Observing DL Vir (HD 120901) with the VLTI

Judith Ngoumou
Iciar Montilla

Porto VLTI Summer School 2007

Scientific motivation

- **object** DL Vir, a system with a cool primary (K0III) and a hot binary as companion (A1). Parsons et al. (Astronomical Journal 127, 2004) have studied it with photometric measurements and spectra, and suspect that it is a triple system.

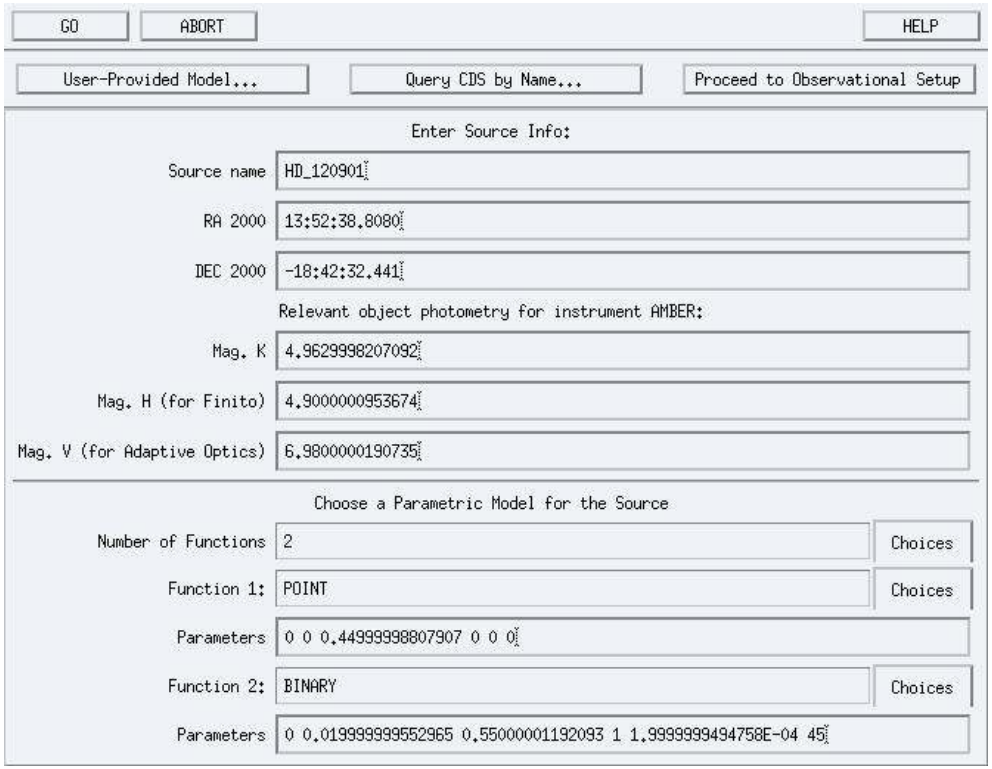
- **the reason** obtain interferometric measurements to calculate the separation, flux ratio and position angle.

- **and the BIG reason** Armstrong et al. (Astronomical Journal 131,2006) have been able to determine the inclination of the orbit of a binary measuring many points in its visual orbit with NPOI. Combining this data with the radial velocities they have determined the masses of the stars.

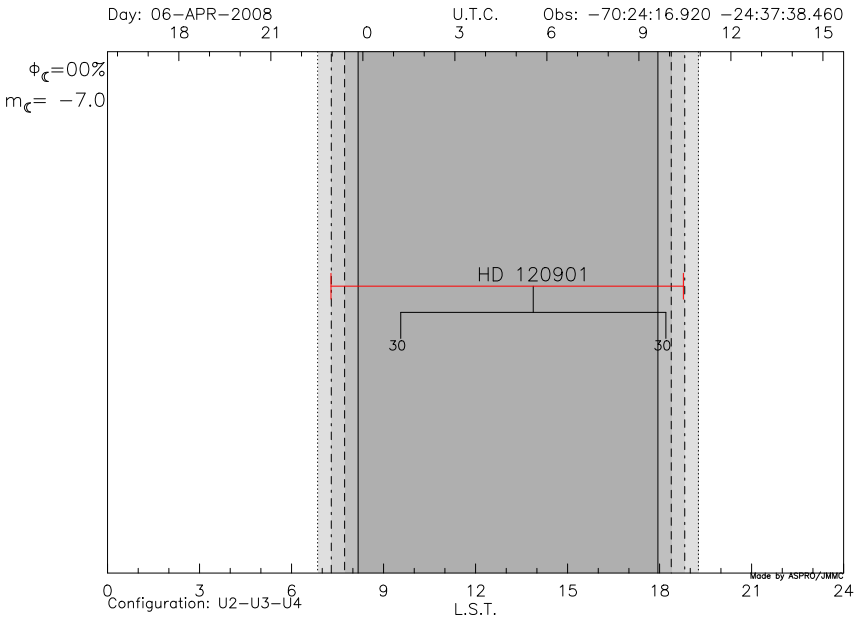
Model parameters

Model estimations for HD 120901

K	H	V	a1+a2 (mas)	b1+b2 (mas)	period (years)	flux ratio
4.963	5.098	6.98	0.02	0.0002	6.25	0.8



Observing proposal



- Instrument: AMBER
- Low resolution, 25 ms
- Visitors mode, H, J, K
- Baseline

  U2-U3-U4 (H.A. -4 to 0)

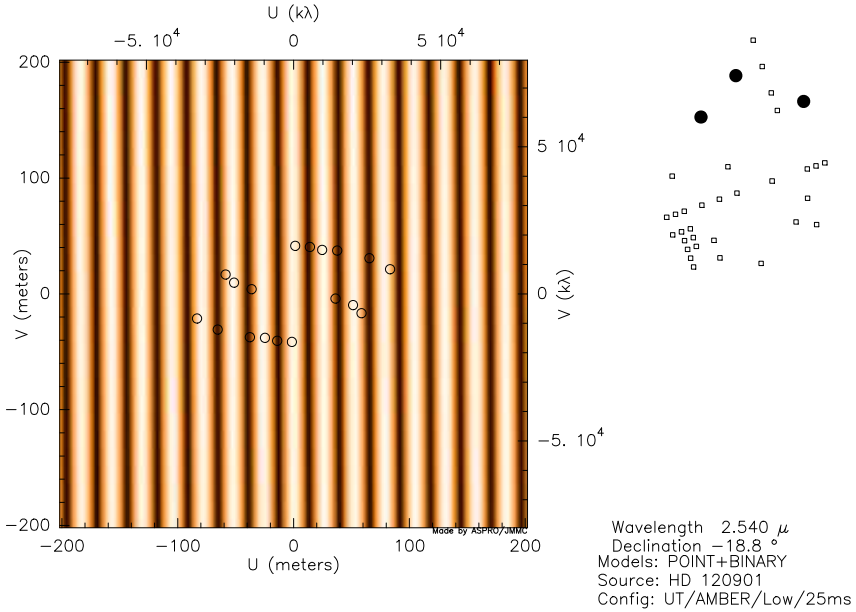
  U1-U2-U3 (H.A. 0 to 4)
- Date 06/04/2008

  06/04/2009

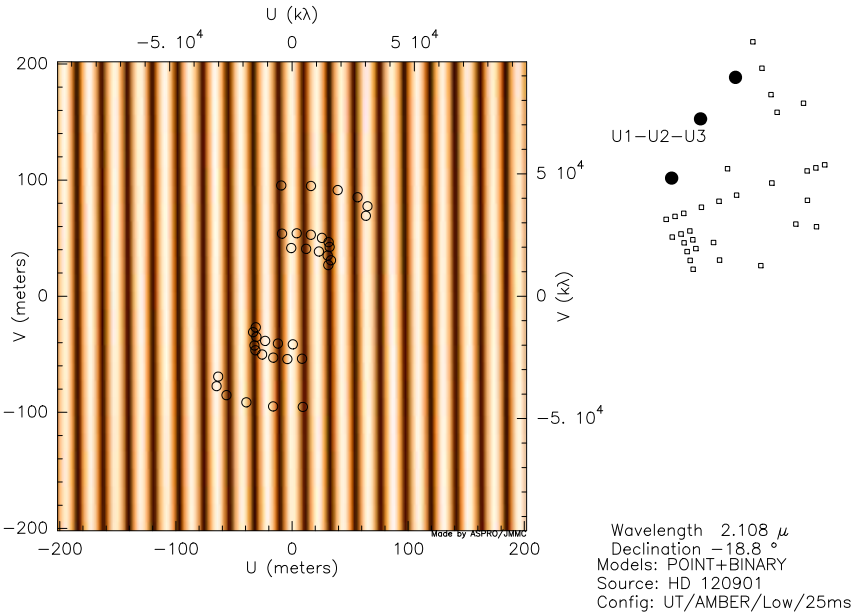
Calibrator: HD 120452_M04
Angular distance to the science object 0.9 deg
Spectral type K0III
No shadowing, delay lines available

UV coverage

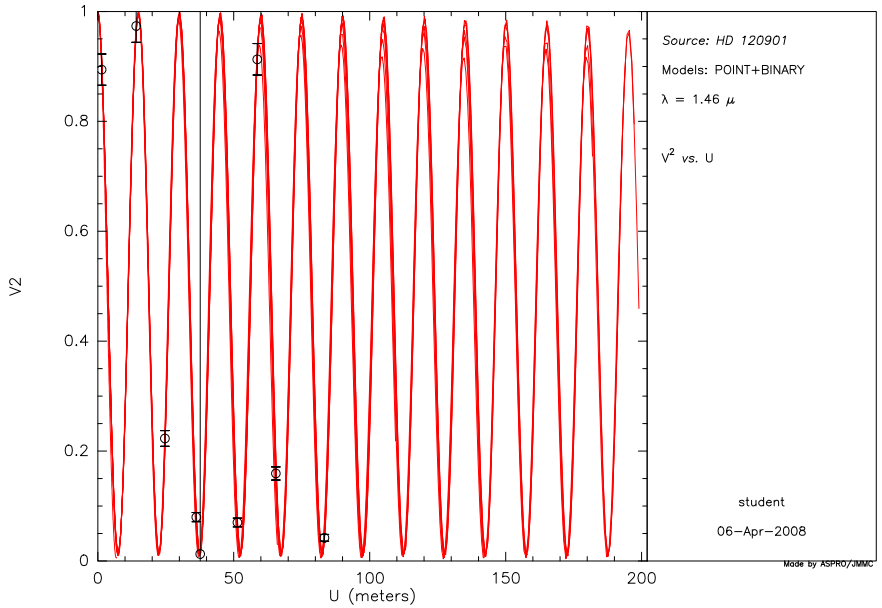
U2-U3-U4

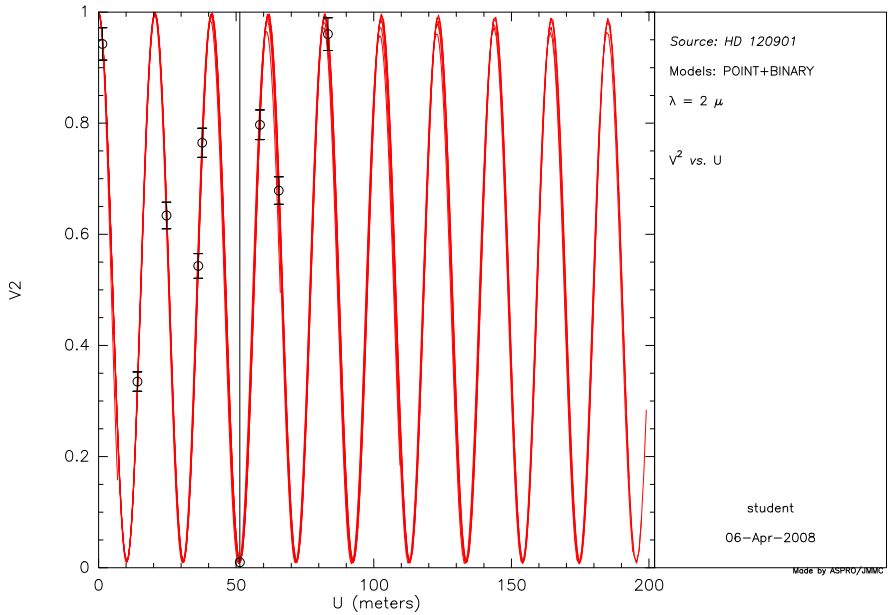


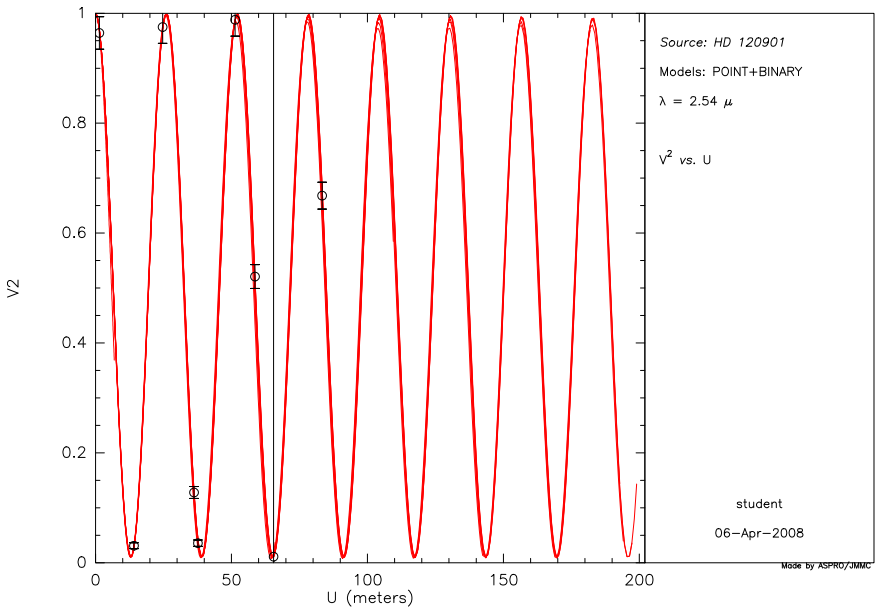
U1-U2-U3



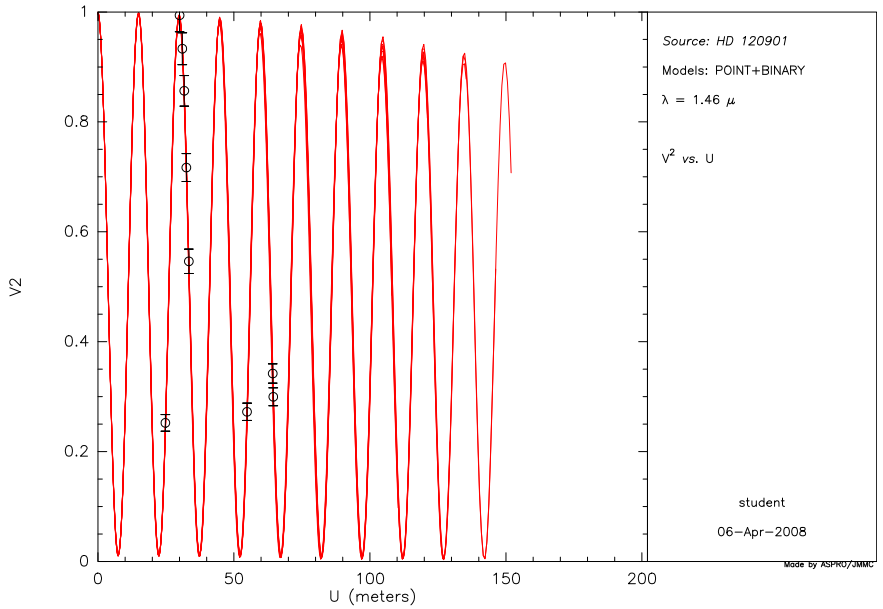
Modeled visibility: U2-U3-U4

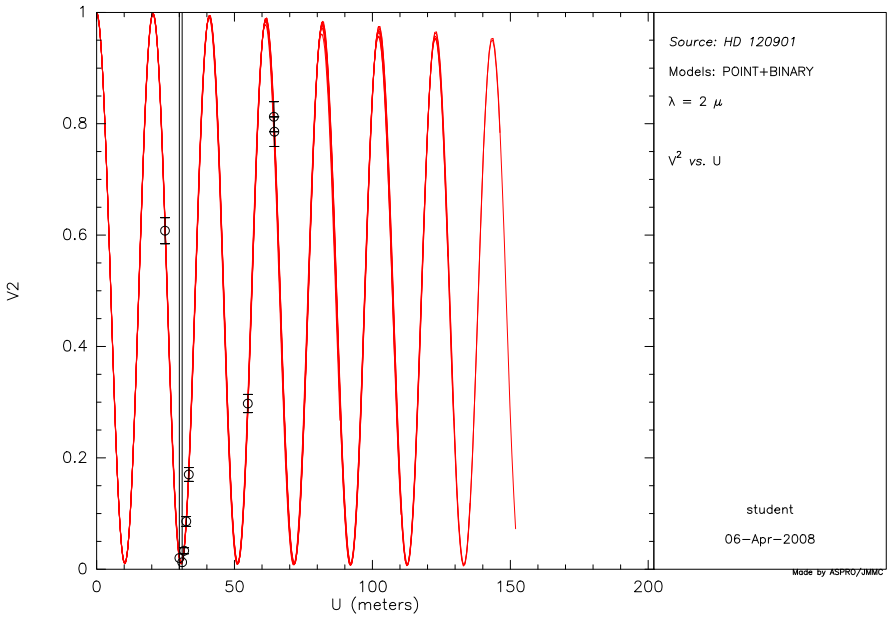


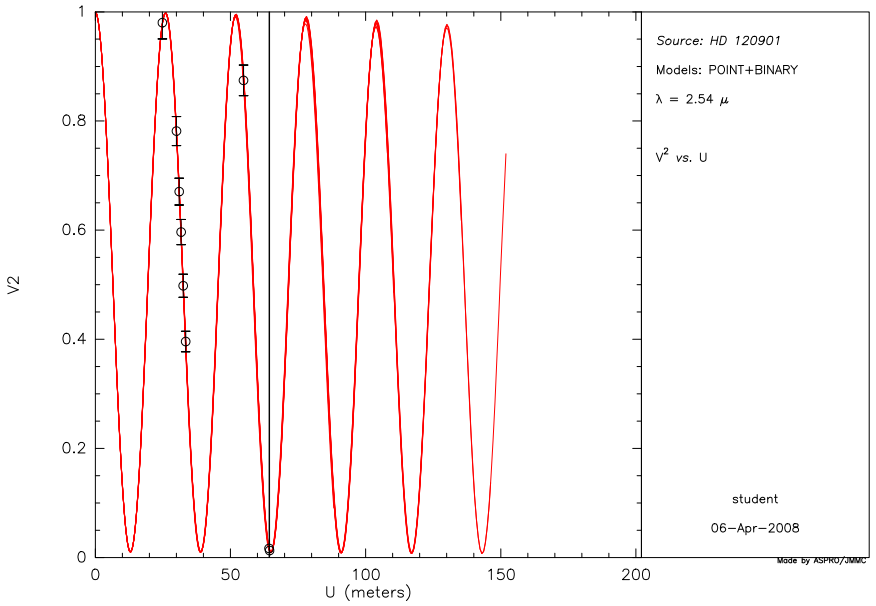




Modeled visibility: U1-U2-U3







Measurements and outcome

• From the interferometric measurements we obtain the flux ratio, the separation and the position angle
• We take measurements two different nights to have an estimate of the visual orbit
• But….probably 2 points are not enough to fit a model to obtain the inclination sin (*i*)
• In case the visual orbit could be constraint to calculate sin (i), combining that data with the spectroscopic radial velocities and using Kepler´s third law:

$$(M_1+M_2)\ 2\pi G \sin^3(i) = P(\nu_{r1}+\nu_{r2})^3$$

it would be possible to calculate the mass of each star.