



Cornell University  
Department of Astronomy

Smaller, Fainter, Closer:  
Finding Stellar Companions  
using  
Aperture Masking Interferometry



- Aperture Masking with LGS:
  - + Resolution, + Contrast
  - Faster Dynamical Masses
- L Dwarf Survey Results:
  - Four Candidate Binaries

David Bernat – Cornell Univ.

# Aperture Masking for Brown Dwarfs

LGS AO needed for dwarf *primaries*.

- ↳ BDs too faint to use as guide star
- ↳ BDs mostly out of Galactic Plane

Nowhere near 100+:1 as with NGS

Experimental LGS offers much worse correction than Keck's.

Poor Data

- ↳ Good enough to do science

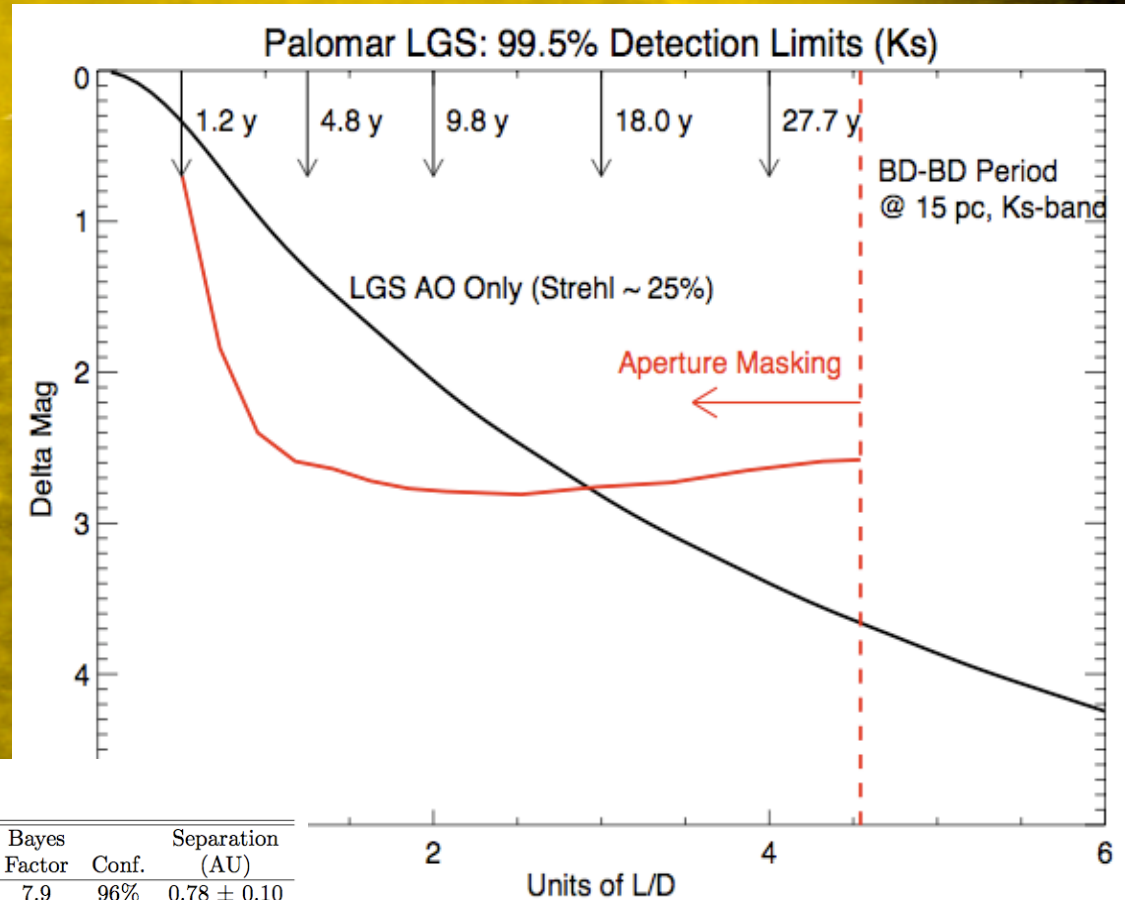


TABLE 3  
MODEL FITS TO CANDIDATE BINARIES

Primary	J. Date (+245000)	Separation (mas)	Az. Ang. (deg)	Contrast Ratio	Bayes Factor	Conf.	Separation (AU)
2M 0036+1821	4731	89.5 ± 11.4	114.1 ± 5.5	13.14 ± 3.14	7.9	96%	0.78 ± 0.10
2M 0345+2540	4731	217.4 ± 9.1	258.8 ± 2.8	26.44 ± 4.22	7.6	98%	5.85 ± 0.26
		352.7 ± 10.5	87.6 ± 2.0	30.79 ± 9.08		96%	9.49 ± 0.31
2M 2238+4353	4732	128.2 ± 10.3	209.9 ± 5.3	17.76 ± 4.25	7.1	97%	2.79 ± 0.30
		228.5 ± 9.1	251.8 ± 3.5	23.79 ± 5.92		95%	4.98 ± 0.42
2M 0355+1133	4757	395.5 ± 9.7	19.5 ± 1.2	17.63 ± 4.22	6.3	97%	8.62 ± 0.66
		82.5 ± 13.0	276.2 ± 4.1	2.10 ± 0.40		90%	1.03 ± 0.27

# Aperture Masking Implementation

- 9-Hole Aperture Mask in Lyot Stop of Palomar
- Resultant image is of 36 overlapping fringes
- Fourier Transform gives phase of each baseline
- Closure Phases (84) constructed and calibrated
- Data fit to predicted CPs of model binary target.
  - ↳ Detection! → Separation, Position Angle, and Contrast Ratio
  - ↳ Estimation of maximum achievable contrast ratio

