

# Latest Trends in Double Star Astronomy in the JDSO

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Maui International Double Star Conference

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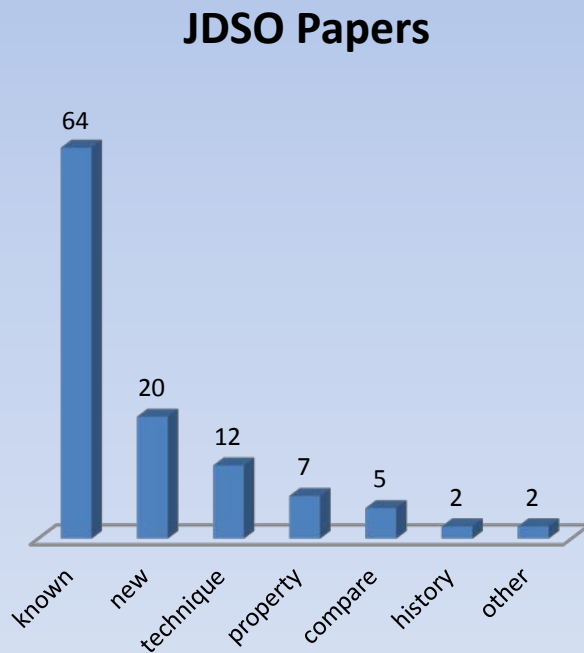
- Introduction to the Journal of Double Star Observations
- Measurement Tools
- Observation Techniques



# Introduction to the Journal of Double Star Observations

- E-Journal at [www.jdso.org](http://www.jdso.org)
- Purpose: to give amateur astronomers a medium to publish their observations of double stars
- Published quarterly (1/1, 4/1, 7/1, 10/1)
- First issue appeared on April 1, 2005
  - now in volume 9
  - 258 total articles

# Types of Papers in the JDSO



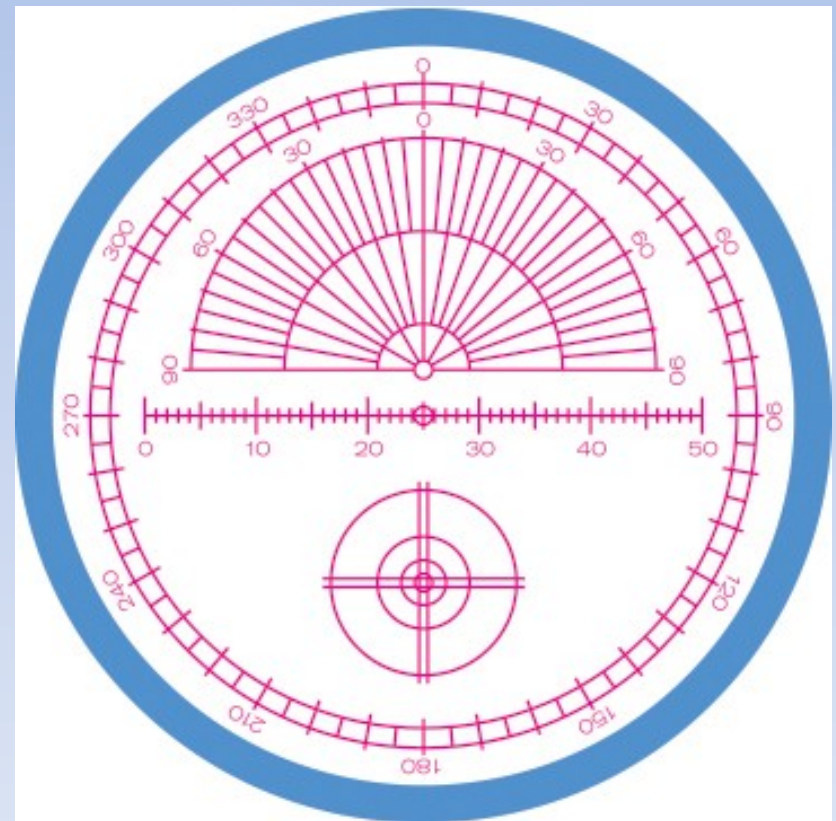
- measurement of known doubles; 64%
- measurement of new doubles; 20%
- observation techniques; 12%
- properties of doubles; 7%
- comparison of techniques; 5%
- history of double stars; 2%
- other; 2%

# Tools of the Trade

**Meade Astrometric Eyepiece**



**Reticle Pattern**





# Micrometer





# CCD Camera





# Techniques

- Stellar Coronagraph
- WebCam
- DSLR
- CCD camera
- Speckle Interferometry
- Lucky Imaging
- Occultation
- Data Mining

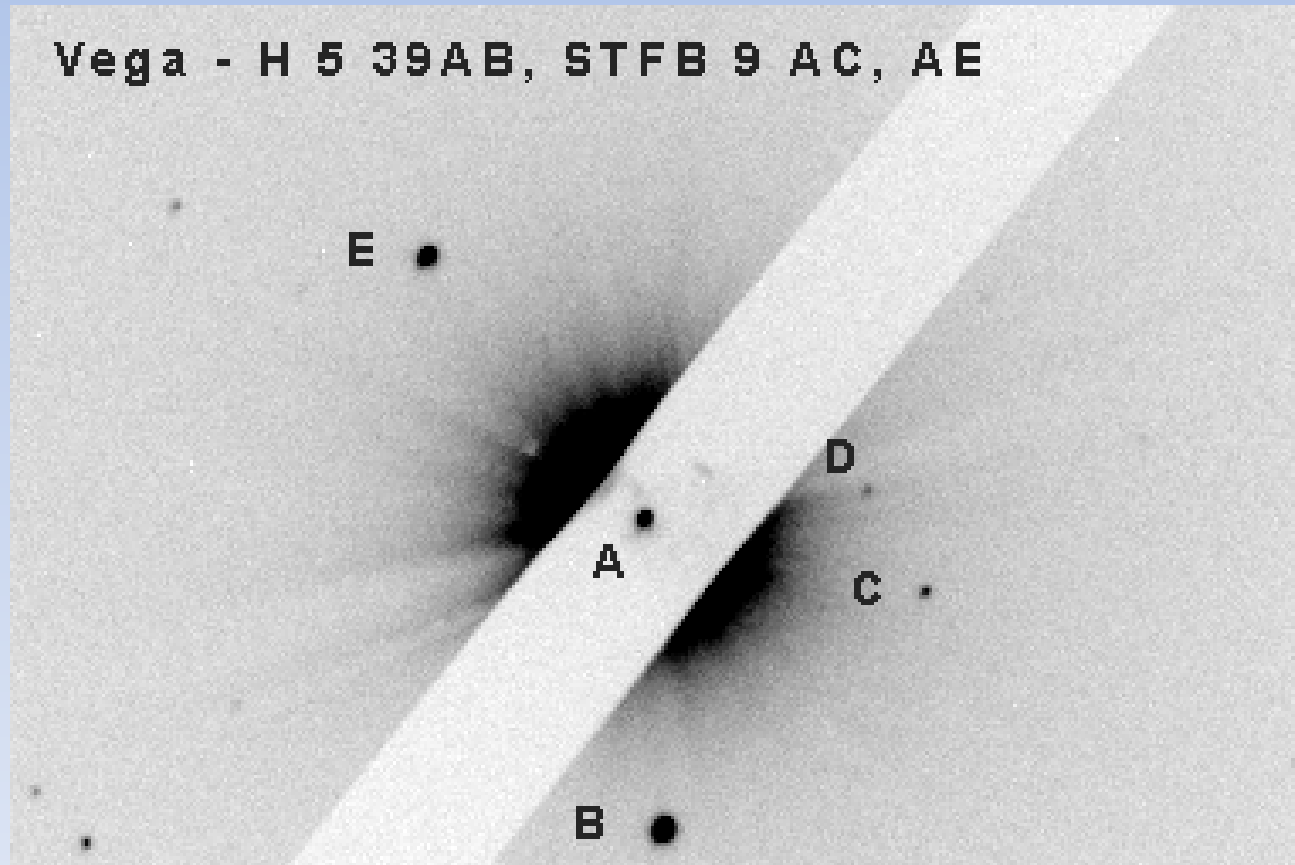


# Stellar Coronagraph

- James Daley, “A Method of Measuring High Delta M Doubles”, **3**, 159-164, 2007.



- Vega and its companions





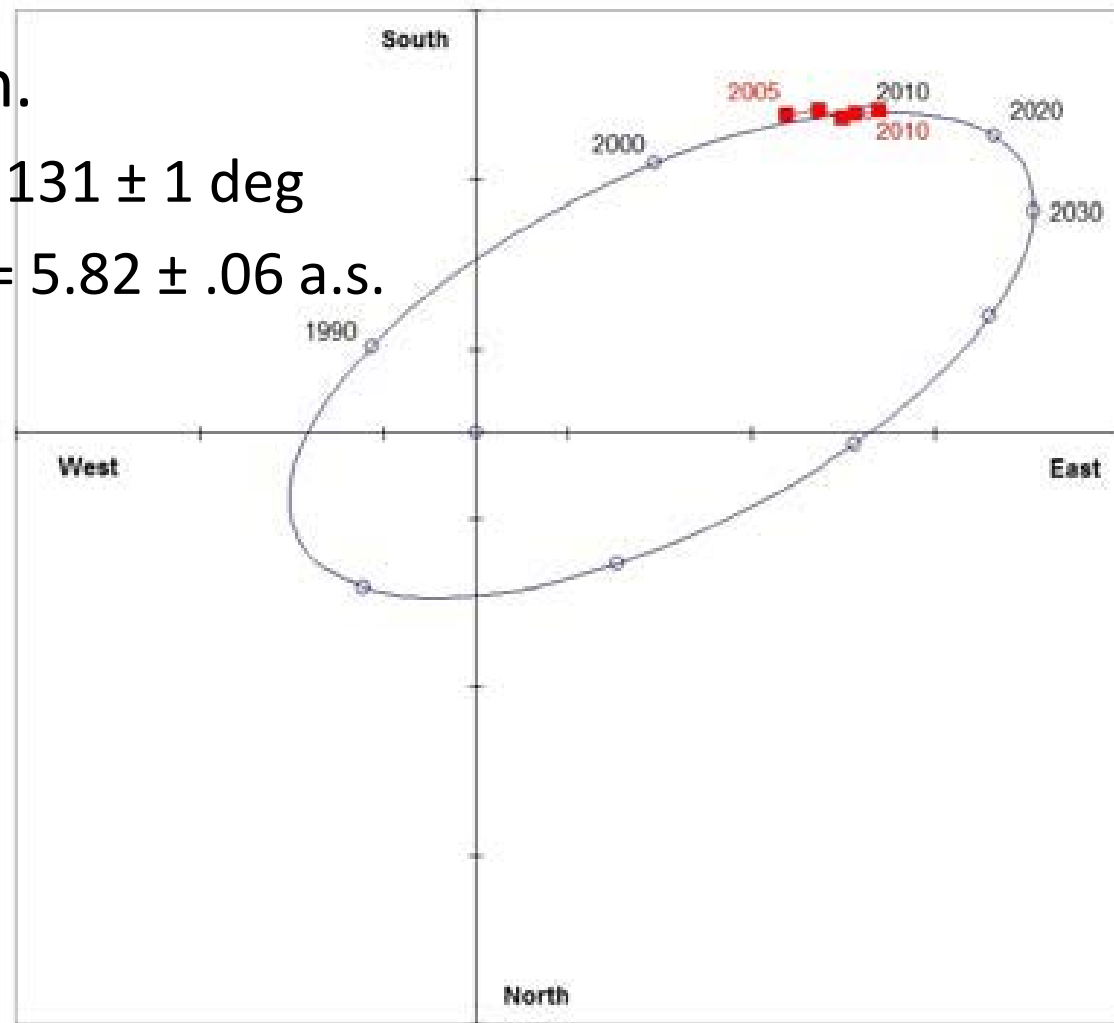
# Webcam

- Wolfgang Vollman, “Binary Stars, Orbital Motion, and a Webcam”, 7, 109-113, 2011.
- Used a Phillips ToUCam, 130 mm AstroPhysics ‘scope, 3X Barlow
- .325 a.s. / pixel, 3.5 x 2.6 arcmin. fov
- Captures several videos, 500 frames each, about 50 seconds. Each star takes 15 to 30 minutes



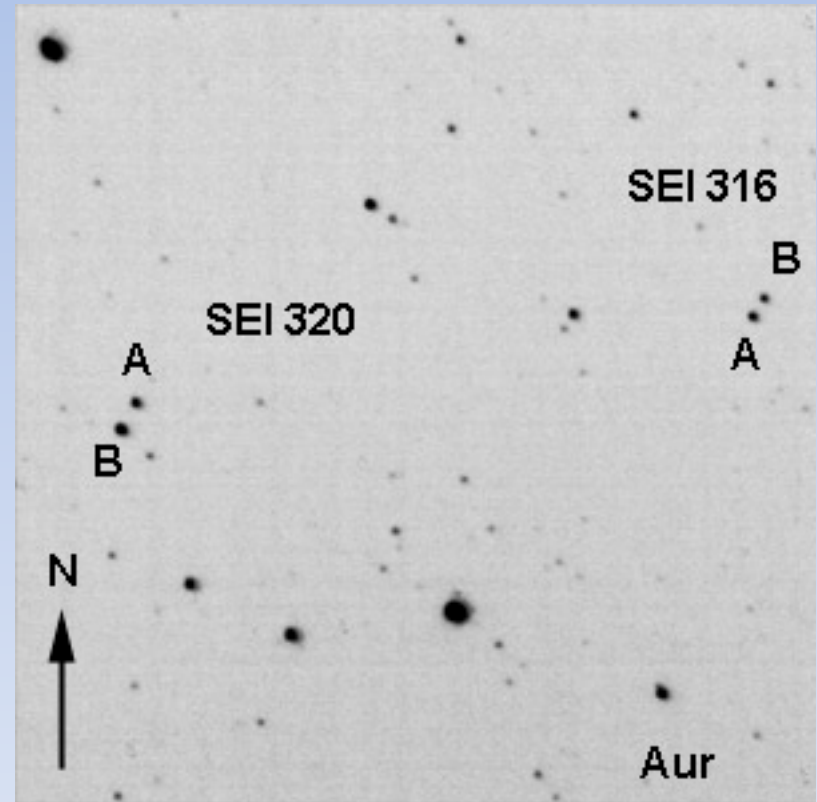
### 70 Ophiuchi (STF2272AB)

- 70 Oph.
  - PA =  $131 \pm 1$  deg
  - sep =  $5.82 \pm .06$  a.s.

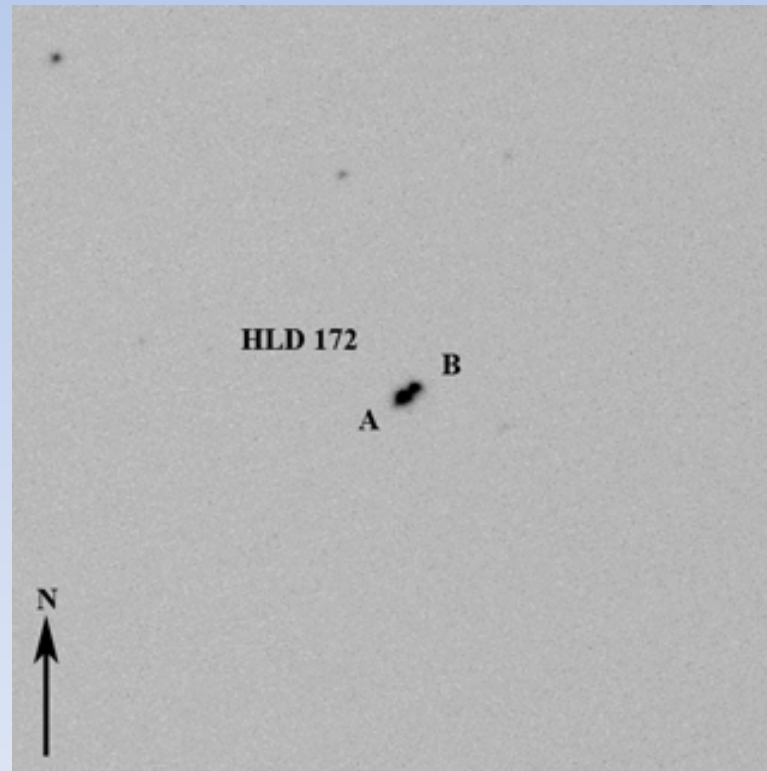


# Digital Single Lens Reflex Camera

- Erno Berko, “Double Star Measures Using a DSLR Camera”, **4**, 144-155, 2008.
- Canon EOS 350D on 14” Newtonian at f12
- 0.3089 a.s./pixel
- sep. std. dev. = 0.06”
- PA std. dev. = 0.2 deg.

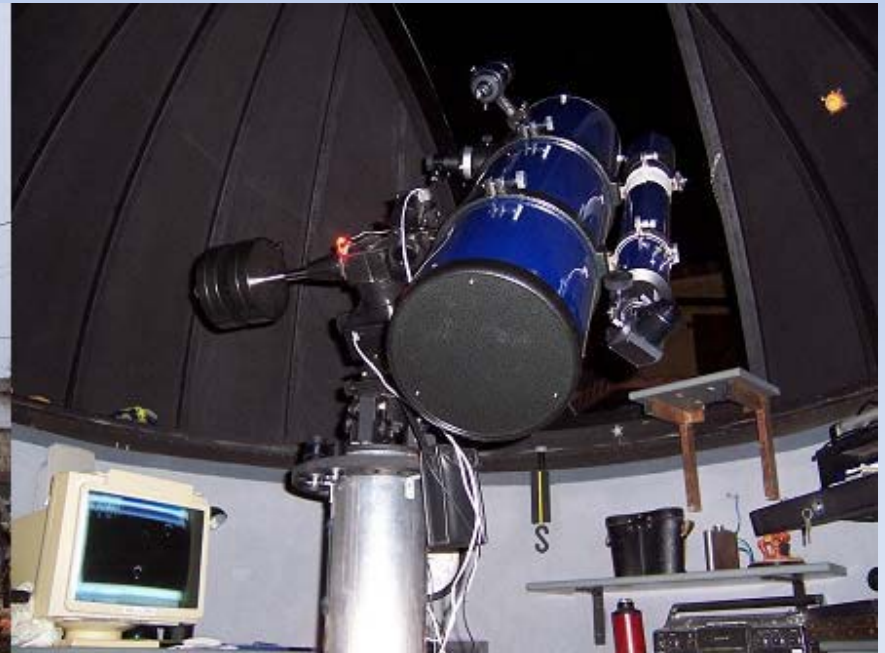


- Michel Michaud, “Double Star Measurements in the Pleiades using a DSLR Camera”, **8**, 249-259, 2012.



# CCD Camera

- Edgardo Masa Martin, “CCD Double-Star Measurements at Observatorio Astronomica Camino de Palomares”, **5**, 18-42, 2009.



# CCD Camera

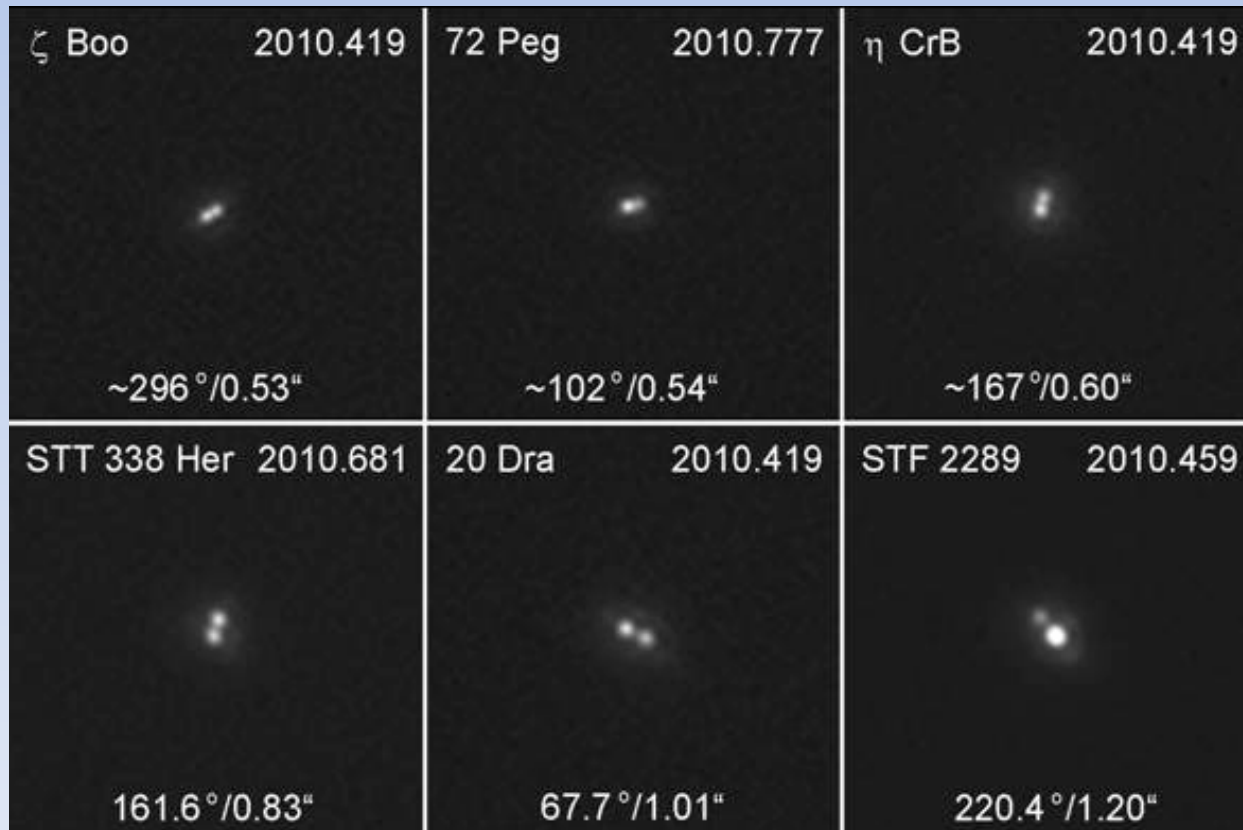
- Lucian Curelaru, et al.,  
“Neglected Double Star  
Measurements at the  
Astronomical  
Observatory of the  
Natural Science  
Museum Galati”, **8**, 201-  
210, 2012.





# Lucky Imaging

- Rainer Anton, “Double & Multiple Star Measurements at the Northern Sky with a 10” Newtonian and a Fast CCD Camera in 2010”, **7**, 78-85, 2011.



- Anton, "On the Accuracy of Double Star Measurements from Lucky Images", 5, 65-71, 2009.

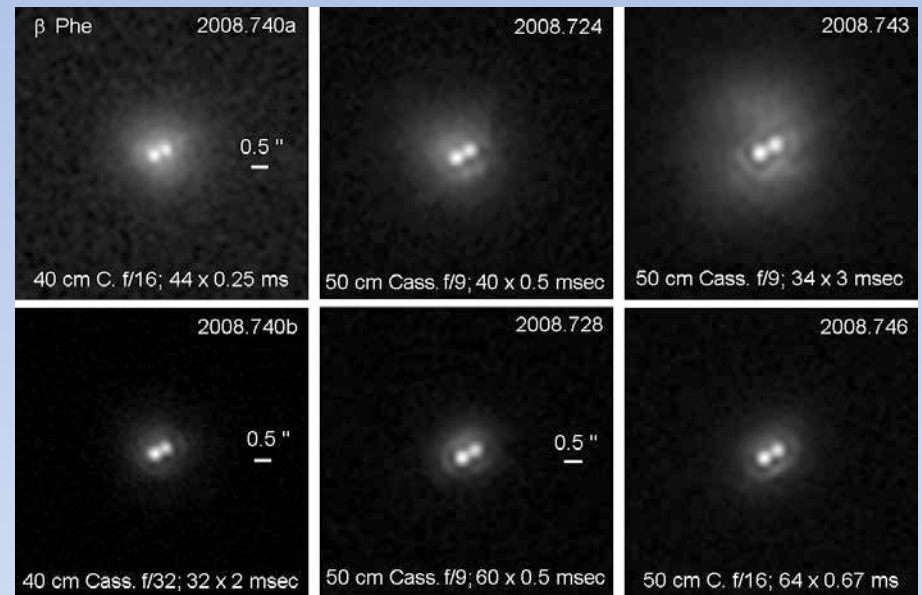
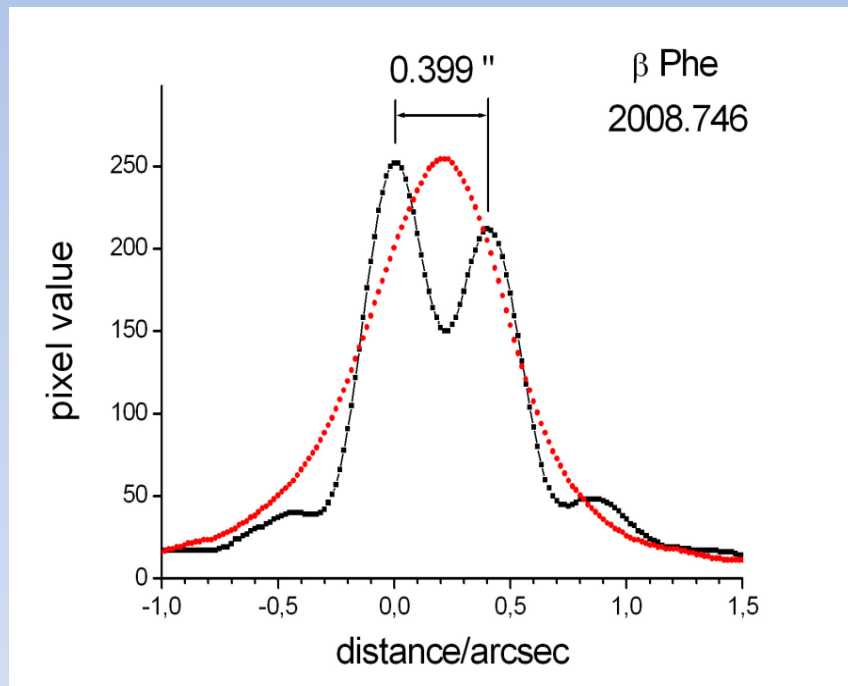
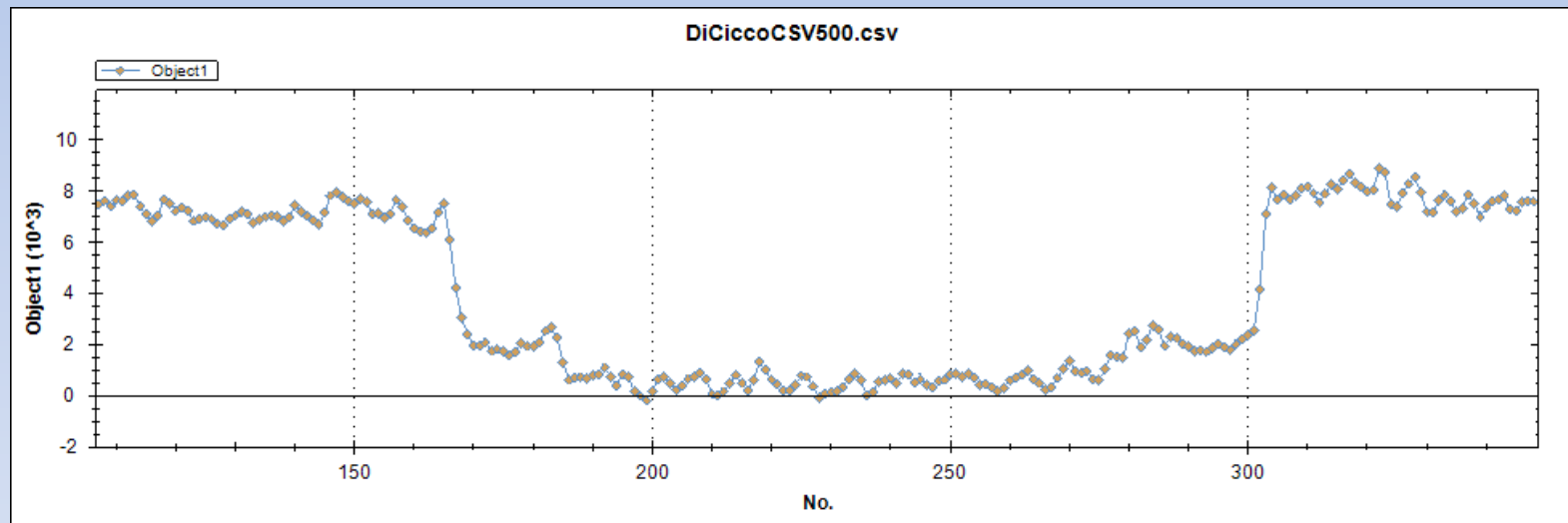


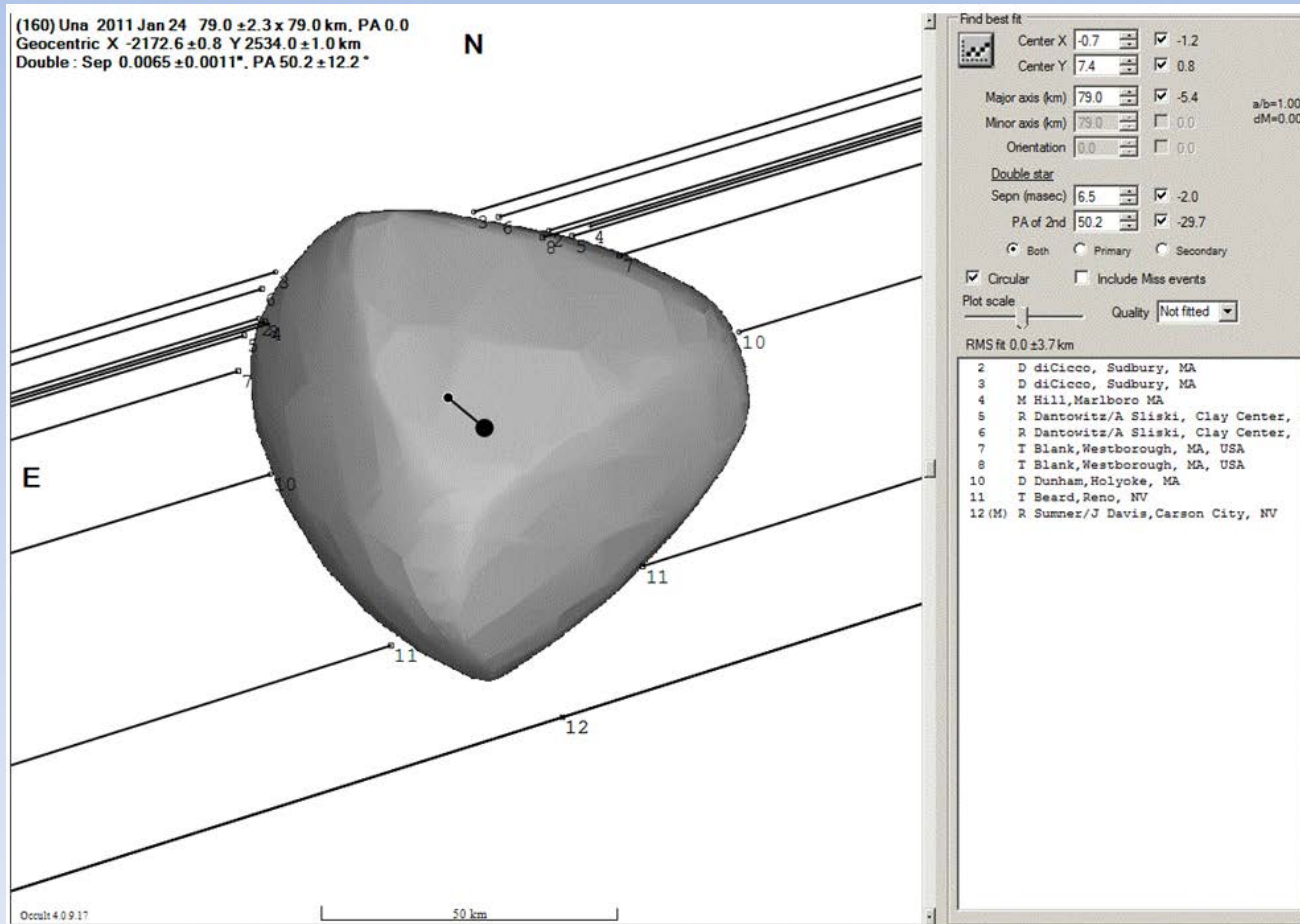
Figure 5: Line scan of the pixel values along the line crossing the peak centroids of both components (black line and data points), taken from the image in fig. 4, bottom right (50 cm telescope). The profile dotted in red is from a superposition of 500 unselected frames (exposure time 0.67 milliseconds), and represents an exposure of 1/3 second.

# Occultations

- Tony George, et al., “HIP 46249 Duplicity Discovery from Asteroidal Occultation by (160) Una”, **7**, 175-179, 2011.

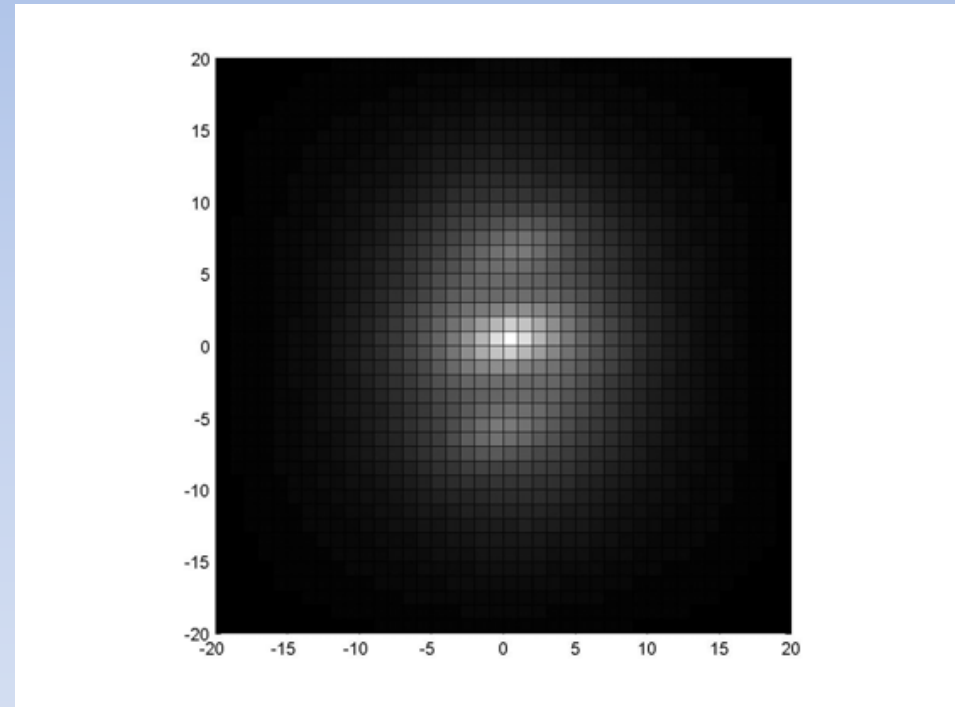


- PA =  $50 \pm 12$  deg.
- SEP =  $.0065 \pm .0011$  a.s.
- Mag = 9.2, 10.6



# Speckle Interferometry

- Roberto Caloi,  
“Estimation of Double  
Star Parameters by  
Speckle Observations  
Using a Webcam”, **4**,  
111-118, 2008.



Phillips ToUCam Pro on a 9.25" Celestron SCT  
at f25

# Data Mining

- Rafael Caballero, “Finding New Common Proper Motion Binaries by Data Mining”, **5**, 156-167, 2009.



CPM pair in 1954 (green) and in 1990 (red)



- Start with entries in NOMAD
- Applied Halbwachs criteria (600)
- Checked against the latest WDS (485)
- Both stars must be listed in Tycho 2, USNOB1, or UCAC 2 (273)
- Eyeball the 273 using POSSI or POSSII (111)
- Measure the remaining – used 2MASS

# Whither Double Star Astronomy?







Thank you to all of the  
contributors, readers, and supporters of the  
Journal of Double Star Astronomy