Lambda Andromedae Imaging Status

Rob Parks

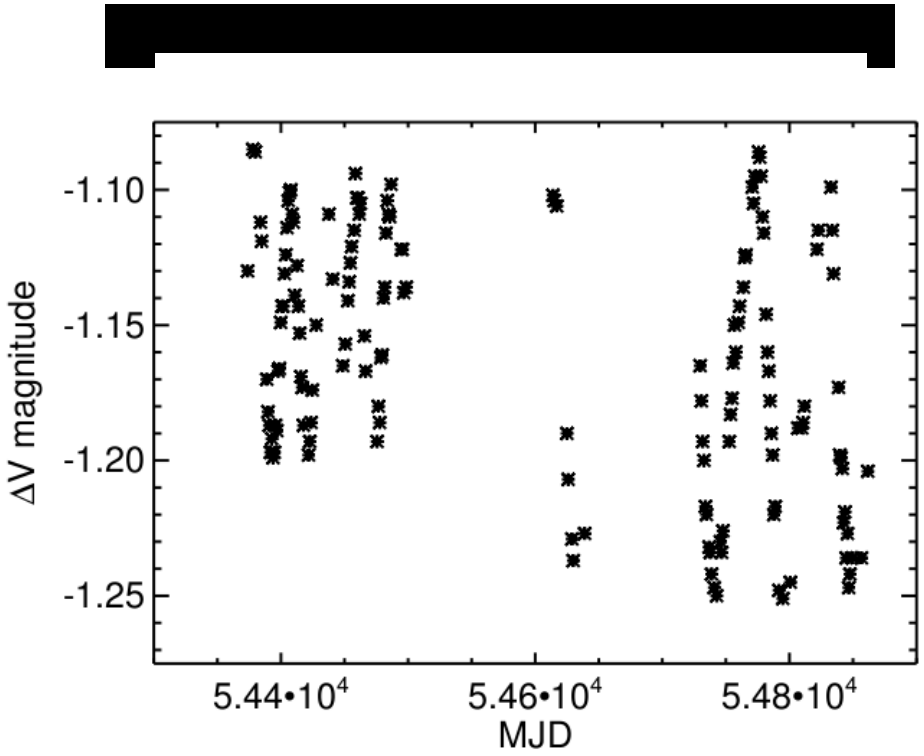
CHARA

Committee and Collaborators

- Advisor
  - Dr. Russel White
- Committee
  - Dr. Douglas Gies
  - Dr. Gary Hastings
  - Dr. Hal McAlister
  - Dr. Peter Plavchan (NExScI)
  - Dr. Jim Sowell (GaTech)
- Collaborators
  - Dr. Gail Schaefer
  - Dr. John Monnier
  - Dr. Frank Fekel (TSU)
  - Dr. Greg Henry (TSU)

Background

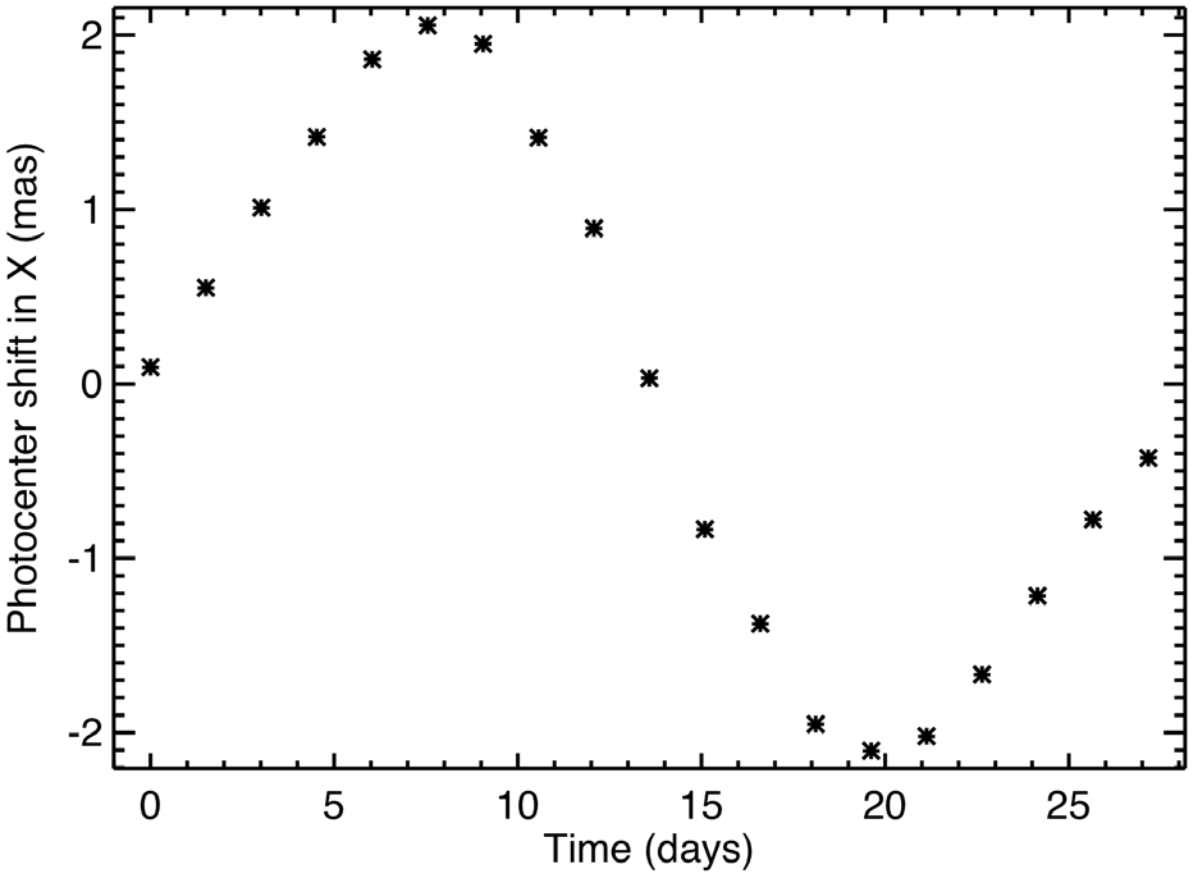
- Purpose
  - direct starspot properties
  - stellar interior physics
- Light Curve Inversion and Dopple Imaging
- MIRC/CHARA
- Complementary Photometry
  - Fairborn Observatoty (TSU)
- Starspot Model
  - Params – Star Size, Starspot: S Latitude, Longitude, Light Ra
  - Limb darkening coefficient fix
  - 1 or 2 starspots



(Frasca et al. (2008)

Code Developments

Size: 2.75 mas
α: 0.24
C_F: 25%
b: 30°
l: -90° to 90°
(10° spacing
F_{sp}/F_{ph}: 0.5



Lambda Andromedae

vsini = 6.5 km/s

P_{phot} = 54.33 days

ΔV mag $\leq$ 0.22 mag

SB1, white dwarf companion

G8 III, T_{eff} = 4700 K

M = 0.65 M_{sun}

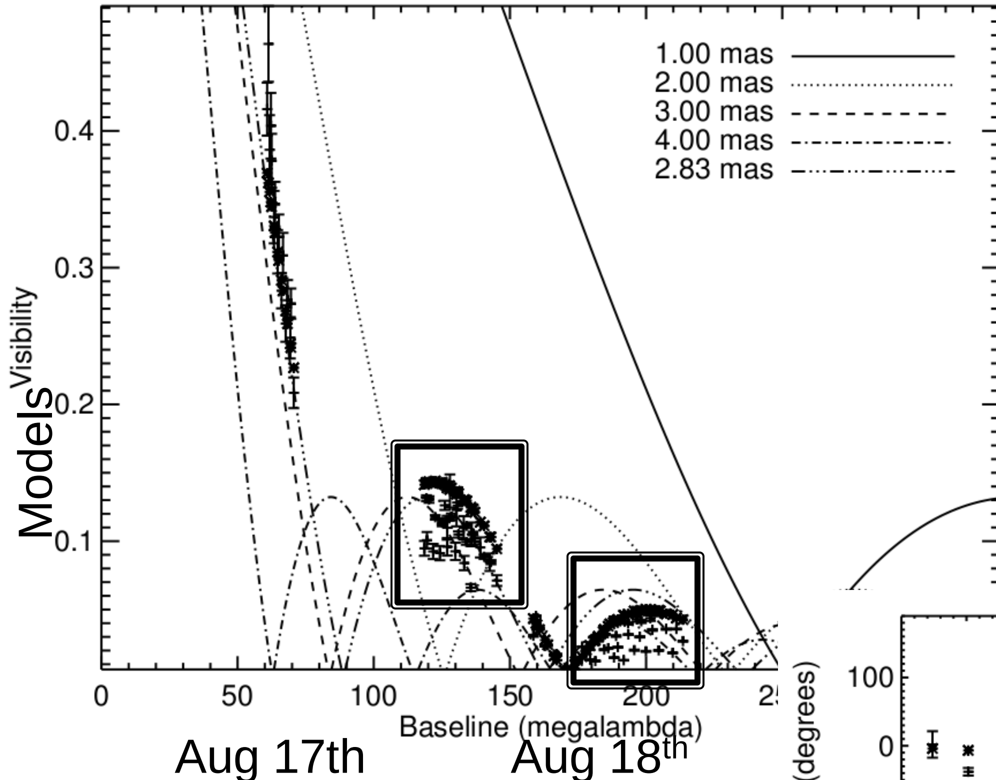
R = 7.5 R_{sun}

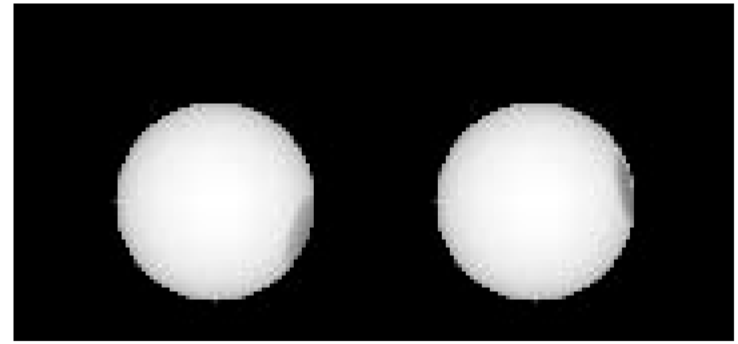
π = 38.74 $\pm$ 0.68 mas

H mag = 1.501

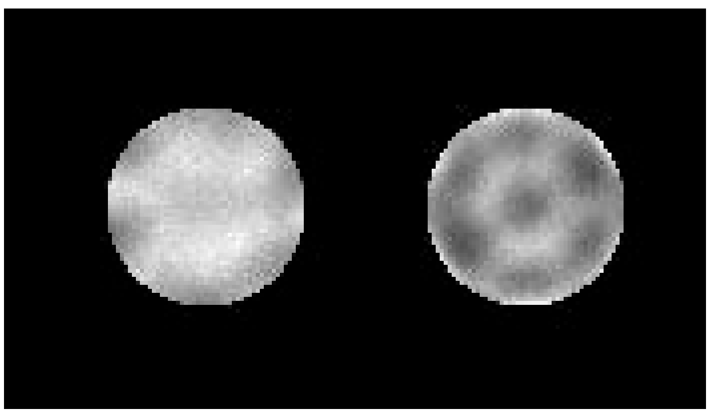
11 yr stellar activity cycle (Hall 1991)

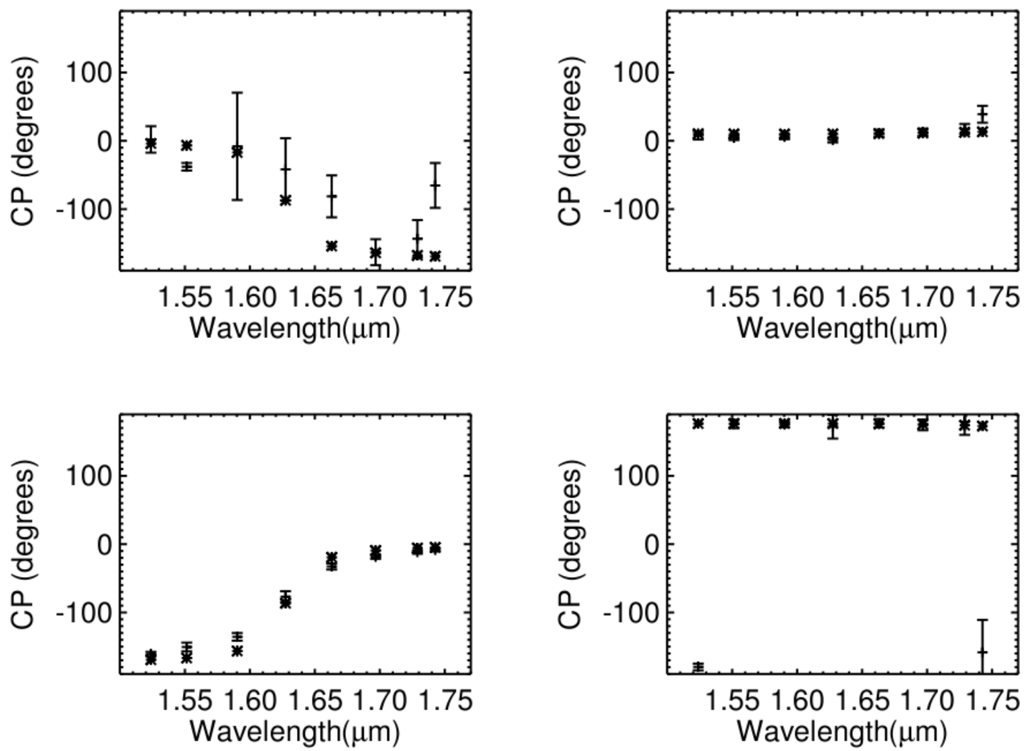
rvations





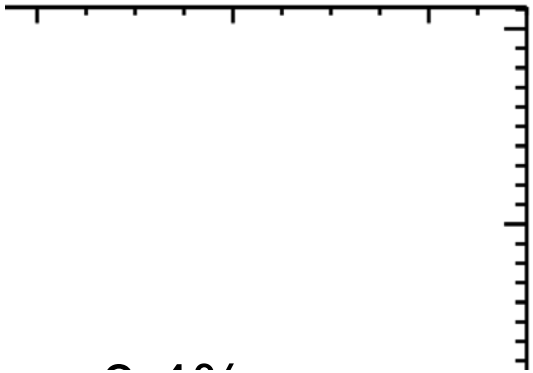
MACIM

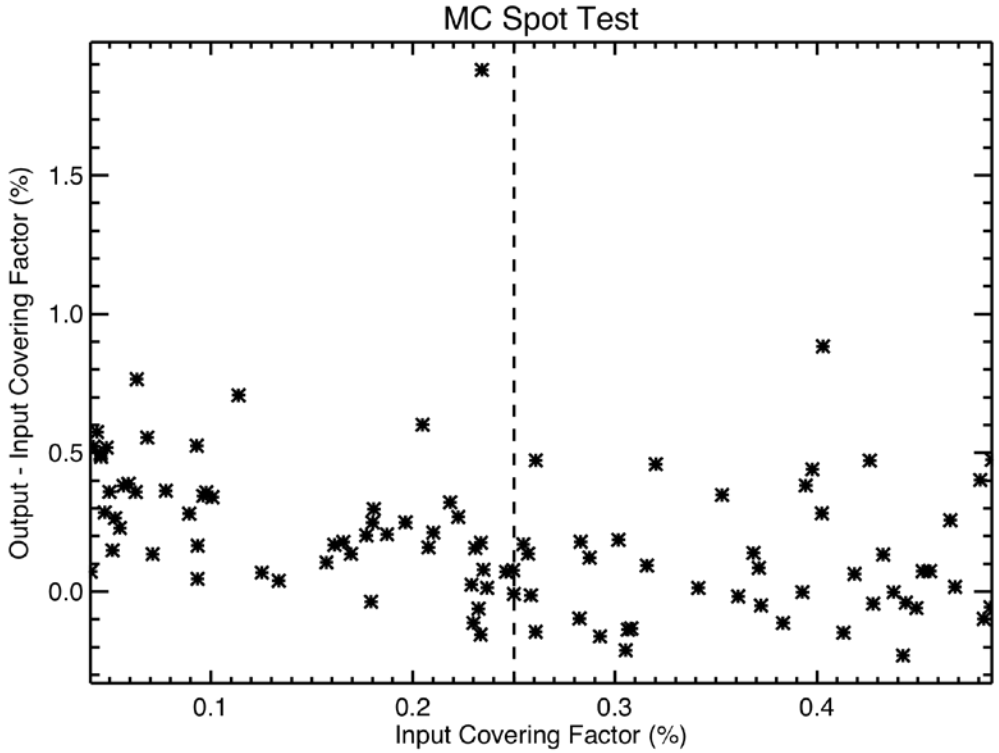




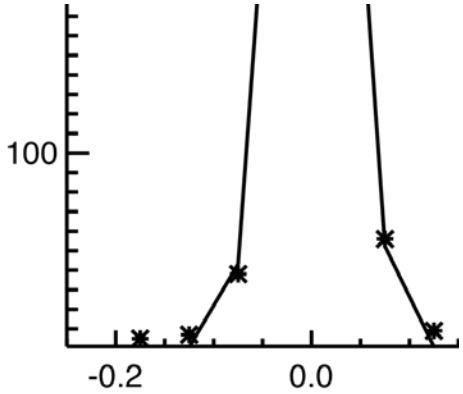
rlo Tests

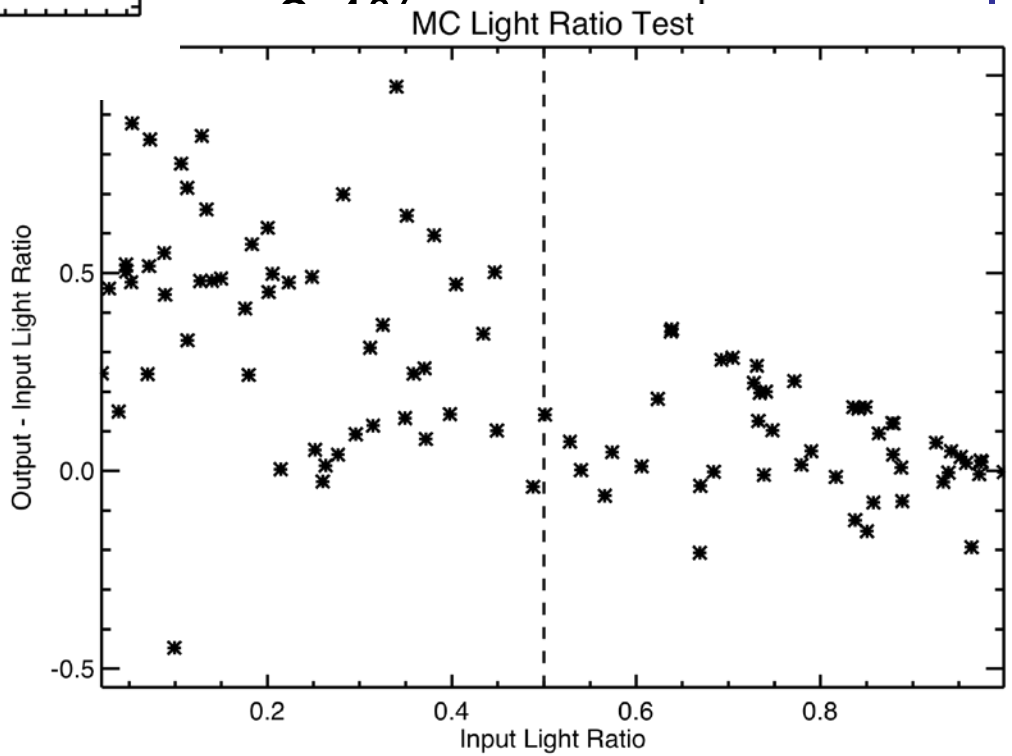
am with 5% bins





- li
- Spot
  - 1(
  - si
  - sp





Georgia State University

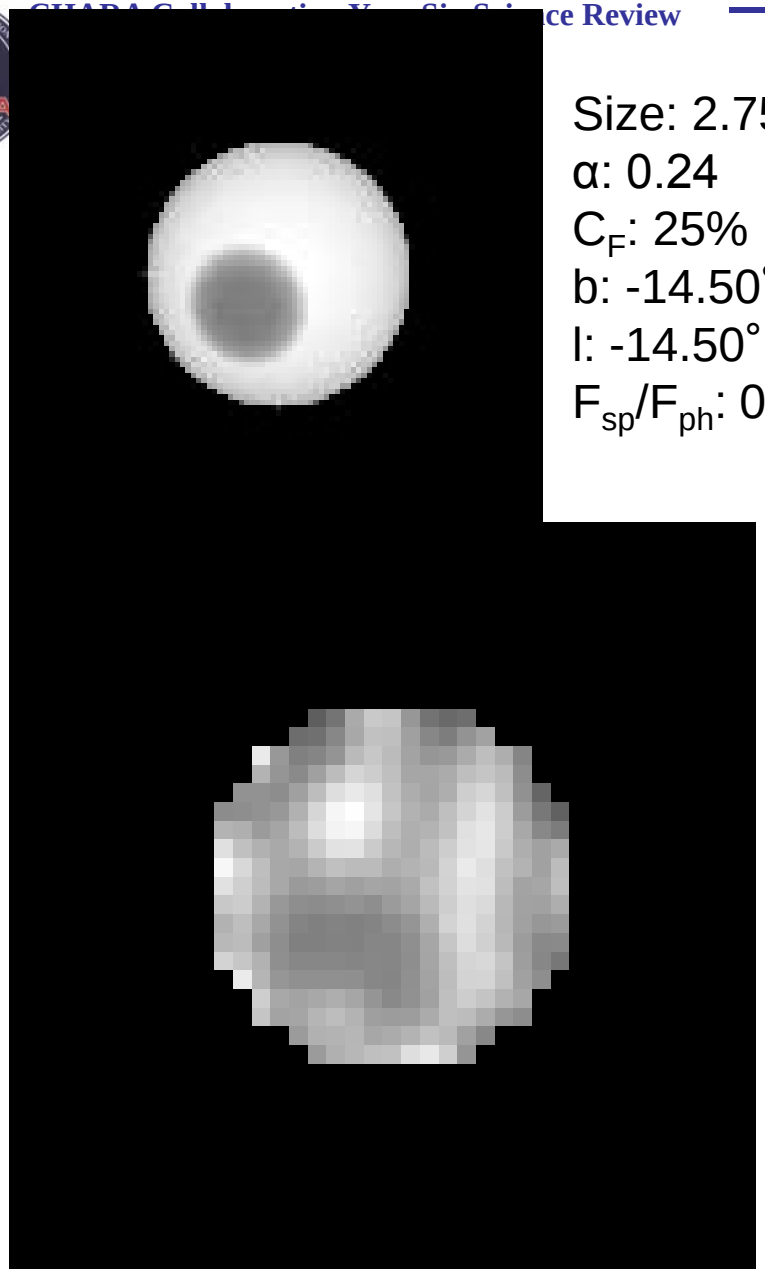
NSF

NOAO

l'Observato de Pa

Spot Recovery via Sampling

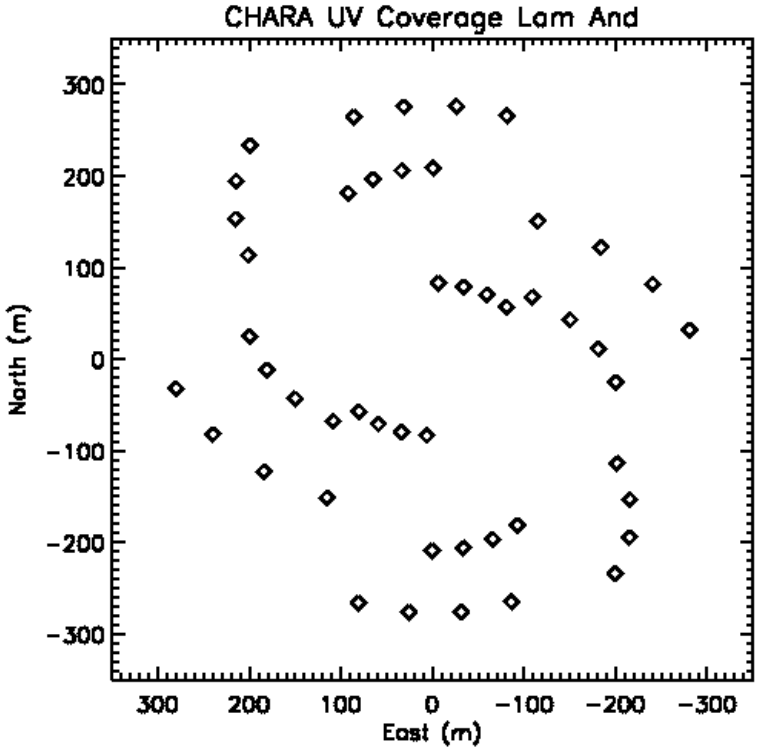
Simulated Star



MACIM

Size: 2.75 mas
α: 0.24
C_F: 25%
b: -14.50°
l: -14.50°
F_{sp}/F_{ph}: 0.5

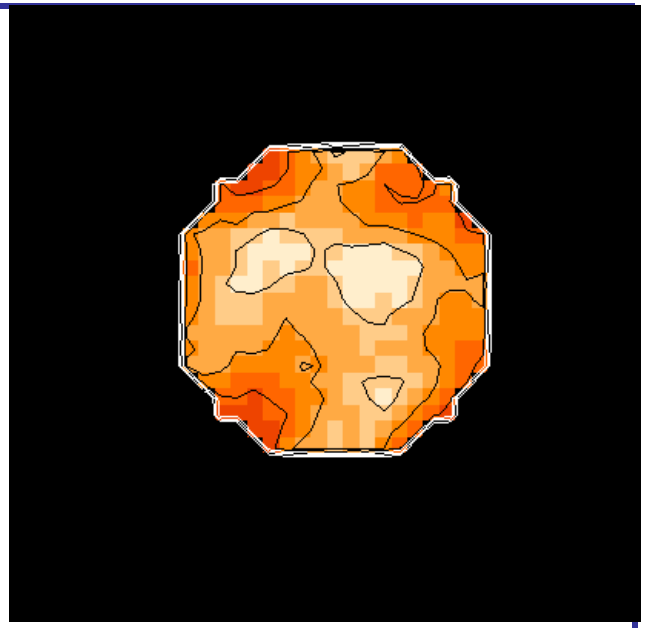
4 Data Sets
~~S1-E1-W1-W2~~
~~S1-E1-W1-W2~~
First Half: S1-E1-W1-W2
Second Half: S2-E2-W1-W2



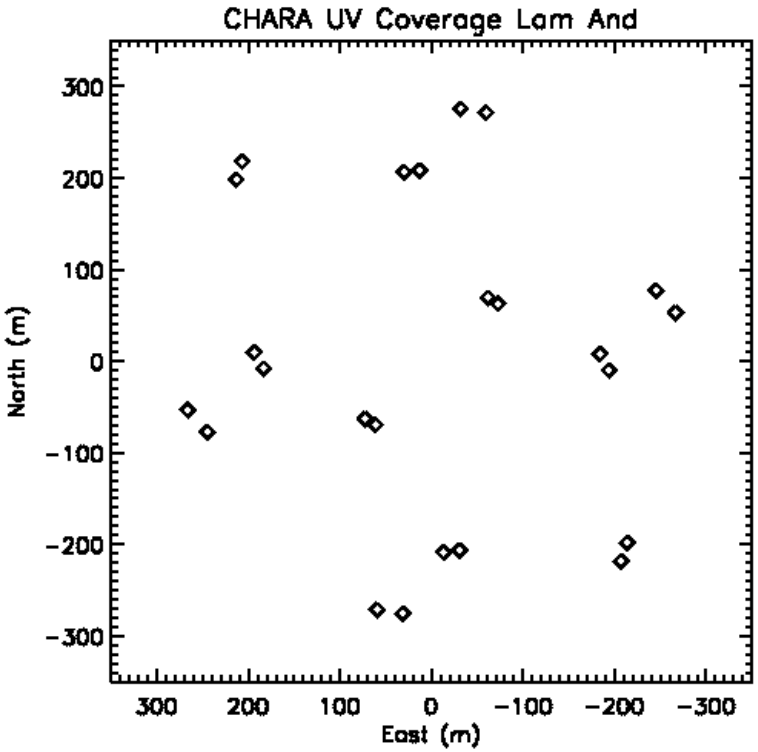
"Observed" Sampling

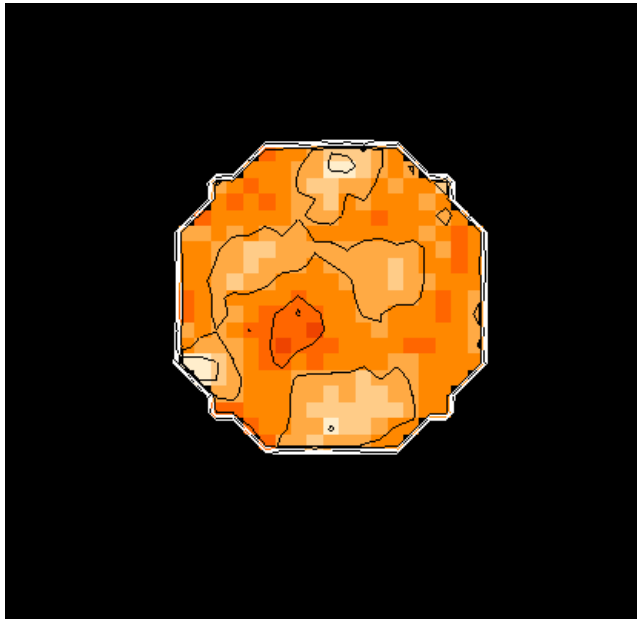
Spot Recovery via Reconstruction

"Observed" Image



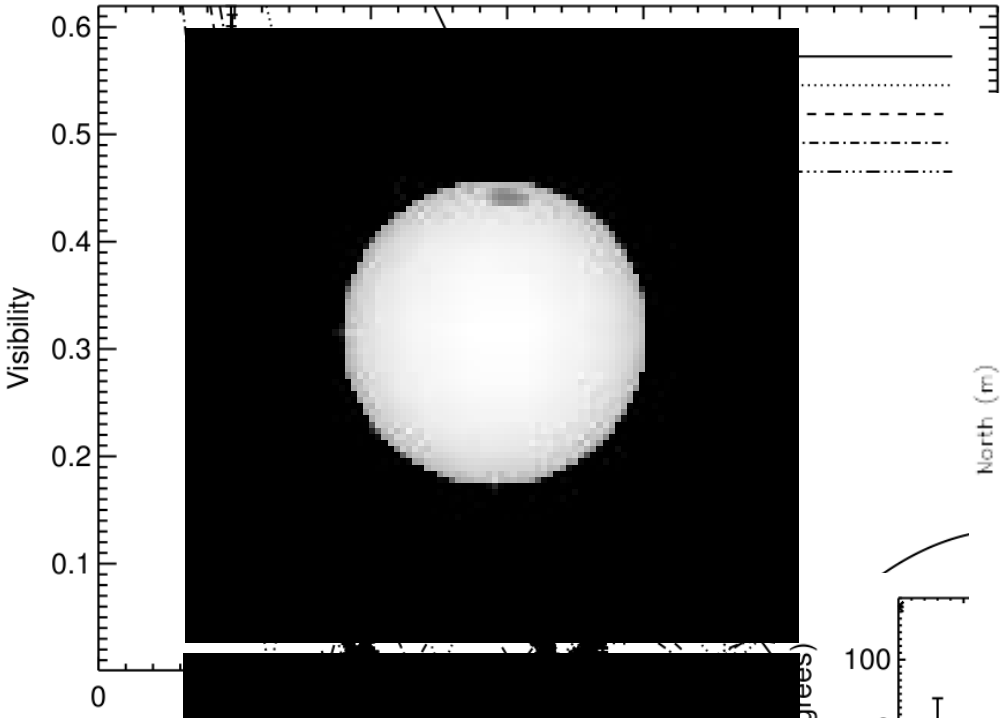
Size: 2.75 mas
C_F = 96%





Normalized Image

Aug 25, 2009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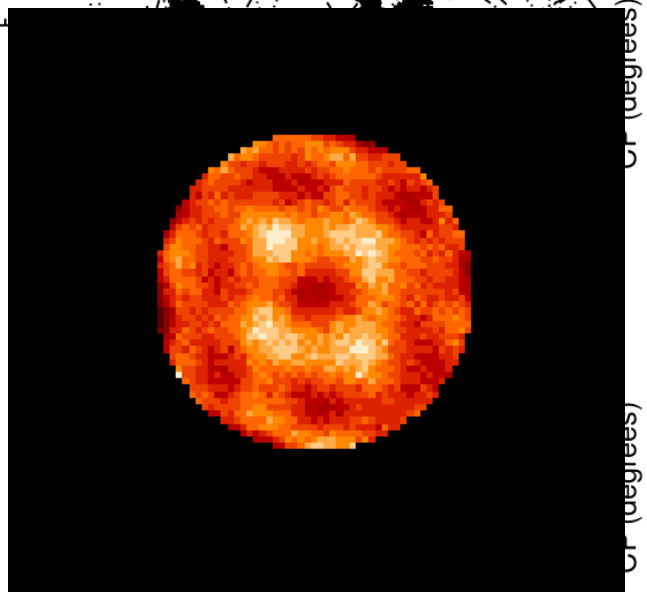
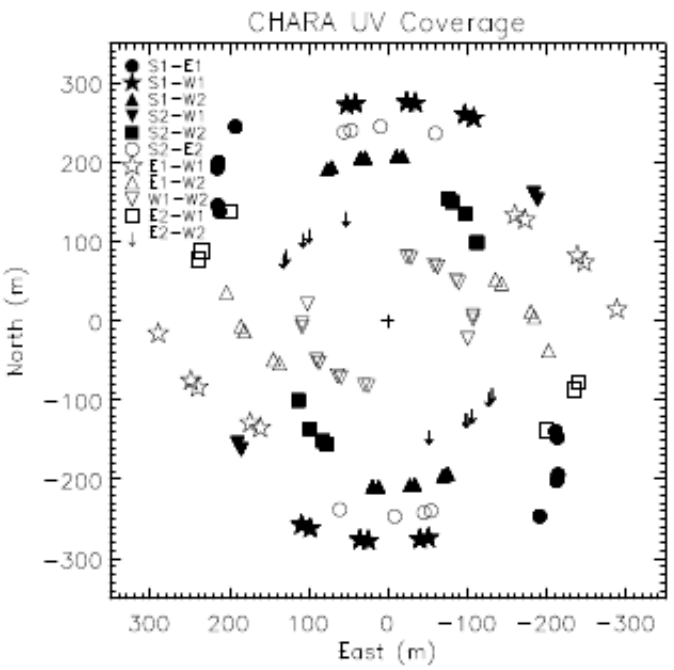
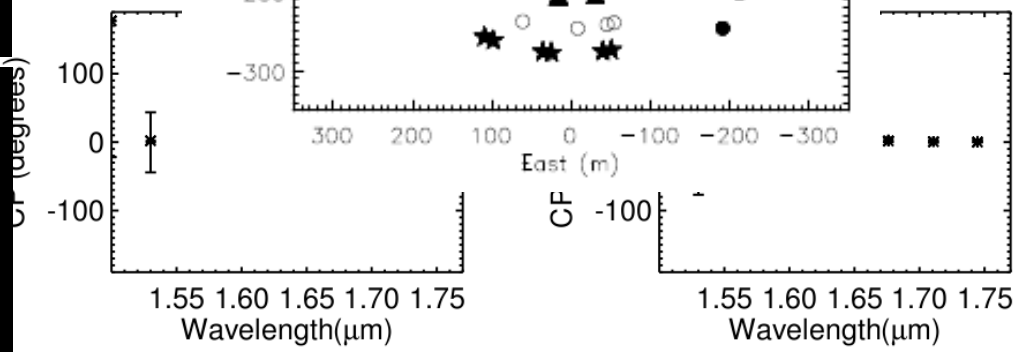
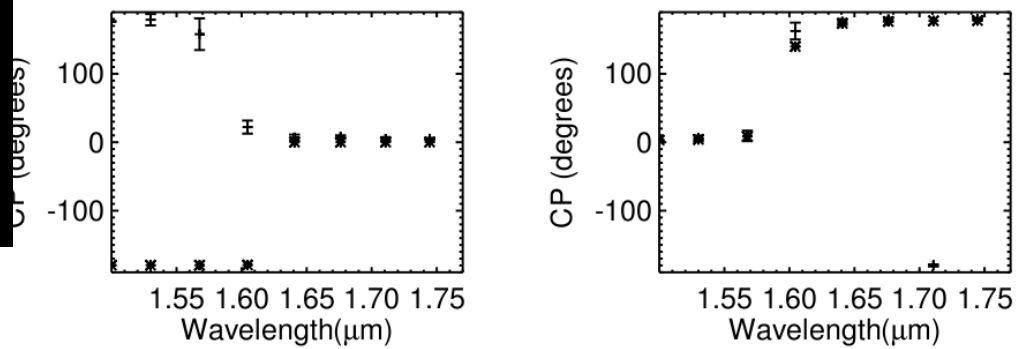
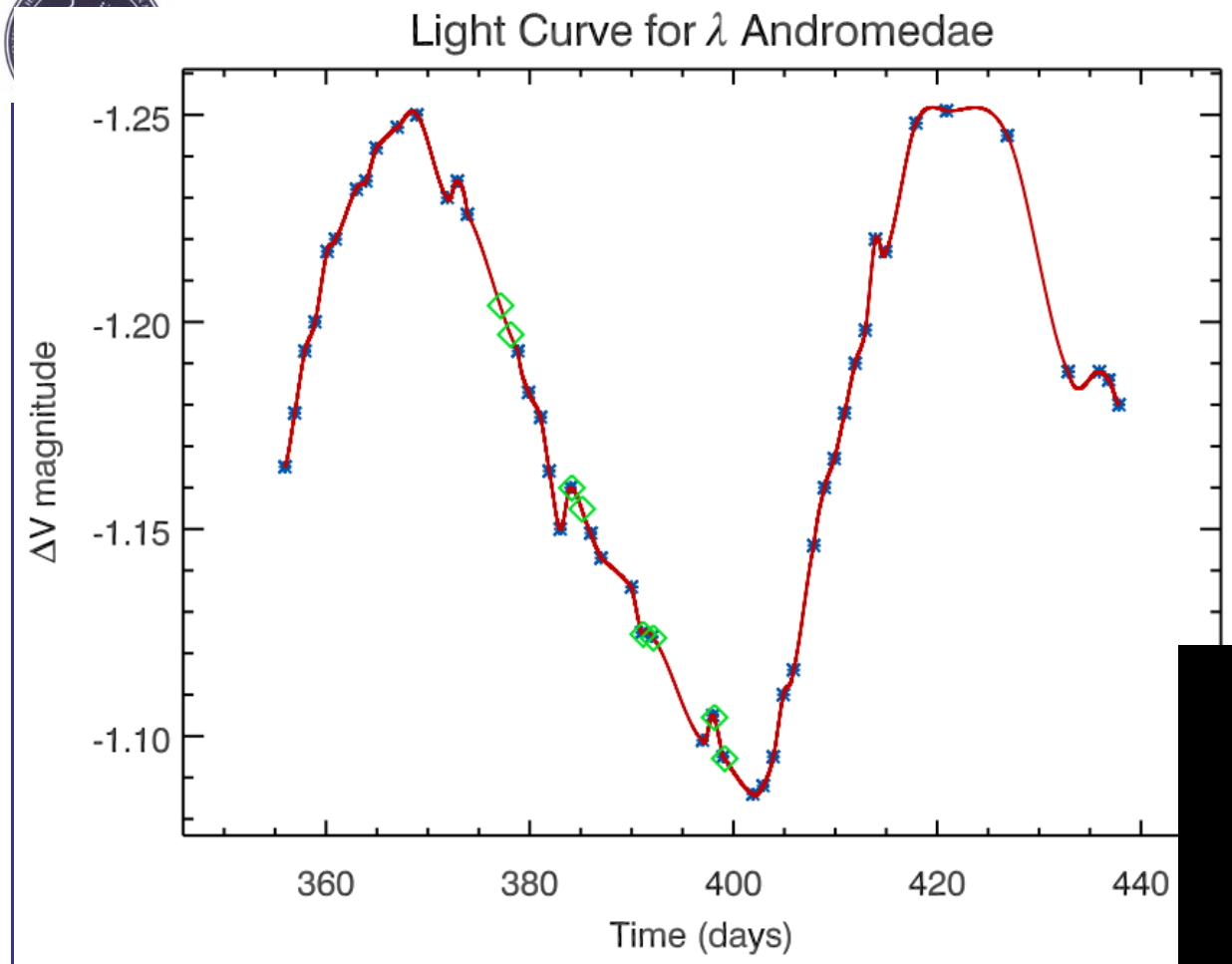

MACIM


CHARA UV Coverage
S1−E1
S1−W1
S1−W2
S2−W1
S2−W2
S2−E2
E1−W1
E1−W2
W1−W2
E2−W1
E2−W2
North (m)
East (m)
300
200
100
0
−100
−200
−300

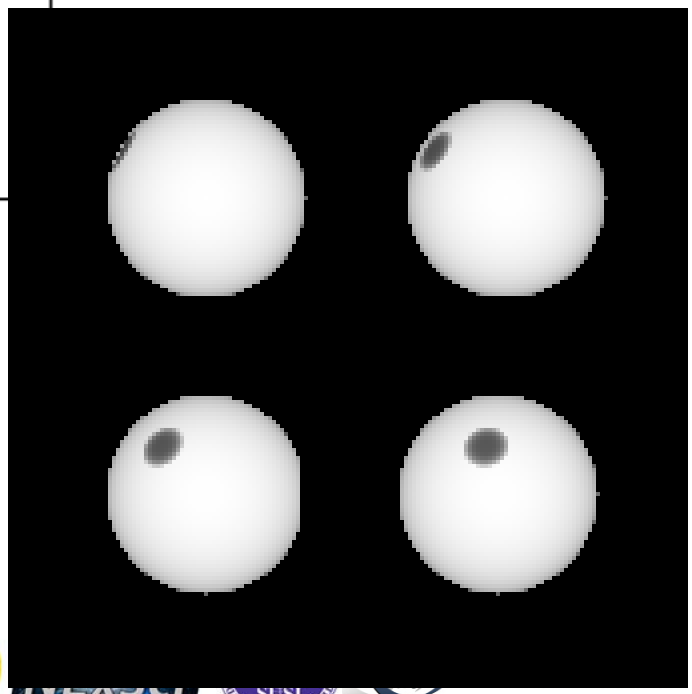

CP (degrees)
100
0
-100
1.55 1.60 1.65 1.70 1.75
Wavelength(μm)


CP (degrees)
100
0
-100
1.55 1.60 1.65 1.70 1.75
Wavelength(μm)



Proposed Observations

- August '10
- 8 total nights
- 2 nights spaced by ~1 week * 4



- Starspot motion from limb to mid-disk
- Outer-Inner Configuration

Future Work

- Develop tests on interferometric imaging strategies
  - submit results by end of summer
  - quantitative effects due to sampling
  - Find improved minimization method
  - Run MC tests using improved observing strategy
- Incorporate spectroscopy and multiple bands into starspot code
- Further investigate other reconstruction programs (i.e. MIRA, WIZARD)
- Graduate Dec ‘11.