gyr
0.8 Gyr
1 Gyr
2.6 M⊙
1.6 M⊙
Predicted Radius (R⊙)
B−V (mag)
1
2
3
4
5
0.0
0.1
0.2
0.3

Challenge:


Metallicity
[Fe/H]=0.05
[Fe/H]=−0.27
Model Radius (R⊙)
1
2
3
4
5
0.0
0.1
0.2
0.3
B−V (mag)

Challenge:

Rapid Rotators



Summary

- Measure radii for all nearby A-stars
  - Using Classic/CLIMB for large targets, PAVO for small targets
- Determine ages based on these radii
  - ~5% precision on “simple” systems
- Open to collaboration