

Interferometric Imaging of Epsilon Aurigae

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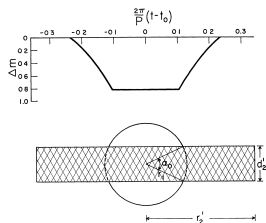
Tuesday, Jan. 11, 2011



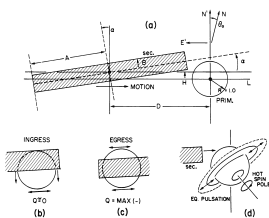
“There is little prospect of resolving this binary by any existing technique since the maximum separation, predicted for 1989, is only $0''.02$, and the companion must be very faint.”

– Van de Kamp, 1981

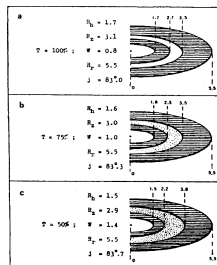
Our understanding



Dark Obscuring
 Rectangle. Huang,
 1965



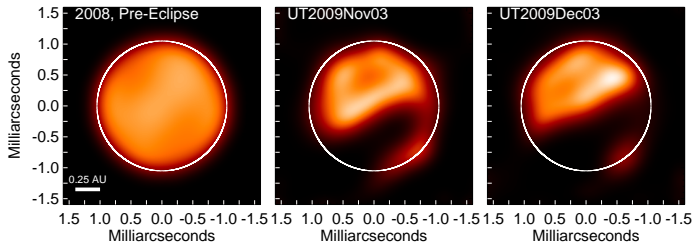
Tilted Rotating Disk.
 Kemp et. al., 1986



Inclined Disk
 with Rings.
 Ferluga, 1990

Ingress Images

Epsilon Aurigae Eclipse (CHARA-MIRC)



Ingress Imaging of epsilon Aurigae. Kloppenborg et. al. 2010

Potential Artifacts

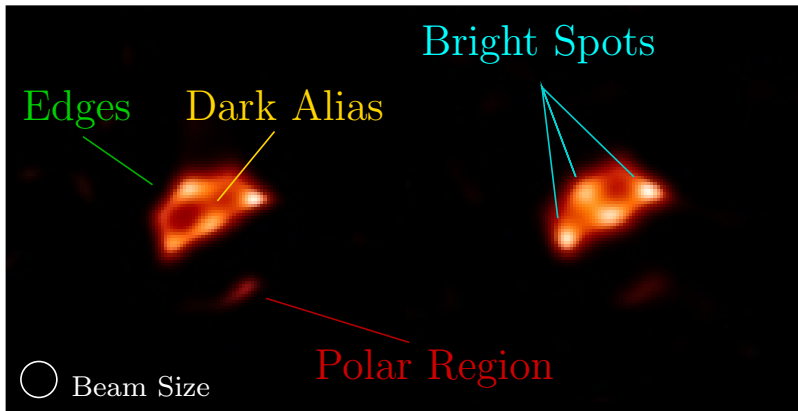
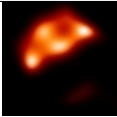
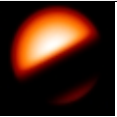
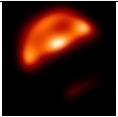
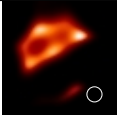
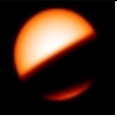

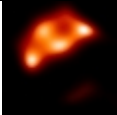


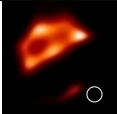
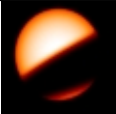



Figure: Possible artifacts in the images

Artifact Discussion

	Data w/ BS MEM	Best Fit Model	Sampled Model w/ BS MEM
2010-09			
2010-11			

Artifact Discussion

	Data w/ BSMEM	Best Fit Model	Sampled Model w/ BSMEM
2010-09			
2010-11			

Likely Artifacts:

- Bright Spots along equator
- Bright spot at North Pole
- Dark alias in northern hemisphere
- Scalloped Edge of disk

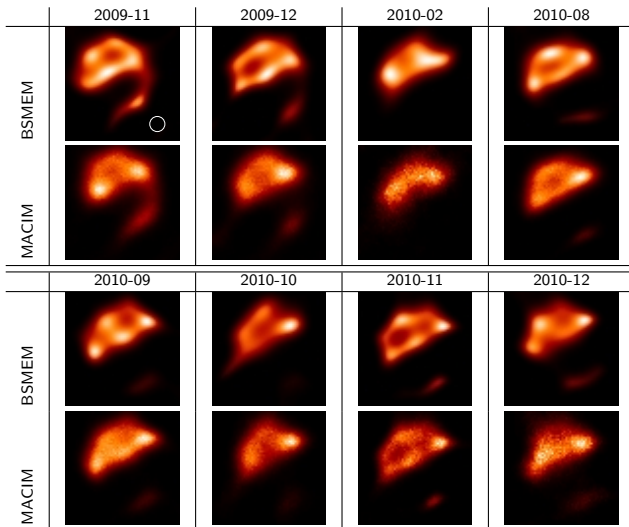
Not Artifacts:

- Southern Pole

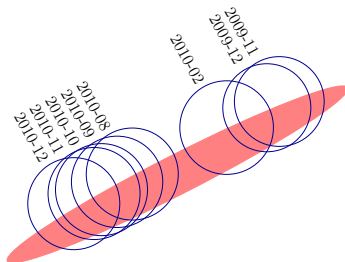
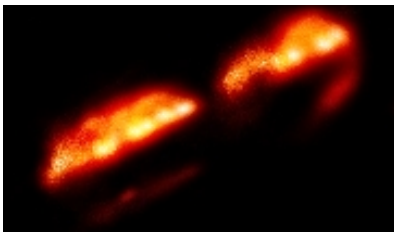
Undecided

- Straight Edges on F-star

All Eight Epochs of Eclipse



Silhouette of the Disk



Results and Next Steps

Date	MJD	F-Star		Disk			Fit Reduced χ^2	
		LDD (mas)	LDR* (R_{\odot})	Semi-Minor (mas)	Axis	Full Thickness* (AU)		Smoothing Coefficient
2009-11	55138	2.304	154.8		0.417	0.522	0.221	2.38
2009-12	55168	2.257	151.7		0.489	0.612	0.240	7.59
2010-02	55243	2.398	161.1		0.550	0.688	0.240	2.39
2010-08	55430	2.353	158.1		0.536	0.670	0.270	9.21
2010-09	55462	2.340	157.2		0.508	0.635	0.232	3.60
2010-10	55492	2.358	158.4		0.523	0.654	0.240	3.22
2010-11	55504	2.354	158.2		0.570	0.713	0.233	5.28
2010-12	55543	2.364	158.8		0.562	0.703	0.403	4.67

* Assuming the nominal Hipparcos distance of 625 pc to the system.

Next Steps:

- Determine disk parameters via. multi-epoch model fitting.
- Full orbital solution (x,y,z)
- Definition of photometric contact times need to be reconsidered

For more information see my poster, 257.03, today.

Any Questions?