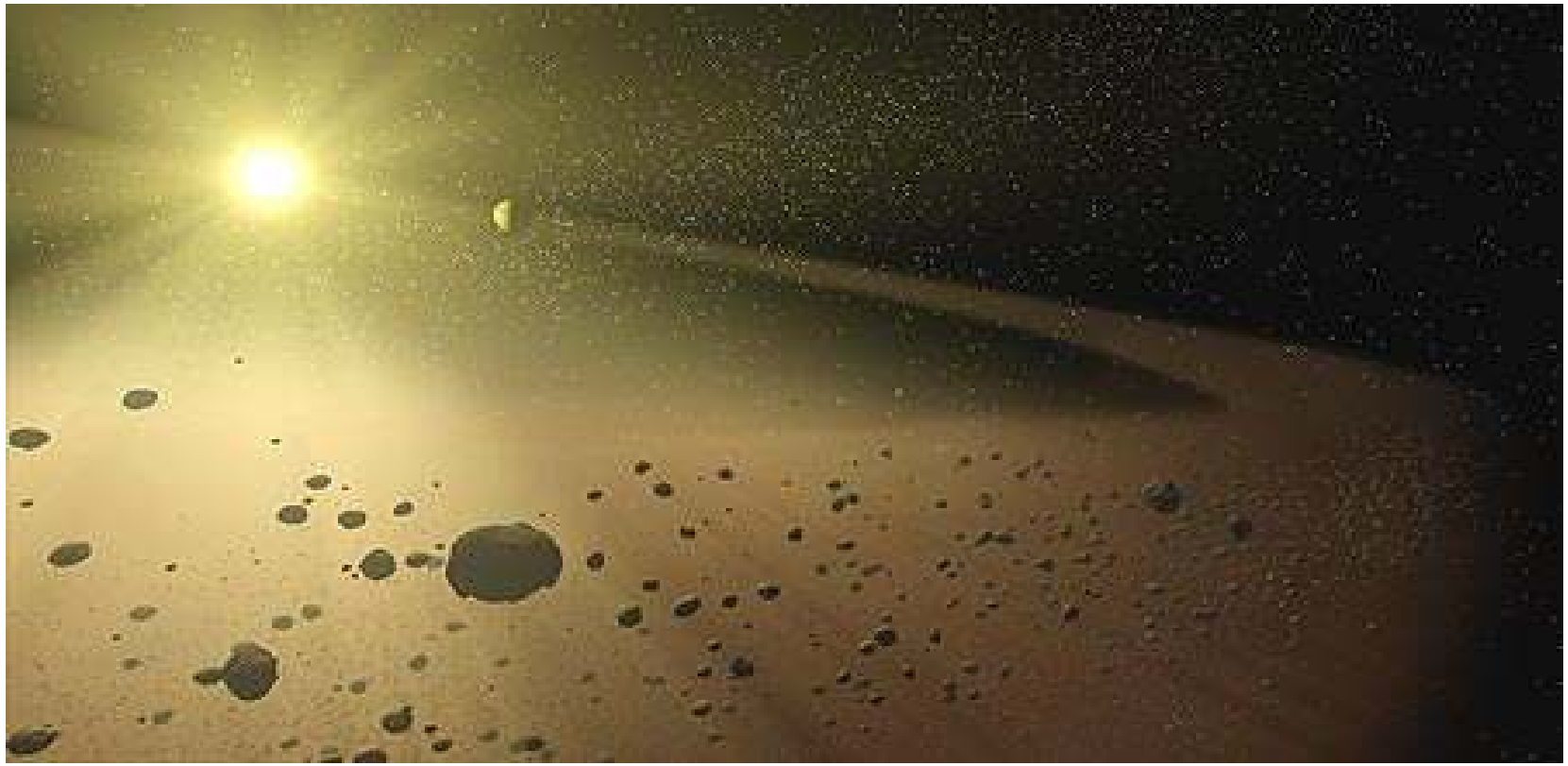
Characterisation of the inner region of three debris discs with AMBER

Hanot Charles and Defrère Denis

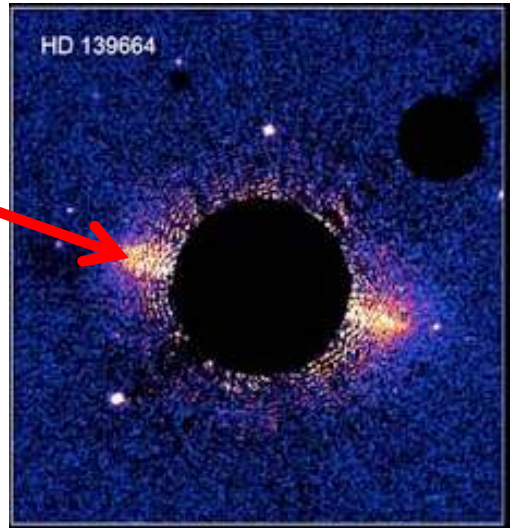


ONTHEFRINGE
Circumstellar disks and planets
at very high angular resolution
Porto - 28/05 to 08/06 2007

Scientific motivations

- Detecting the signature of hot dust around three bright Vega-type stars (70 Vir, G Lup and HD 207129).
- What's a Vega-type star?
  - ✓ Significant IR luminosity excess (Spitzer, IRAS).
  - ✓ About 15% of the ma rs.
- Appropriate targets to test heories for planetary systems.

3´´ occultation
(≈ 50 AU)



Hubble (ACS)

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  - ✓ About 15% of the main sequence stars.
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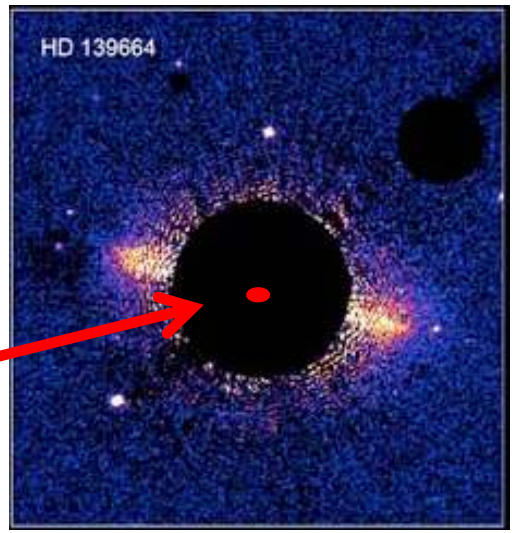
Interferometry with AMBER

0.011´´ resolution
(≈ 0.2 AU)

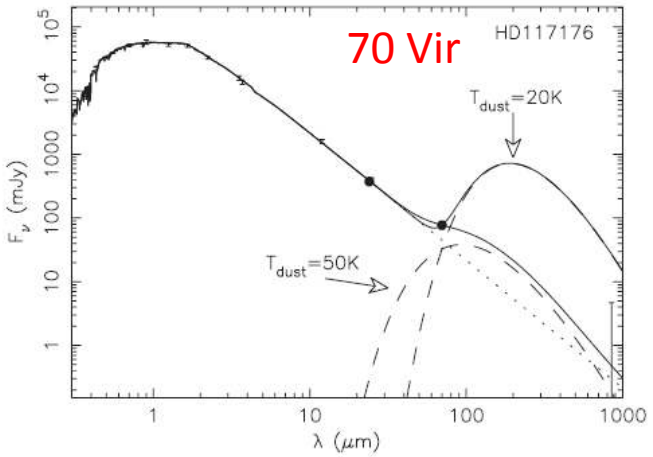


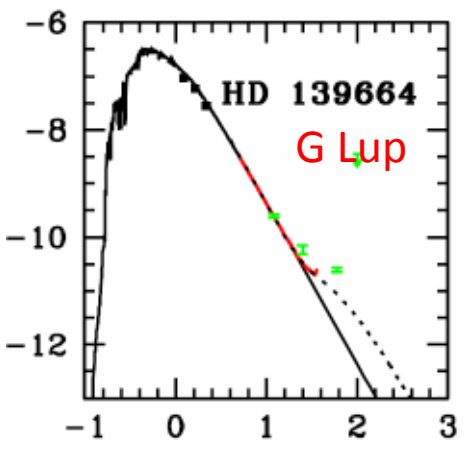
Scientific motivations

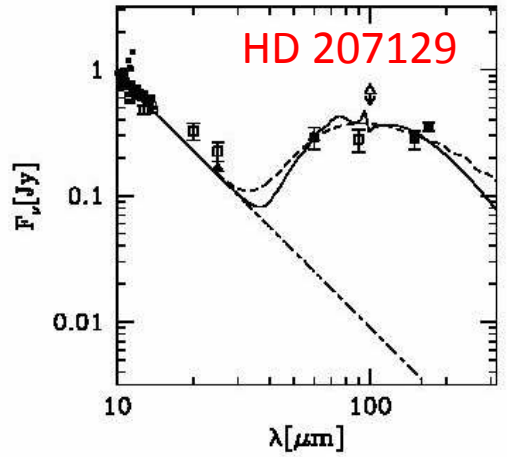
- Already observed Vega-type stars with their measured flux ratios:
  - ✓ **Vega :** 1.29 ± 0.19% (Absil et al., A&A, 2006)
  - ✓ **τ Cet :** 0.98 ± 0.21% (Di Folco et al., A&A, 2007)
  - ✓ **ε Eri :** < 0.6% (Di Folco et al., A&A, 2007)
  - ✓ **β Leo:** 2.06 ± 0.79% (see Akeson talk)

- Aim of the proposal: extending the study to the 3 following targets

Stars	Type	Dist [pc]	Vmag	Kmag	Age	Ldisk/Lsta	Reference
70 Vir	G2.5V	18.1	5.00	3.25	5.4G	1E-05	Bryden et al. 2006
G Lup	F5V	17.5	4.64	3.66	200M	1.3E-04	Chen et al. 2006
HD 207129	G2V	15.6	5.58	4.14	40M-6G	1.4E-04	Chavero et al. 2006

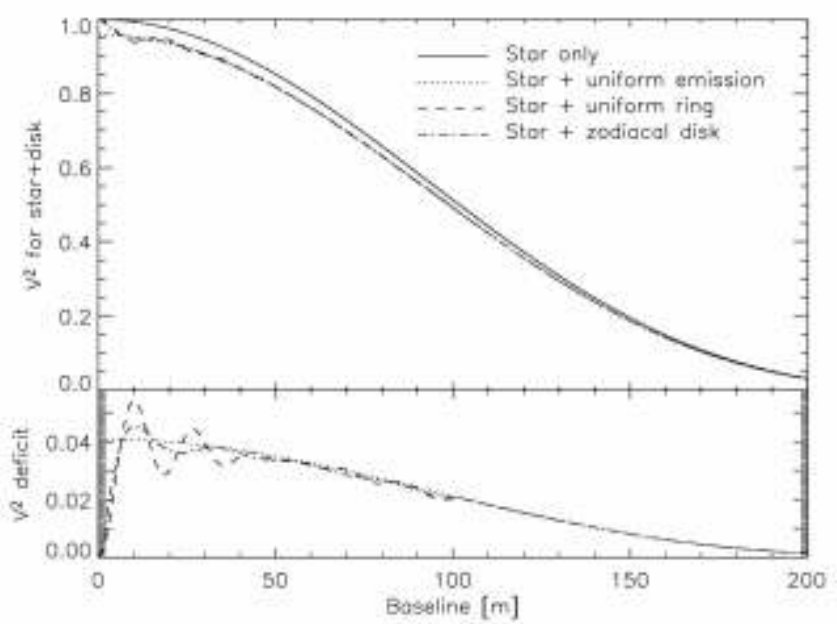


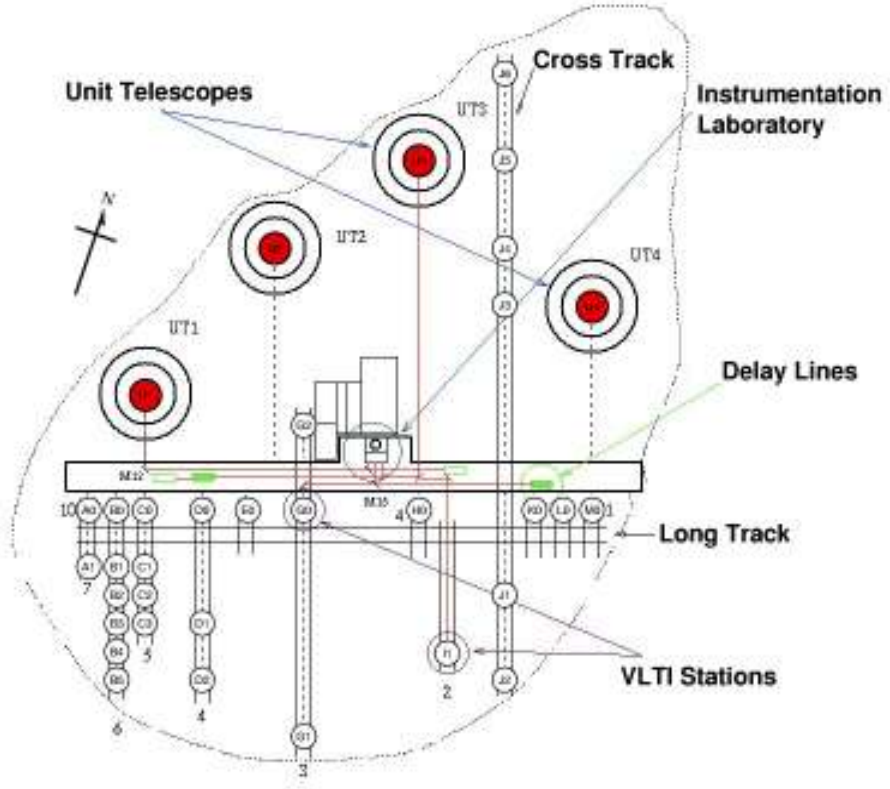




Observation strategy

- Obtaining visibility measurements at short baselines (host star unresolved).





- Why AMBER?
  - Appropriate angular resolution on EO-G0-H0;
  - Good dynamic range ;
  - Good wavelength range (substantial emission in the near-infrared).

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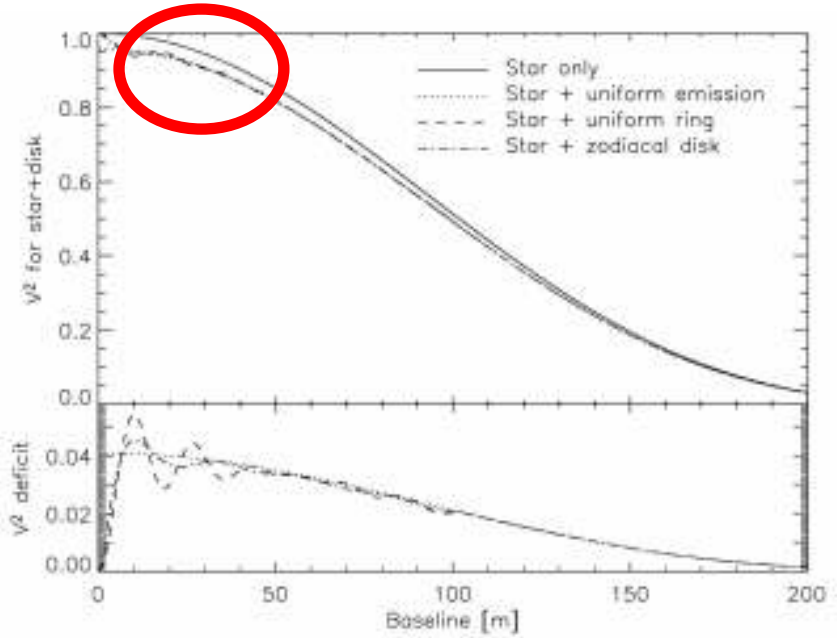

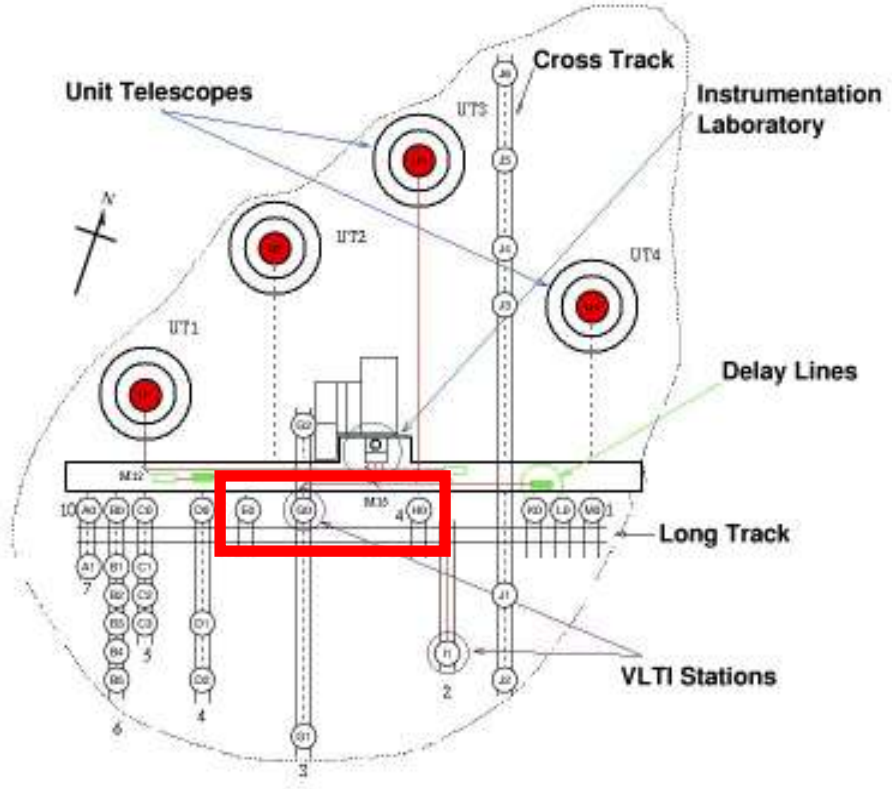

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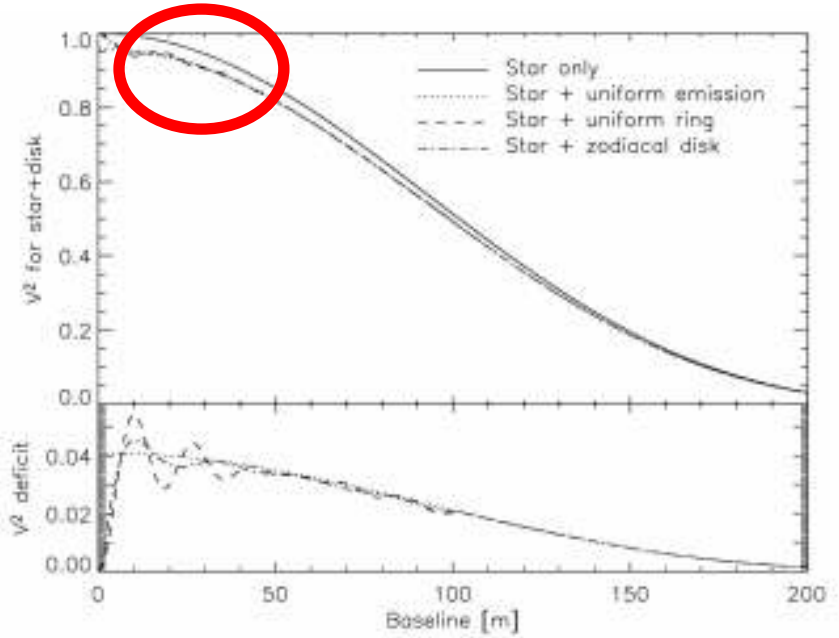
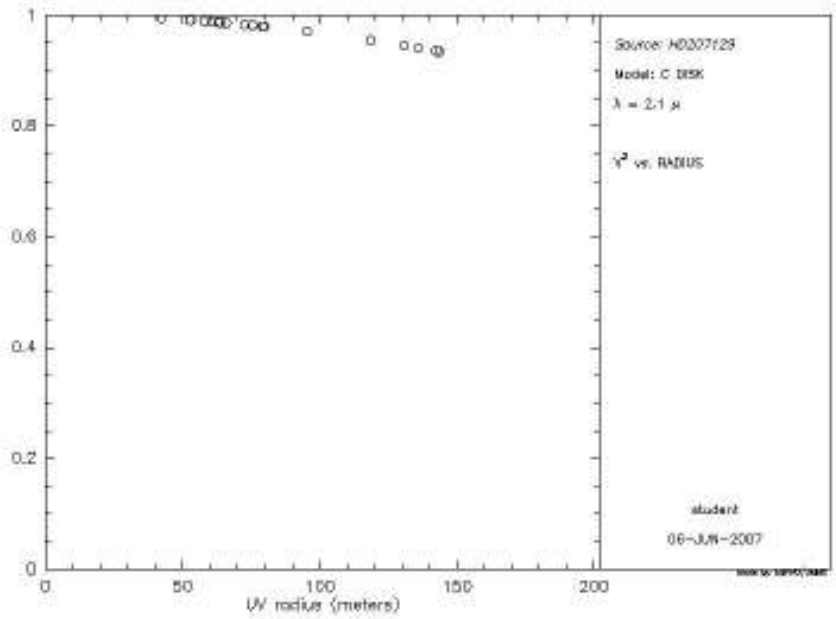
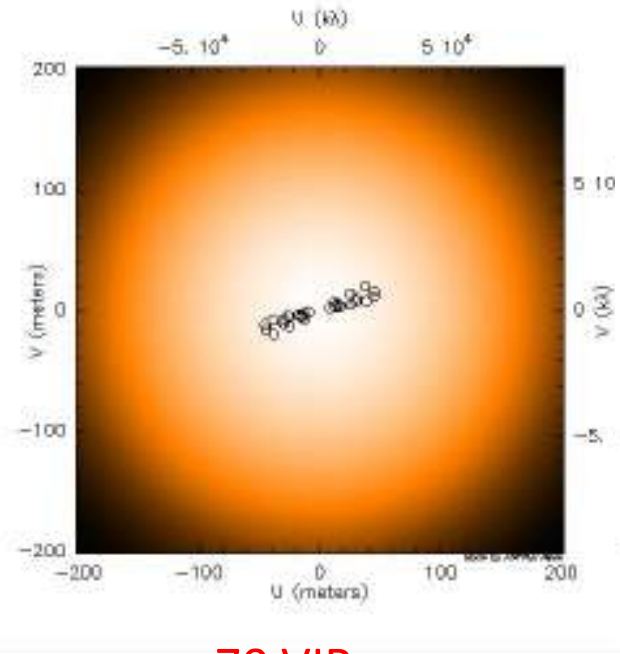




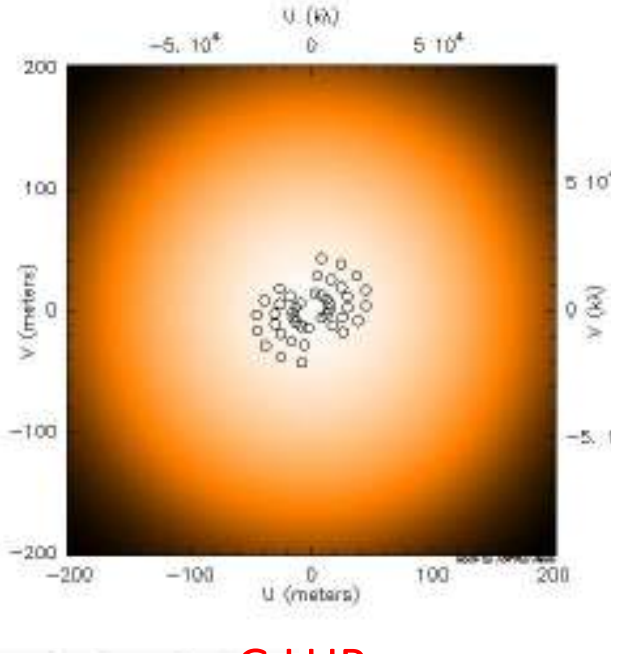
- Maximum resolution of AMBER insufficient to resolve the target stars
- Use of surface brightness technique (Kervella et al. 2004)

What about the u,v plane?

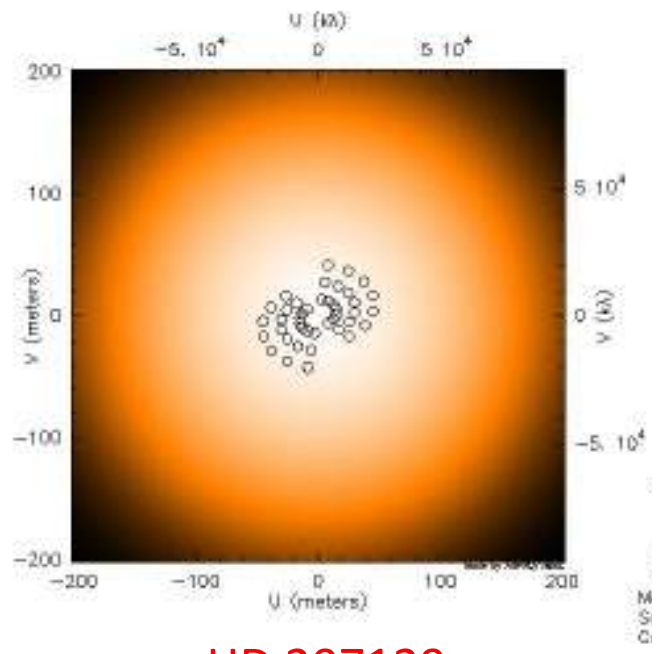
- The central stars are unresolved $\Rightarrow$ V $\approx$1



70 VIR



G LUP

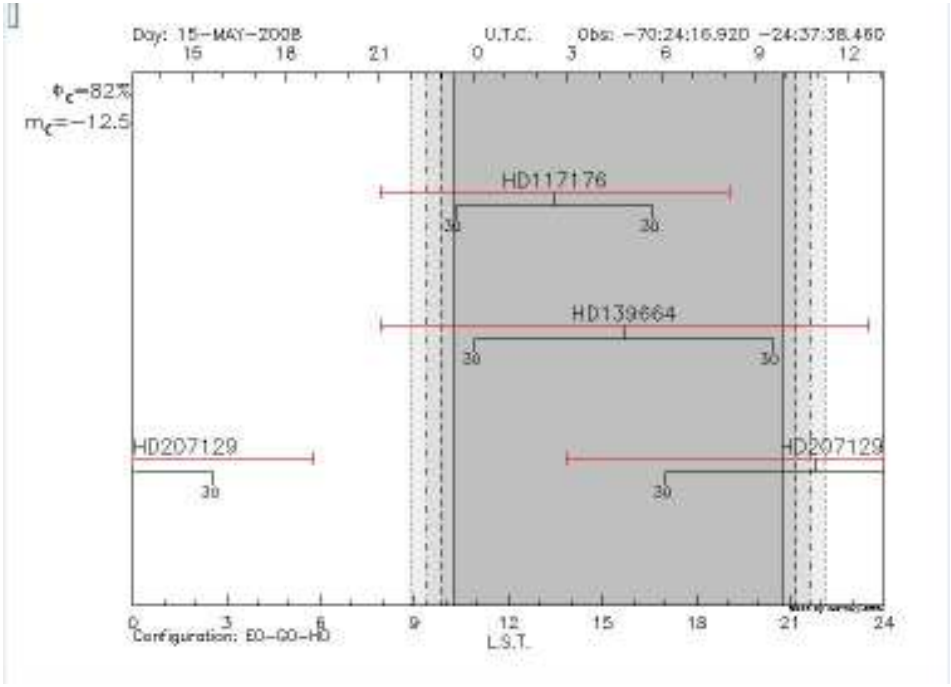


HD 207129

Observation window

- Observation constraints:
  - ✓ 1 calibrated triplet of visibilities with AMBER = 1h30;
  - ✓ Standard accuracy of AMBER = 2-5%;
  - ✓ Desired accuracy ≈ 1%;
  - ✓ Required time per target = 6 x 1h30 = 9h;
  - ✓ 3 asked nights.

- Targets observable at the same time from 15 May to 15 June



Calibrators

- Ideal calibrators properties:
  - Small angular distance
  - Observable at the same time
  - Unresolved withour baselines
  - Similar magnitude than the target star
  - Same spectral type as the target star

- In practice we have relaxed the spectral type constraint

Target	Calibrator
70 VIR	HD114889
G LUP	HD137730
HD207129	HD204960

QUESTIONS ?