Double Star Study at Leeward Community College

Rebecca Church

Dr. Russ Genet

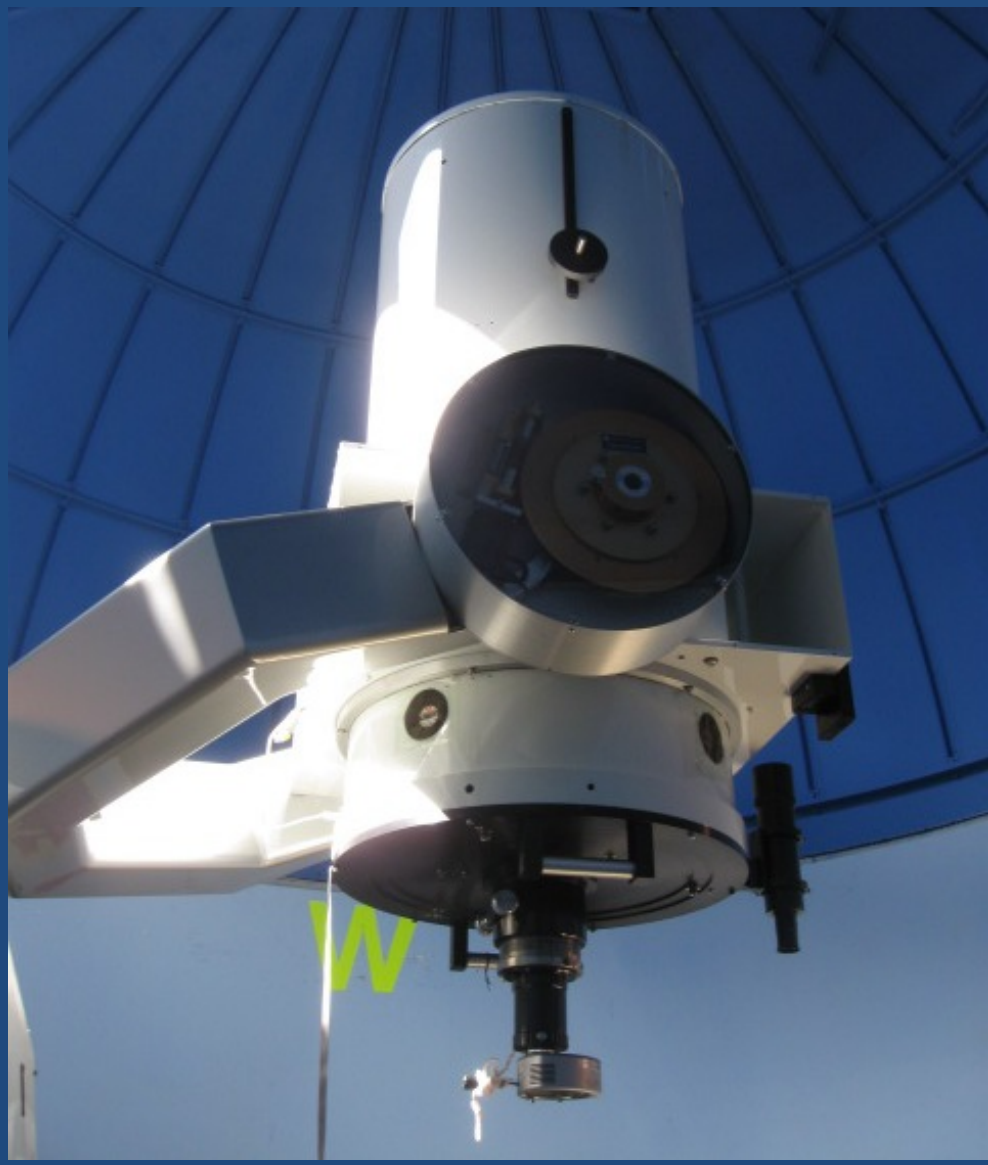
Dr. Kakkala Mohanan

Kilo Hoku Hale at LCC

- 2 Observatories – built in 1996 & 1998.
- Radio Astronomy program (Radio Jove)
- UHF/VHF Antenna used for data link (Engineering Dept.)

The Telescope

- Optical Guidance Systems
- Ritchey-Chretien 20-inch
- f-ratio 8.1

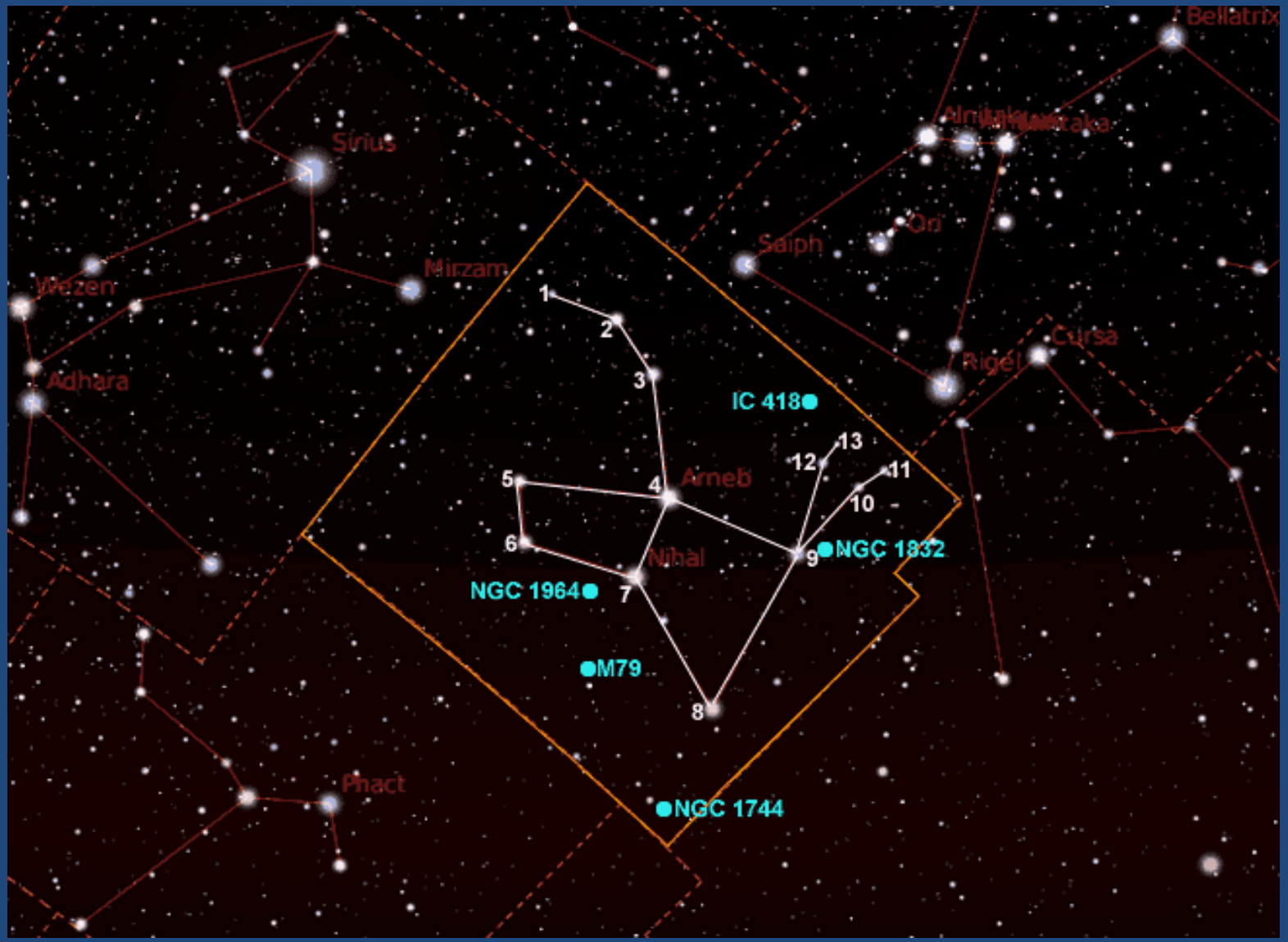


Acquisition Systems

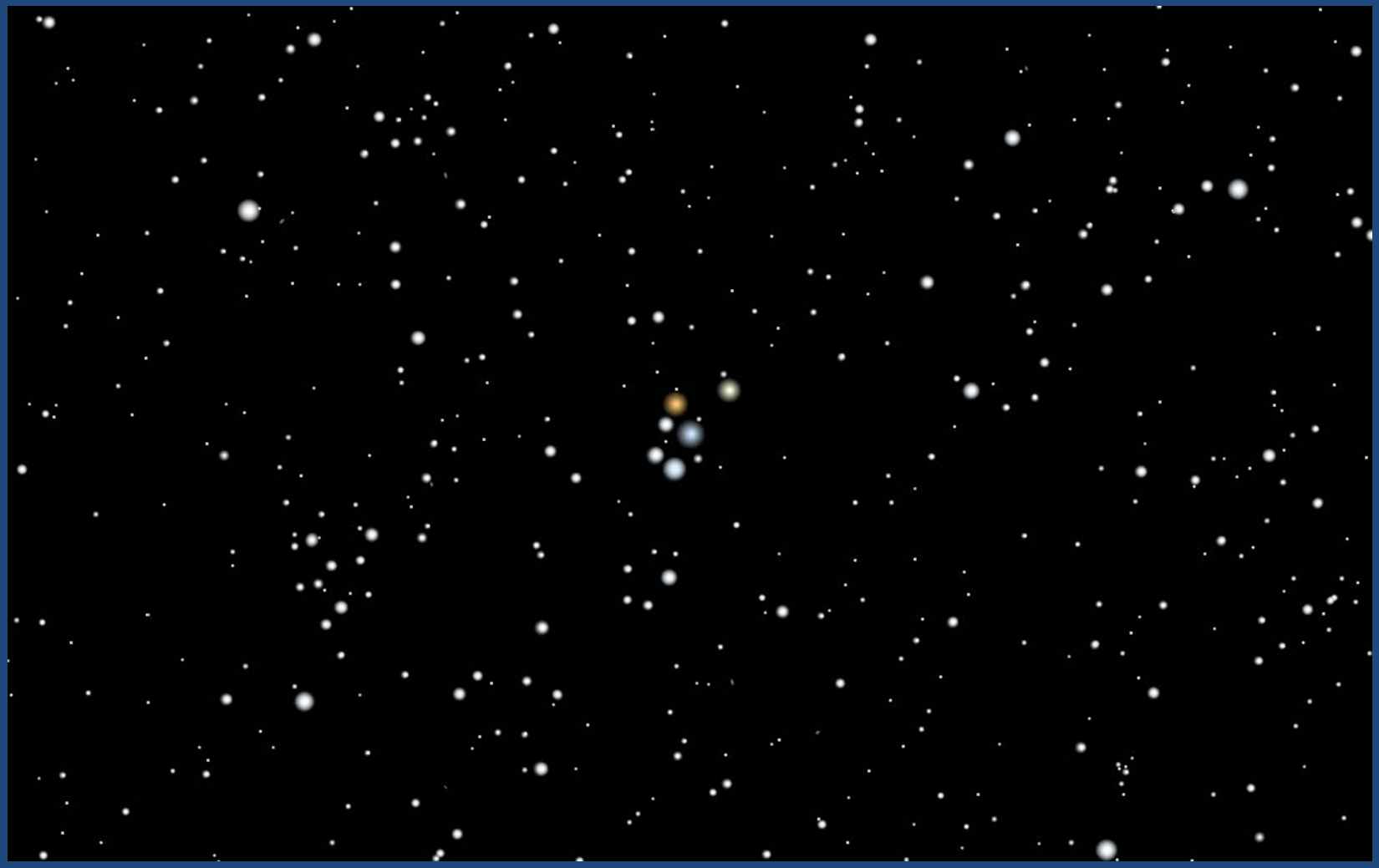
- Apogee Alta U6
- SBIG STV
- SBIG ST-6
- SBIG ST-7
- SBIG ST- 9
- SBIG Spectrometer
- Andor Luca-S
- Canon Rebel Ti3

The Beginning

Lepus Beta 321 Star Field

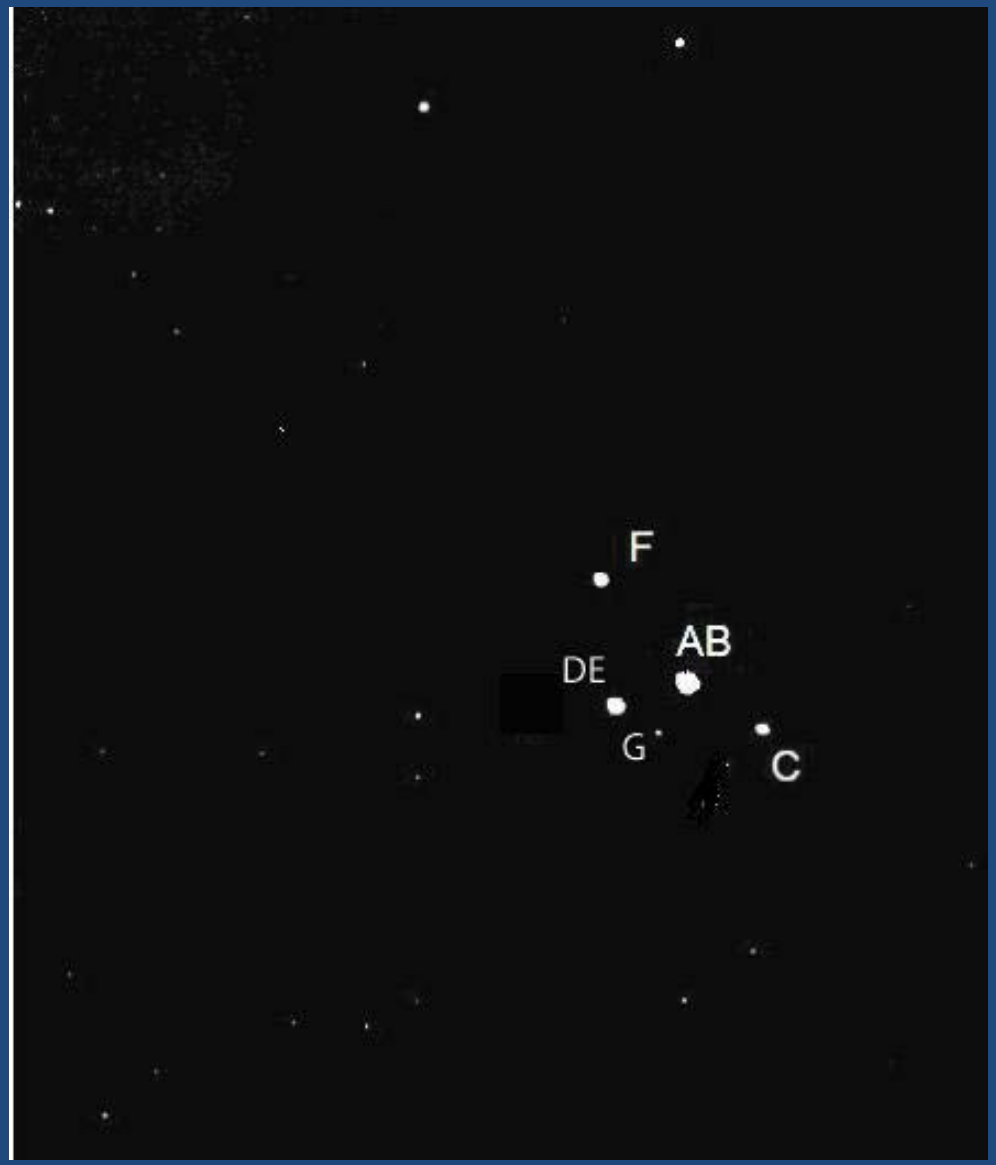


Sky 6 Star Field



Lepus Beta 321

- A single 10 sec image
- Were able to resolve AC, AE, AF components
- AB was too close to resolve (sep of just 0.4 arcsec)



Data Result Comparison
Lepus 321 Beta

Star Pair	Our Sep (a.s.)	Haas Sep (a.s.)	Delta Sep (a.s.)	Our PA (deg.)	Haas PA (deg.)	Delta PA (deg.)
AC	89.3	89.9	0.6	136.5	138	1.5
AE	75.6	76.0	0.4	8.6	8	-0.6
AF	133.9	132.3	-1.6	299.5	299	-0.5
AG	59.6	N/A	N/A	50.7	N/A	N/A

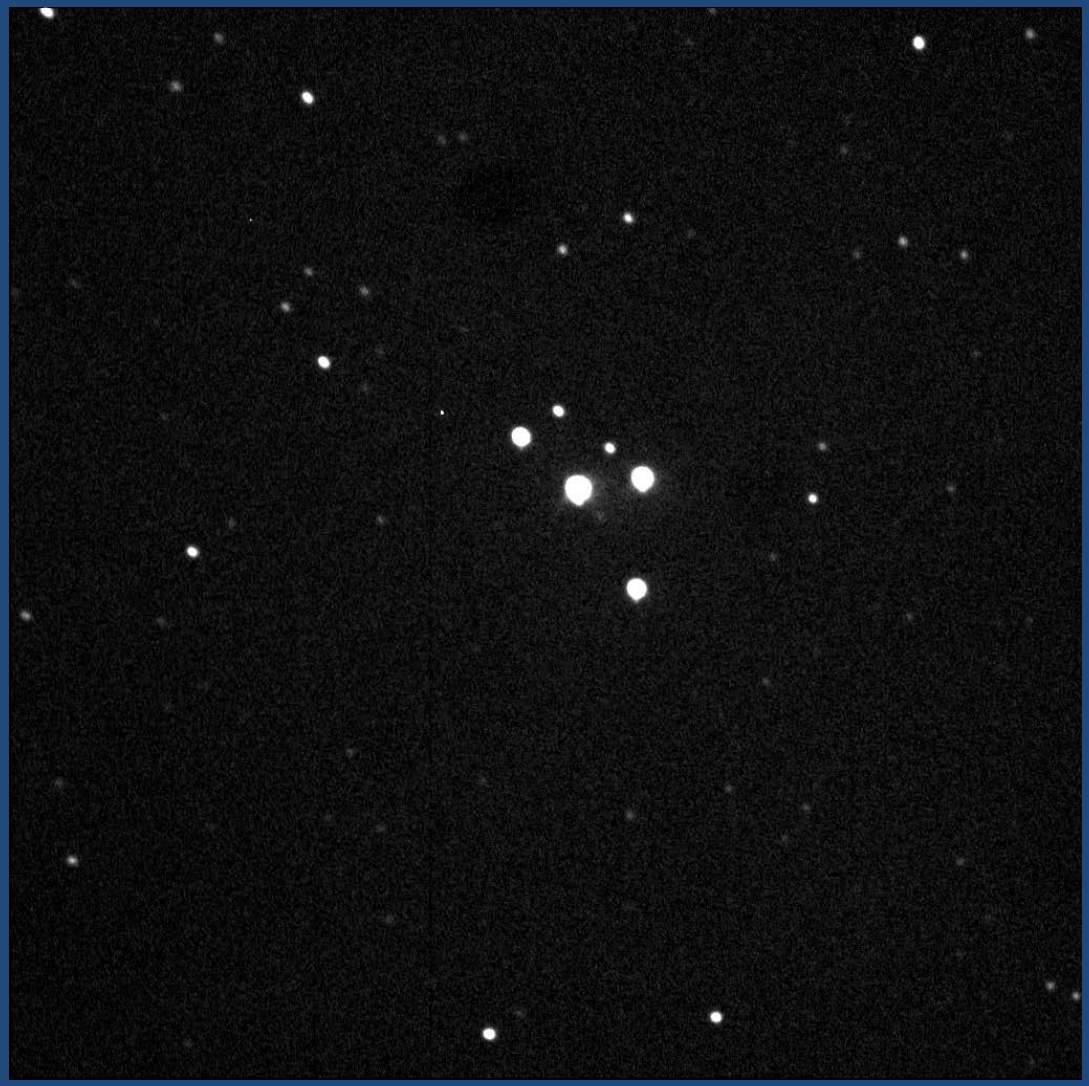
- Our data is in agreement with Sissy Haas data (2008)
- Our data includes AG component, which Hass does not report
- AB component is not resolved to be reported.

Russ Returns!

Lepus Beta 321 Revisited

- Need more data for further verification
- Want to try to resolve AB component
- Opportunity to achieve the above using newer technology
  - Lucky Imaging
  - Speckle Interferometry

Lepus Beta 321 Field CCD image

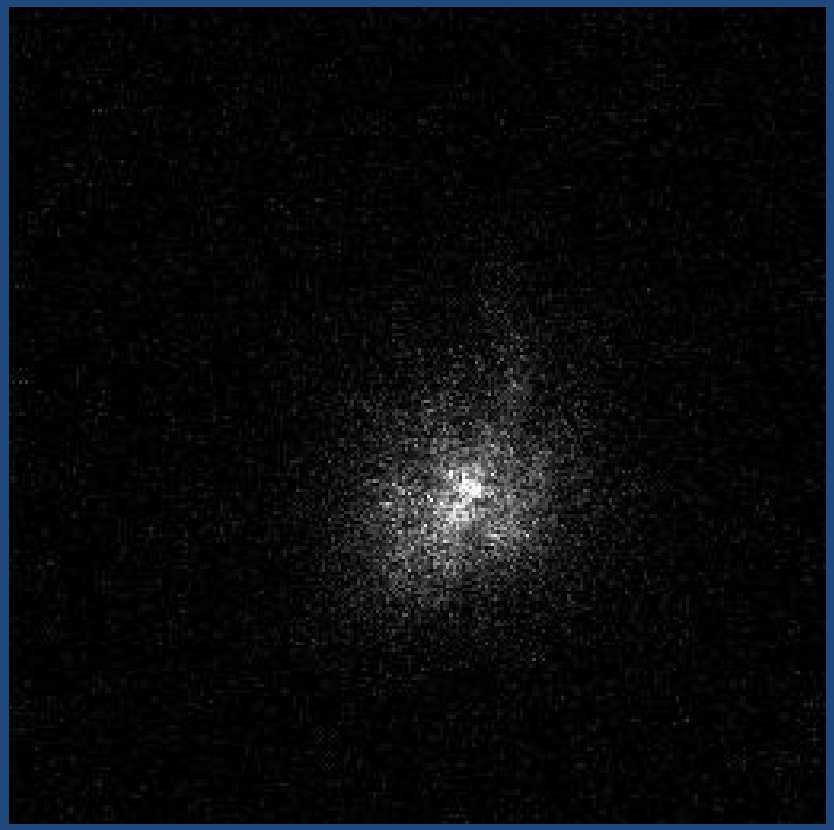


- Apogee Alta U6 CCD
- Chip cooled to -10 C
- Integration: 0.8 sec
- No. of frames acquired for data reduction: 20
- Present image is composite of 5 frames.
- Dark Subtracted

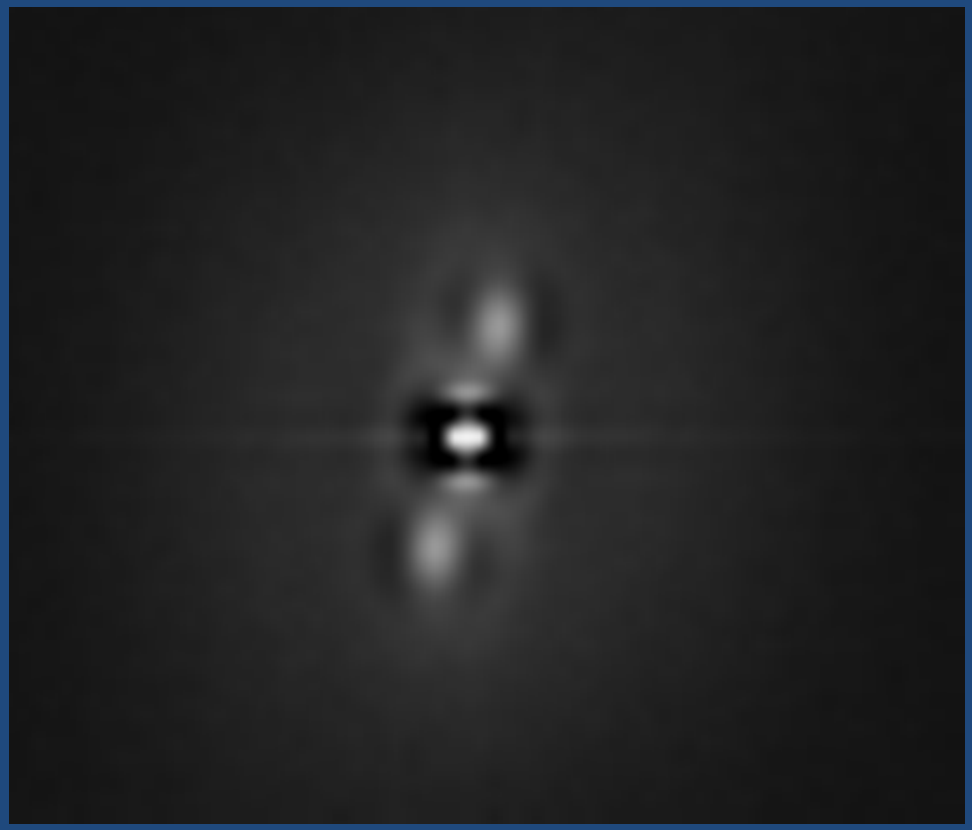
Andor Luca-S

- 37 full frames/sec
- 10 µm pixel size
- Electron multiplication
- Cooled to -20 Celsius

Lucky Imaging of Beta 321



Speckle of Beta 321



Results

- It was not possible to resolve AB component using Barlows
- Used Lucky and Speckle techniques
  - Lucky was not successful in resolving AB
  - Interferometry was able to resolve AB and initial data suggests that the separation angle is 0.4 arcseconds

A Student's Perspective

- Hands on learning
- Chance to take part in real scientific research
- Publish papers

I would like to thank …

- *Leeward Community College for giving me the opportunity to work at the observatory and for supporting me with this research program.*
- *I would also like to thank my family, especially my husband, Jason, for their patience in allowing me to spend many long nights at the observatory.*

And…

- *Professor Mohanan for spending many nights the past year showing me how to use the equipment and helping me gain an appreciation for our beautiful night sky.*

And finally…

- *Professor Genet for bringing his double star research program to Leeward Community College.*

END!!!