



The LINC-NIRVANA High Resolution Imager: From the Lab to First Light

Tom Herbst, MPIA
AstroTechTalk, MPIA, 26 September 2014



The LINC-NIRVANA High Resolution Imager: From the Lab to First Light

Tom Herbst, MPIA
AstroTechTalk, MPIA, 26 September 2014

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

MCAO – Multi-Conjugate Adaptive Optics

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

MCAO – Multi-Conjugate Adaptive Optics

GWS – Ground-layer Wavefront Sensor

MHWS – Mid-High-layer Wavefront Sensor

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

MCAO – Multi-Conjugate Adaptive Optics

GWS – Ground-layer Wavefront Sensor

MHWS – Mid-High-layer Wavefront Sensor

AIV – Assembly, Integration, and Verification

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

MCAO – Multi-Conjugate Adaptive Optics

GWS – Ground-layer Wavefront Sensor

MHWS – Mid-High-layer Wavefront Sensor

AIV – Assembly, Integration, and Verification

PAE – Preliminary Acceptance Europe

A Word on Words...



AstroTechTalk
26 September 2014
MPIA Heidelberg

MCAO – Multi-Conjugate Adaptive Optics

GWS – Ground-layer Wavefront Sensor

MHWS – Mid-High-layer Wavefront Sensor

AIV – Assembly, Integration, and Verification

PAE – Preliminary Acceptance Europe

werde
wurde – I will never get these correct...
würde

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

degree ($^{\circ}$) – $1/360$ of a circle (moon is 0.5 degree)

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

degree ($^{\circ}$) – 1/360 of a circle (moon is 0.5 degree)

arcminute ($'$) – 1/60 of a degree (limit of human eye)

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

degree ($^{\circ}$) – $1/360$ of a circle (moon is 0.5 degree)

arcminute ($'$) – $1/60$ of a degree (limit of human eye)

arcsecond ($''$) – $1/60'$ (limit of atmosphere $\sim 0.5''$)

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

degree ($^{\circ}$) – 1/360 of a circle (moon is 0.5 degree)

arcminute ($'$) – 1/60 of a degree (limit of human eye)

arcsecond ($''$) – 1/60' (limit of atmosphere \sim 0.5'')

milliarcsecond (mas) – 0.001'' LBT limit is 50 mas at 2 μ m

And A Word on Units...



AstroTechTalk
26 September 2014
MPIA Heidelberg

degree ($^{\circ}$) – 1/360 of a circle (moon is 0.5 degree)

arcminute ($'$) – 1/60 of a degree (limit of human eye)

arcsecond ($''$) – 1/60' (limit of atmosphere \sim 0.5'')

milliarcsecond (mas) – 0.001'' LBT limit is 50 mas at 2 μ m

Strehl Ratio – Measures image quality (1 = perfect)

Outline



AstroTechTalk
26 September 2014
MPIA Heidelberg

- About LINC-NIRVANA...
- Project Status...
- Implementation Plan...

- About LINC-NIRVANA...
- Project Status...
- Implementation Plan...

- About LINC-NIRVANA...
 - What we are trying to do
 - How LINC-NIRVANA works

- Project Status...
 - LINC-NIRVANA AIV (HD)
 - First Light with Pathfinder (LBT)

- Implementation Plan...
 - MCAO & Interferometry
 - What's next...

What We Are Trying To Do...



AstroTechTalk
26 September 2014
MPIA Heidelberg

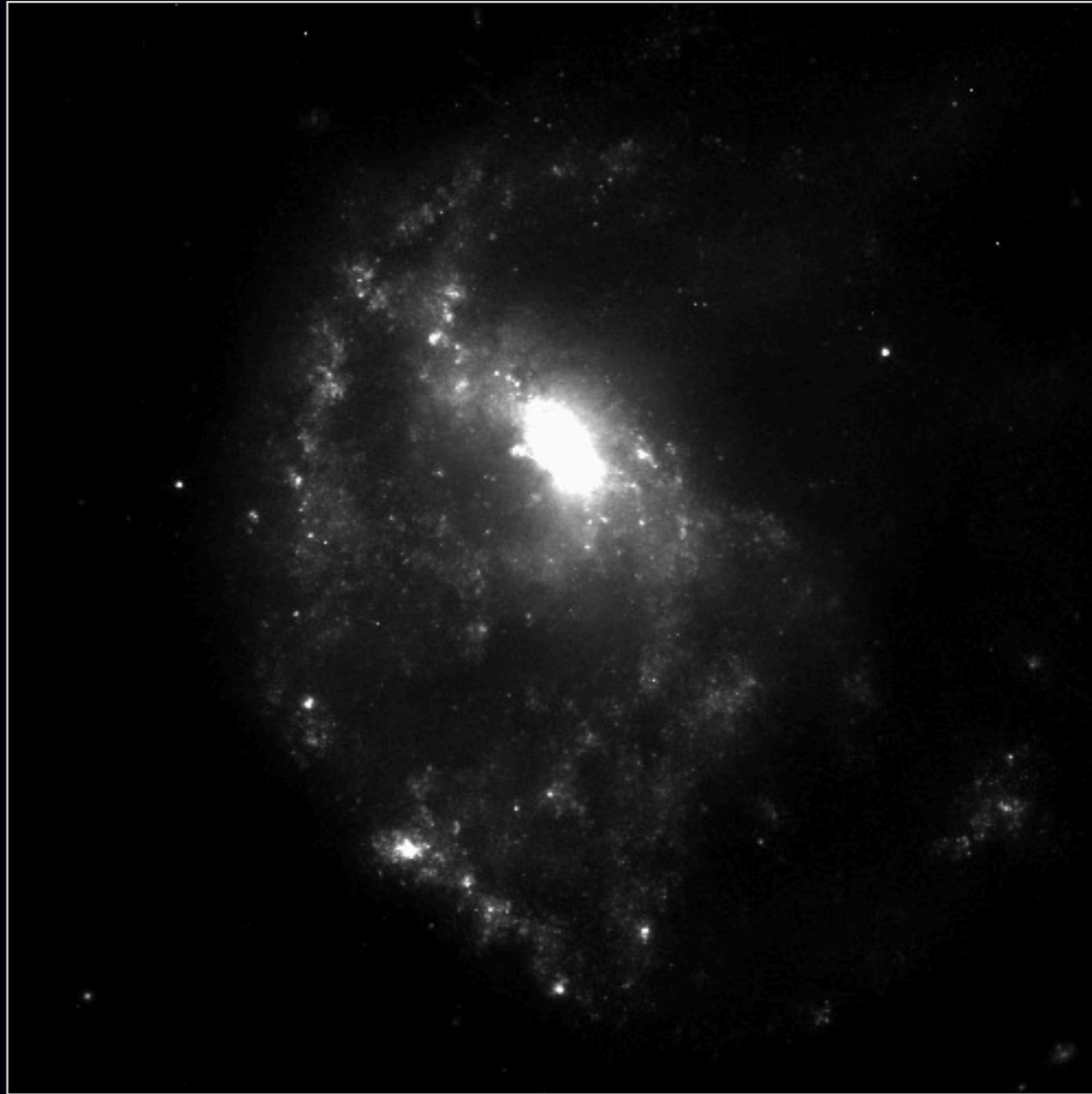
What We Are Trying To Do...



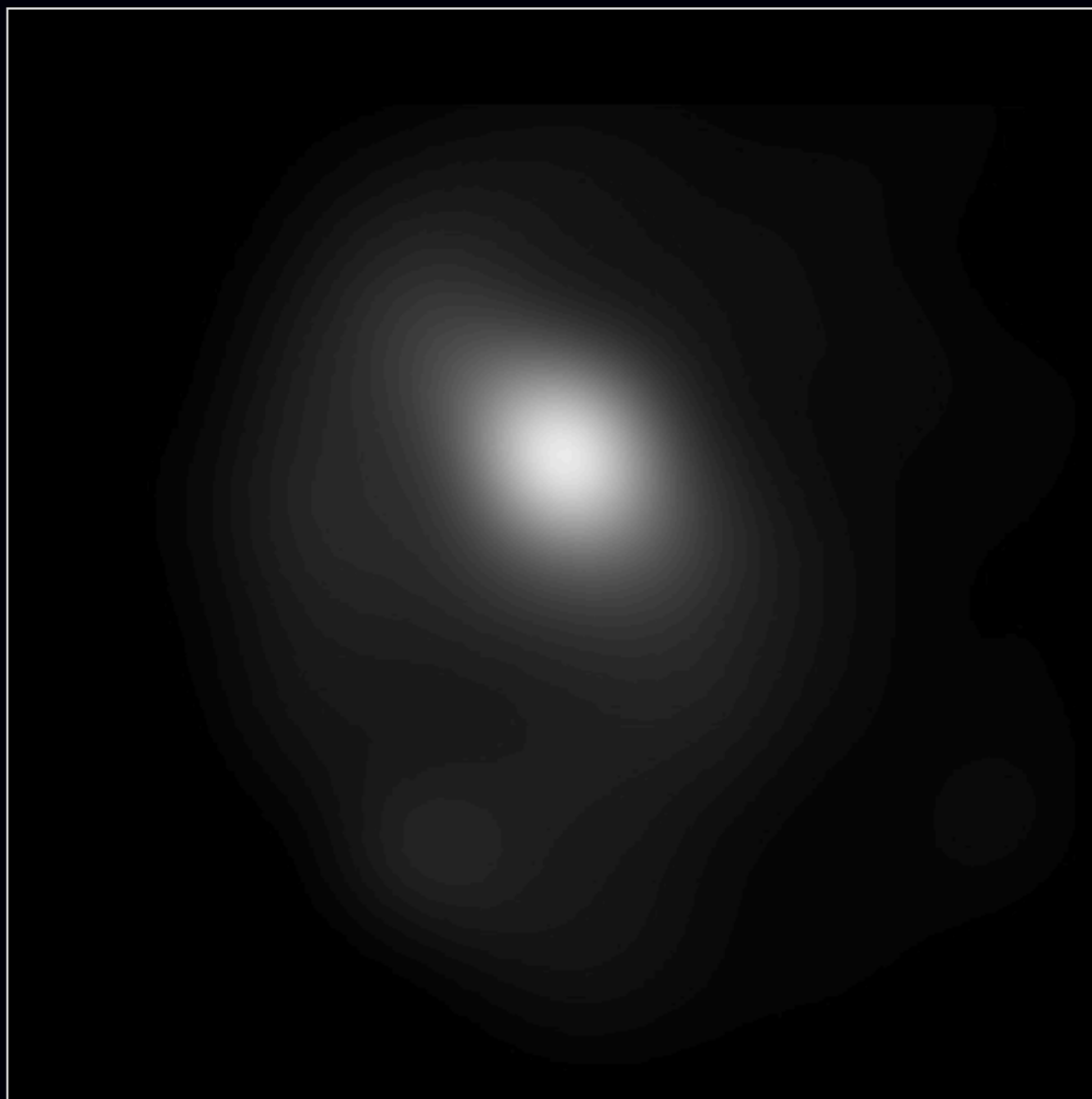
AstroTechTalk
26 September 2014
MPIA Heidelberg

Science

NGC 922



NGC 922

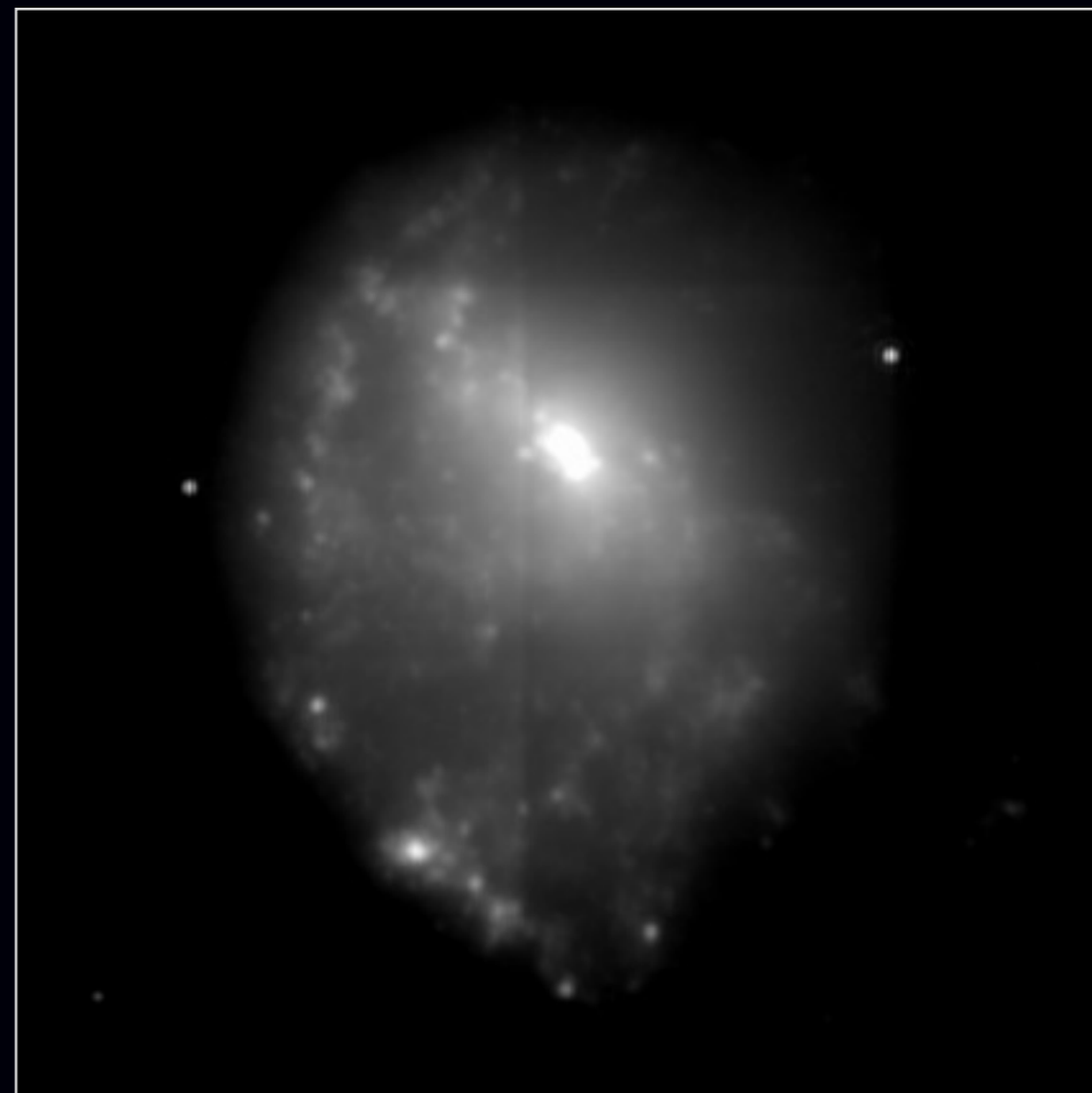


Seeing 0.7 arcsec

NGC 922

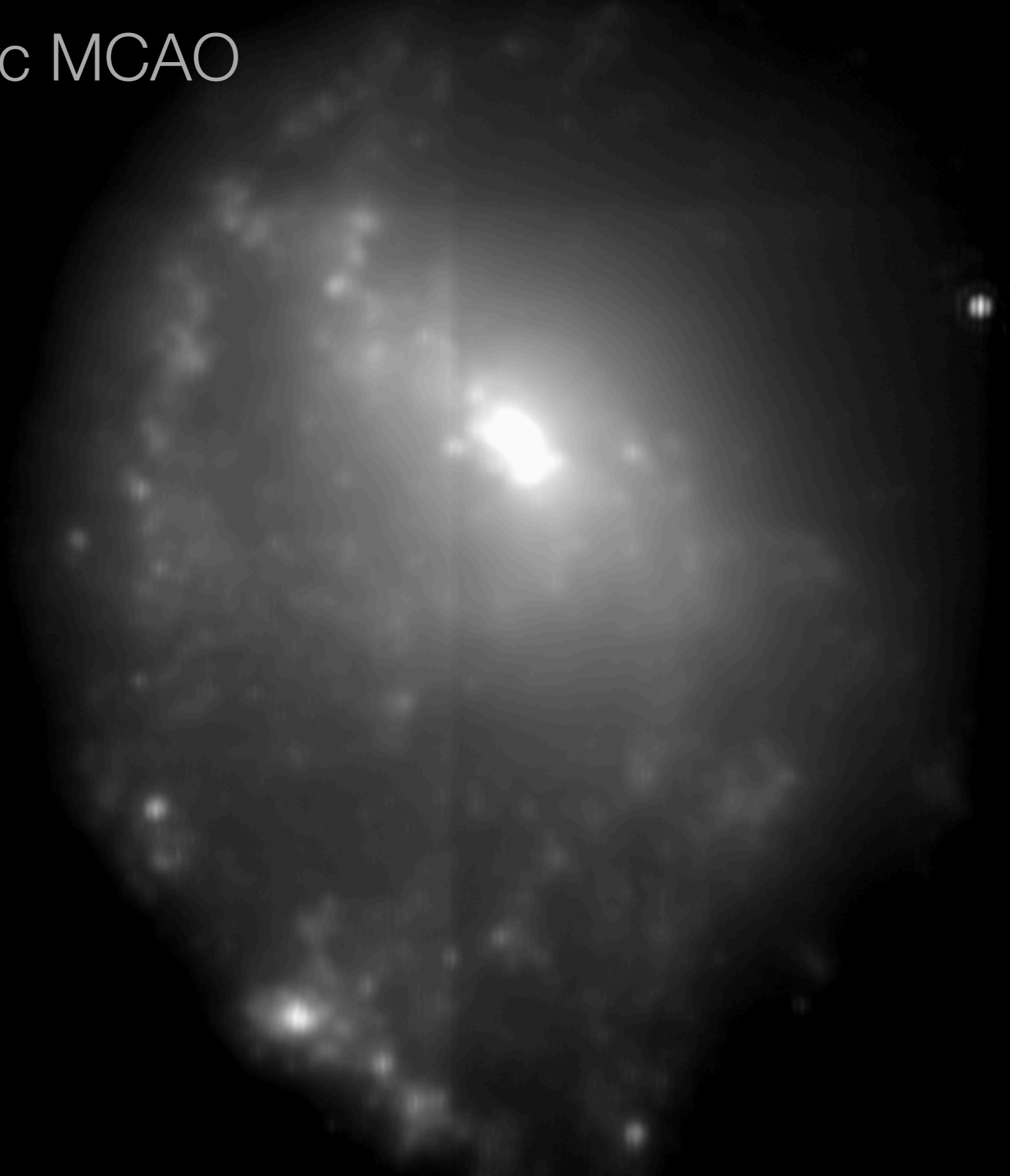


Seeing 0.7 arcsec

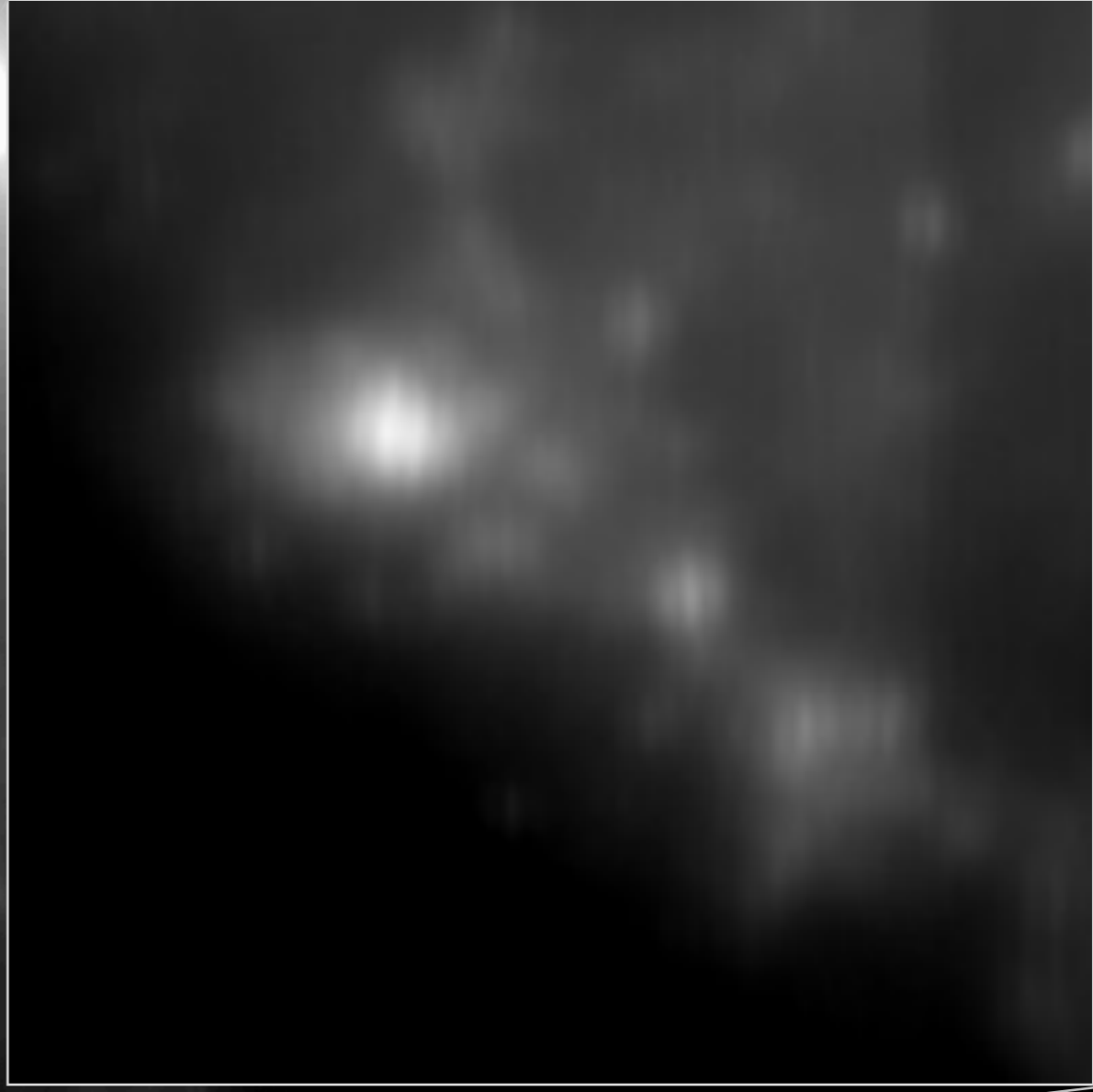
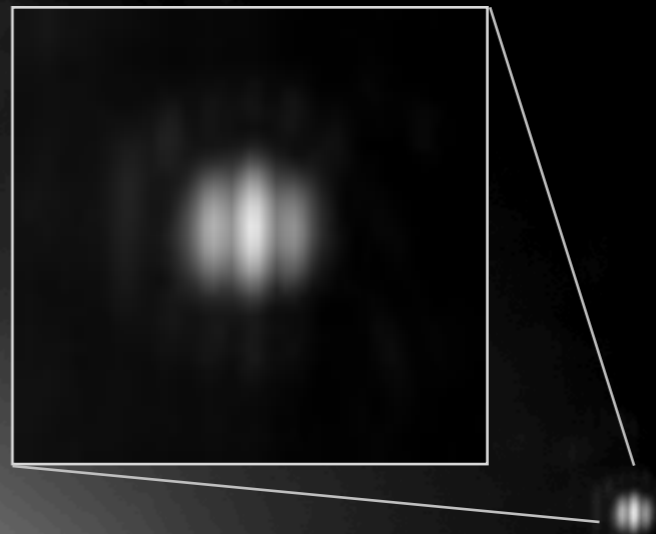
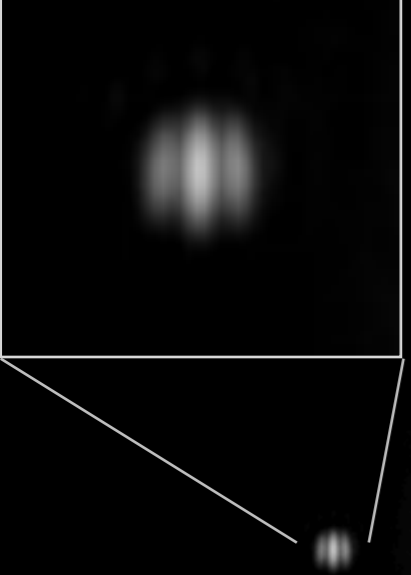


LINC-NIRVANA

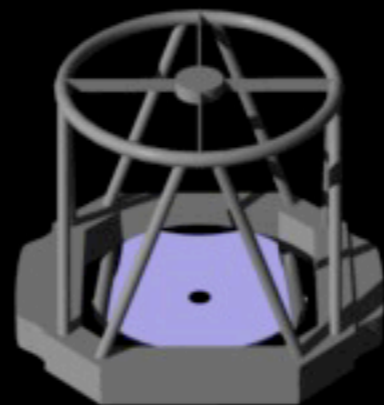
Panoramic MCAO

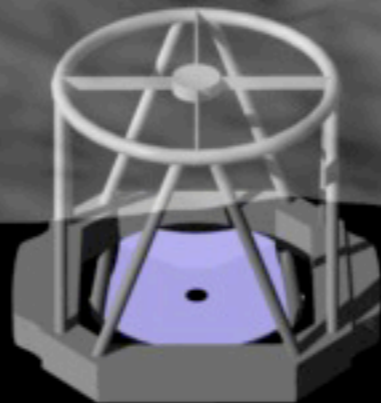
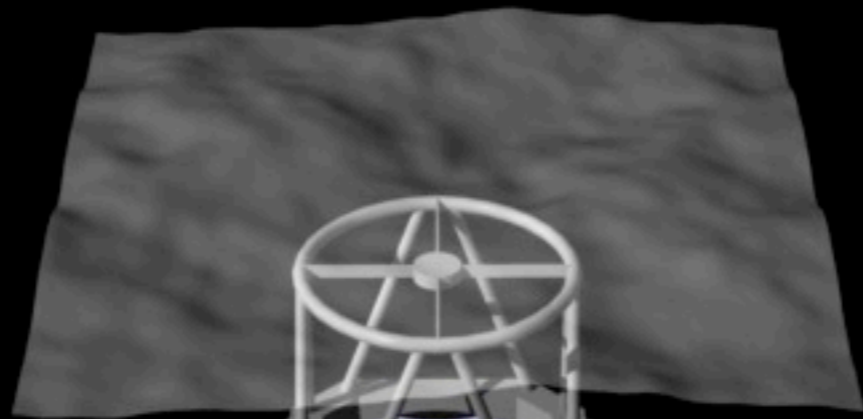
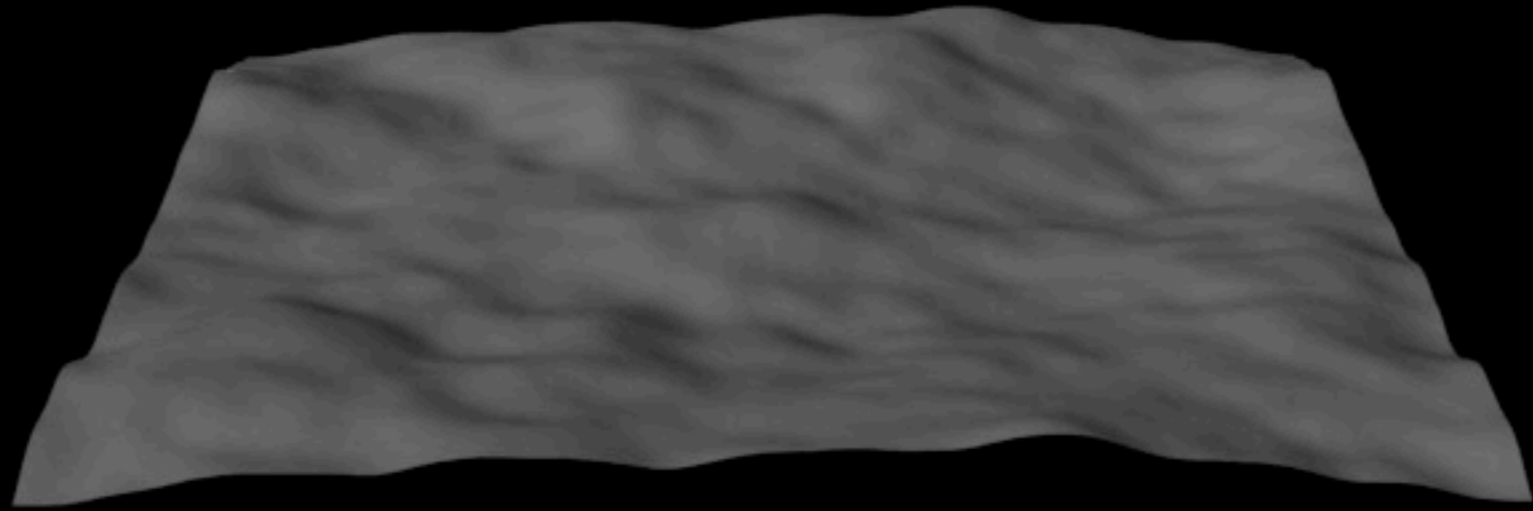


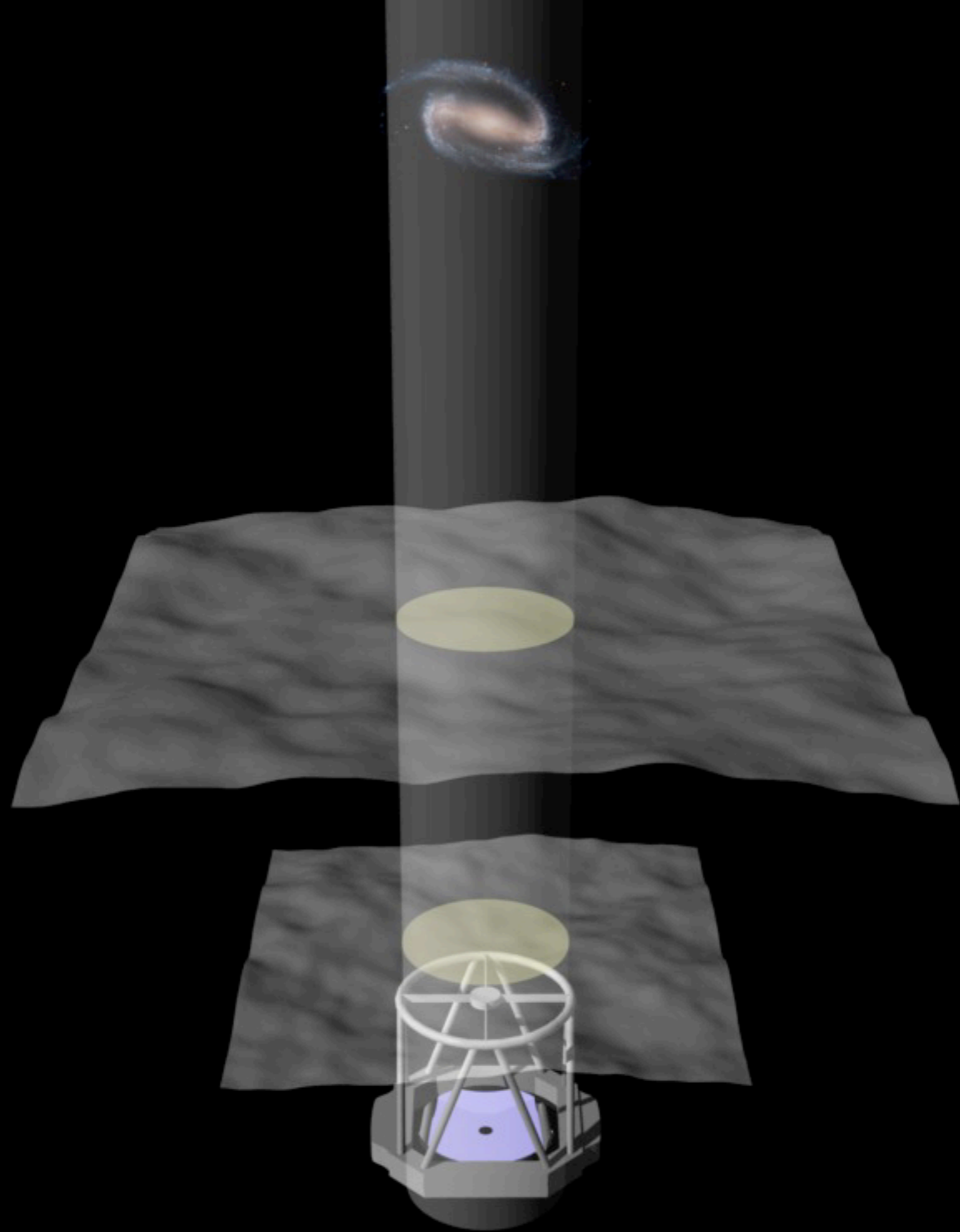
Panoramic MCAO
and eventually...

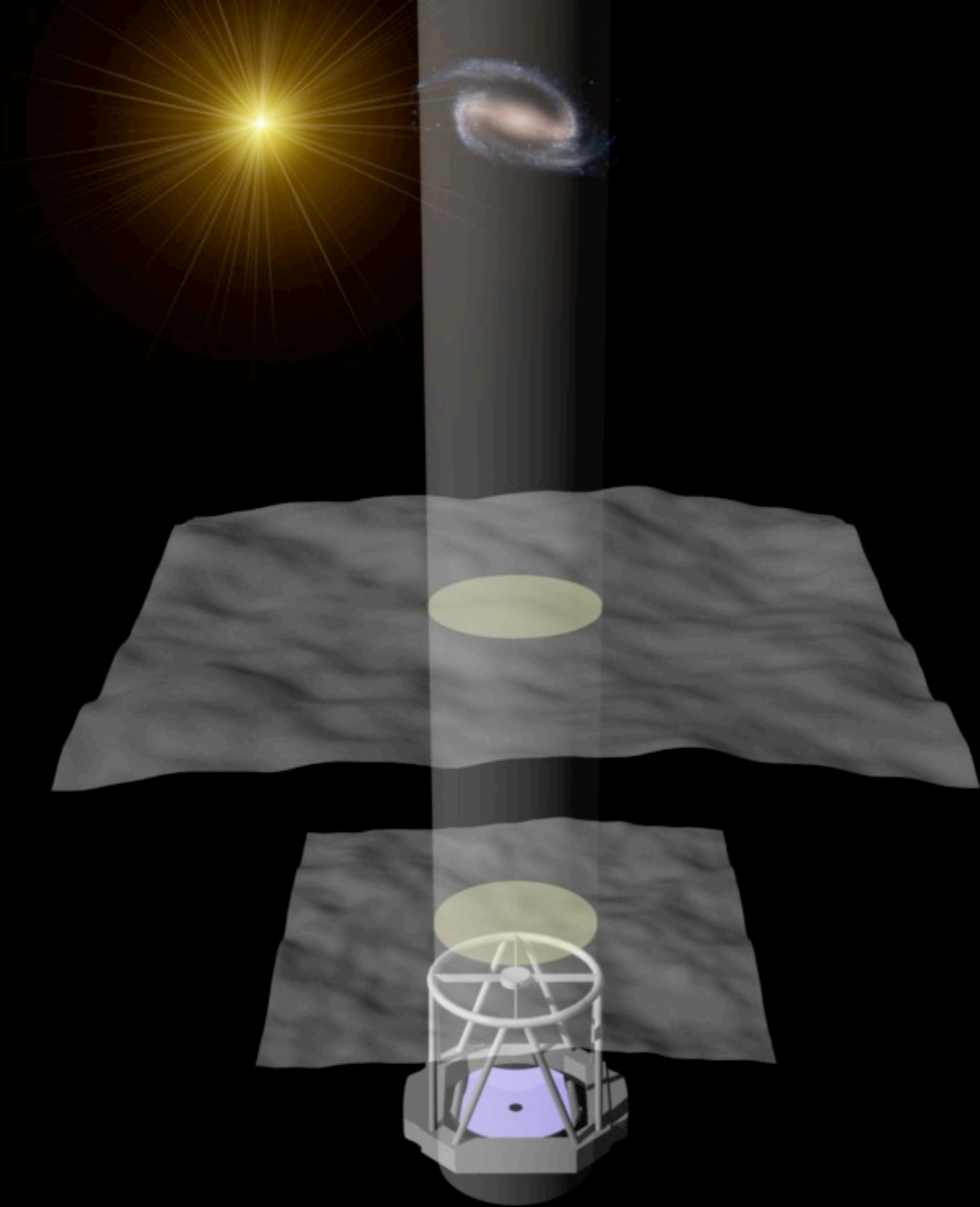


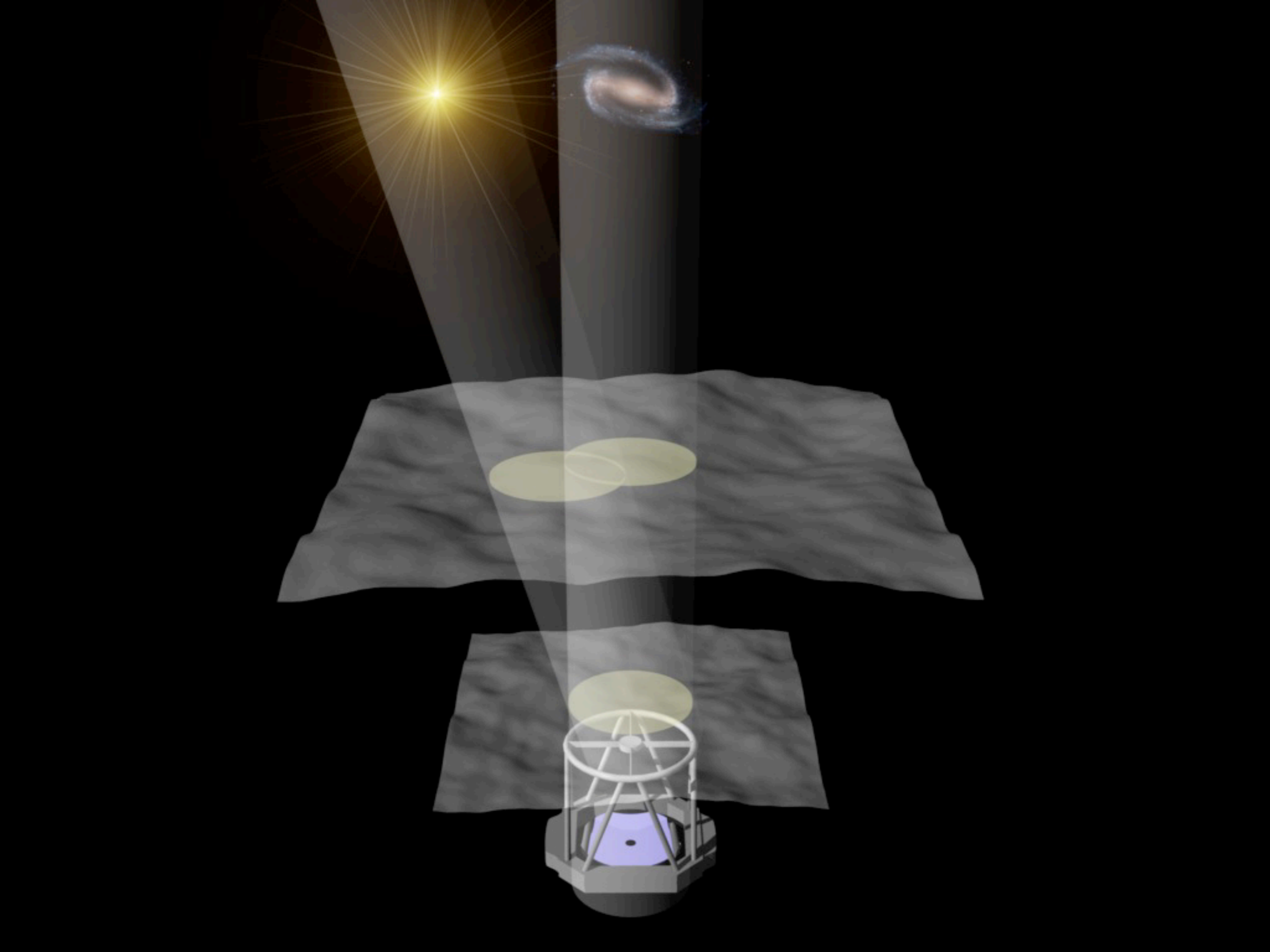
MCAO - A One-Slide Explanation

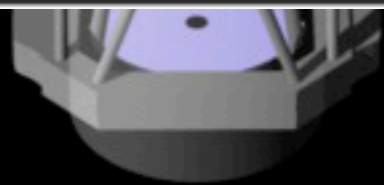
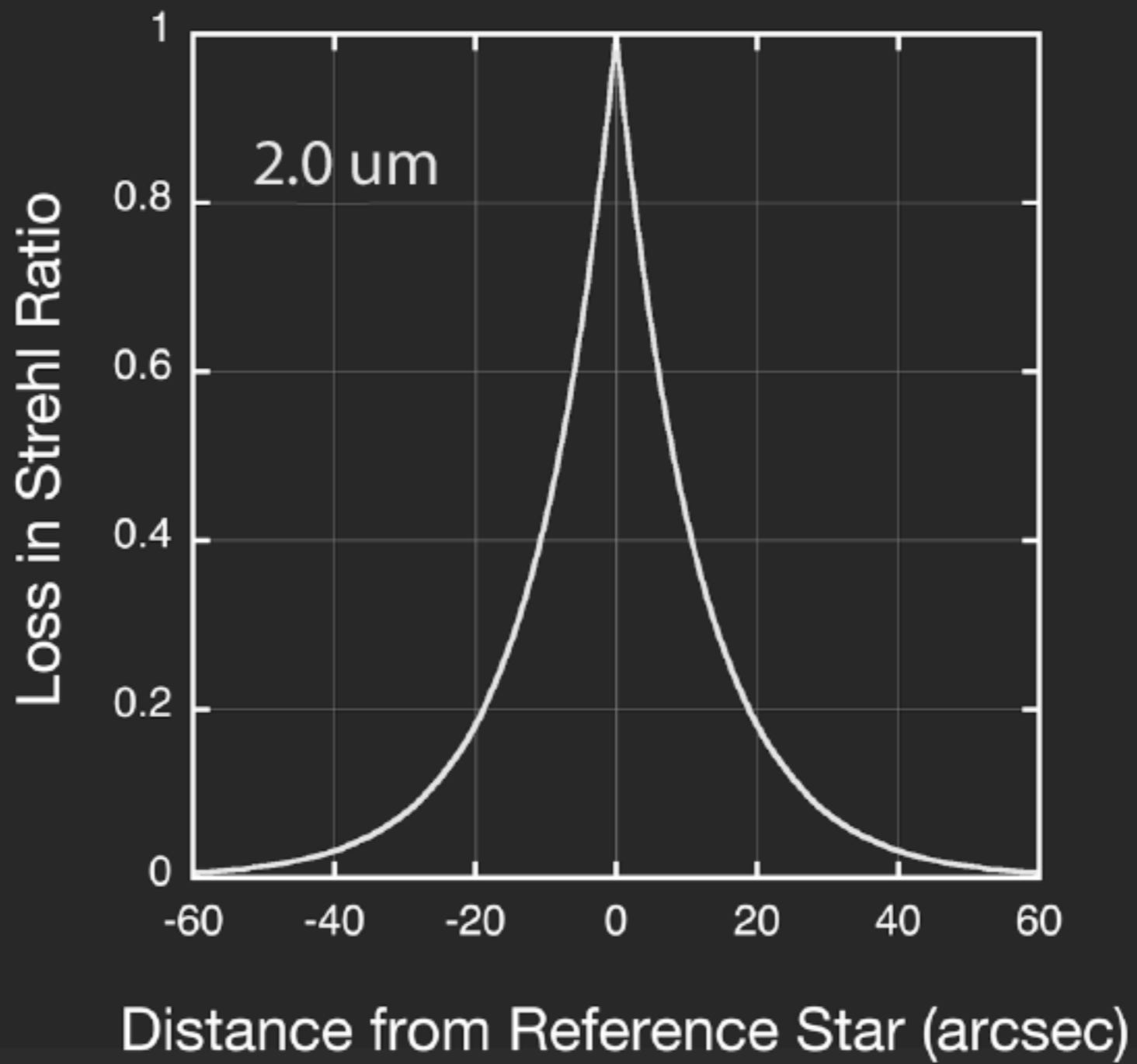


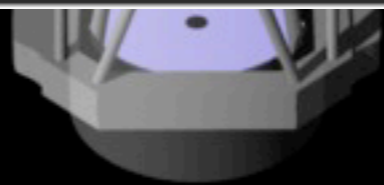
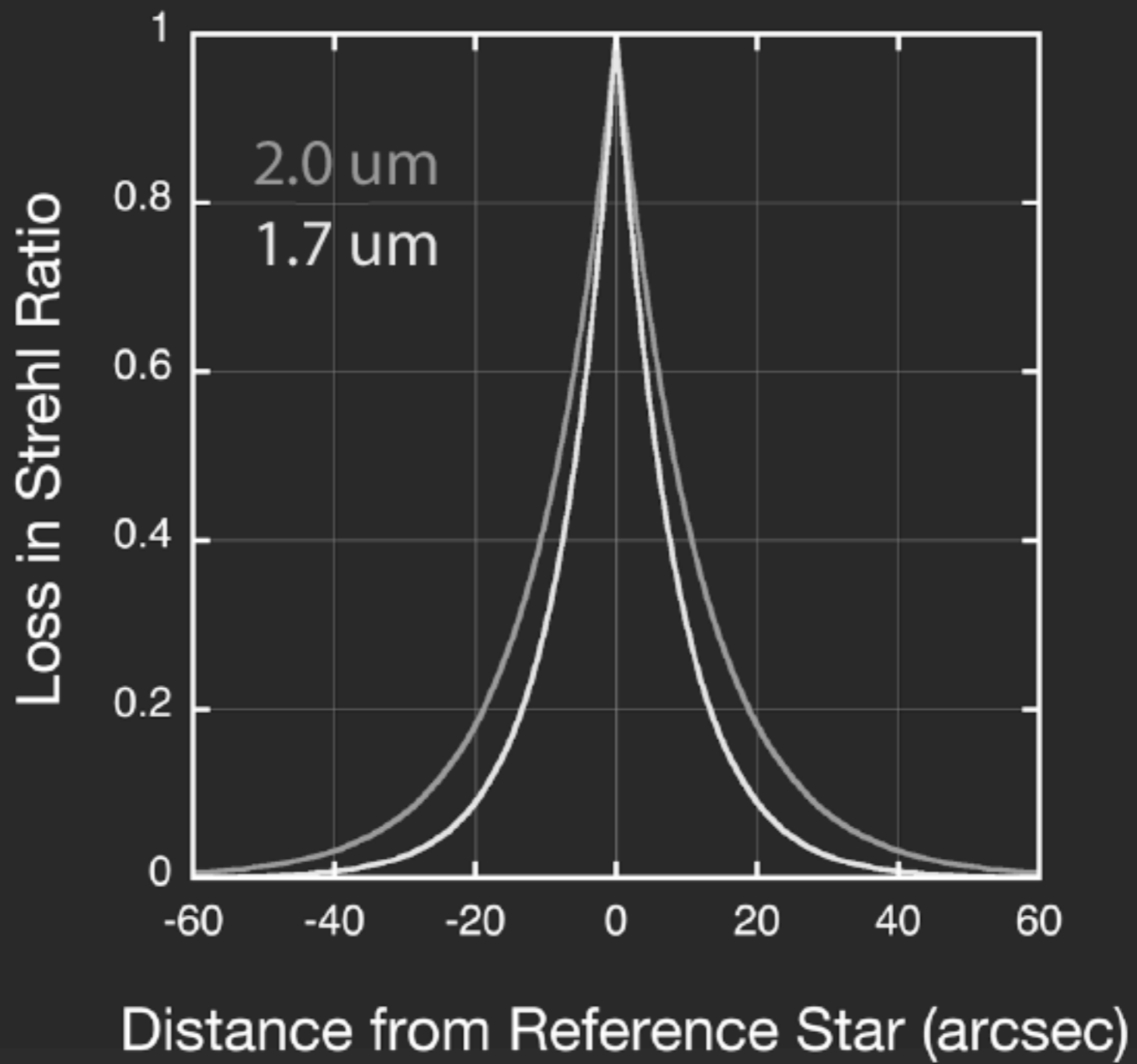


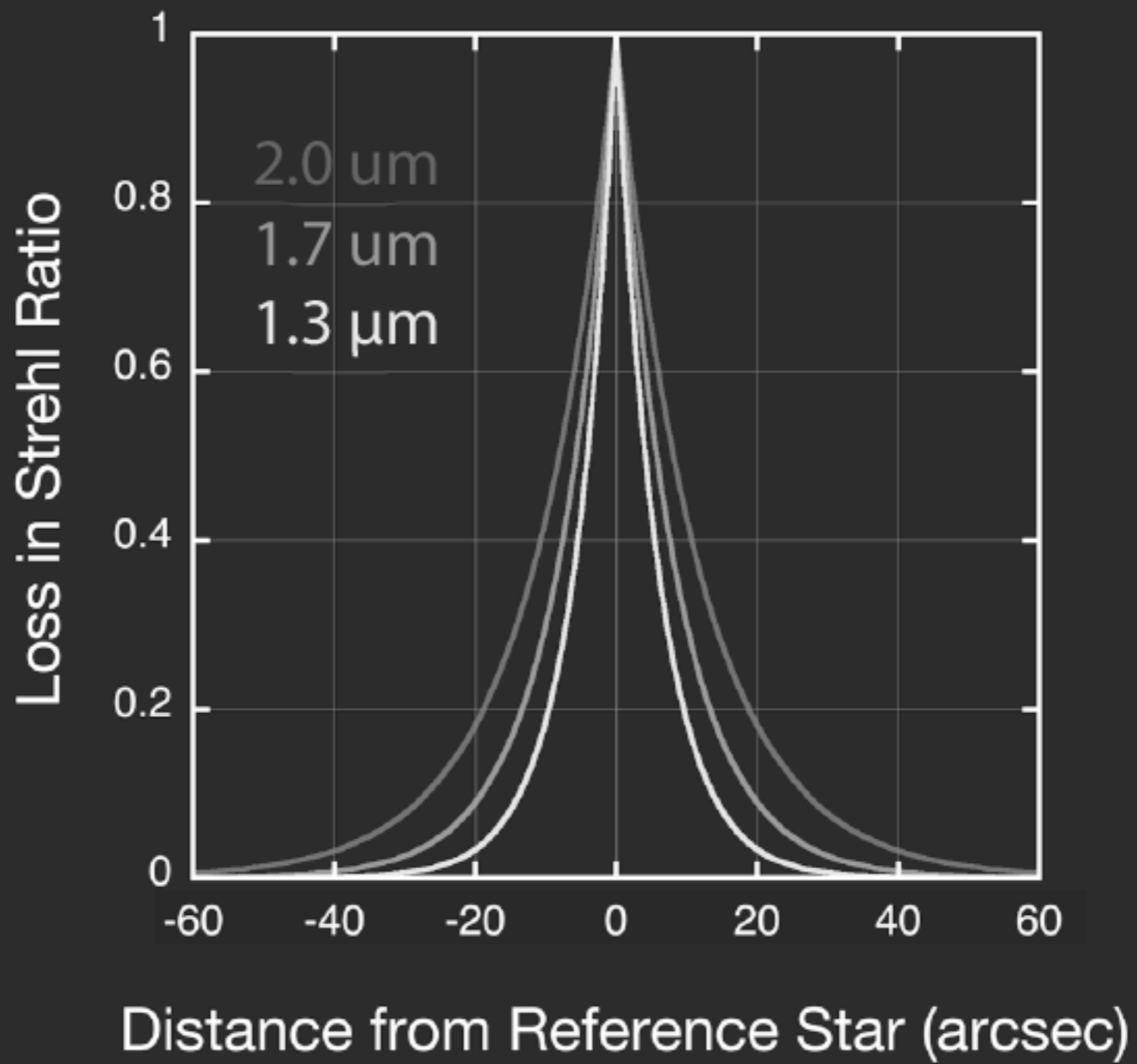


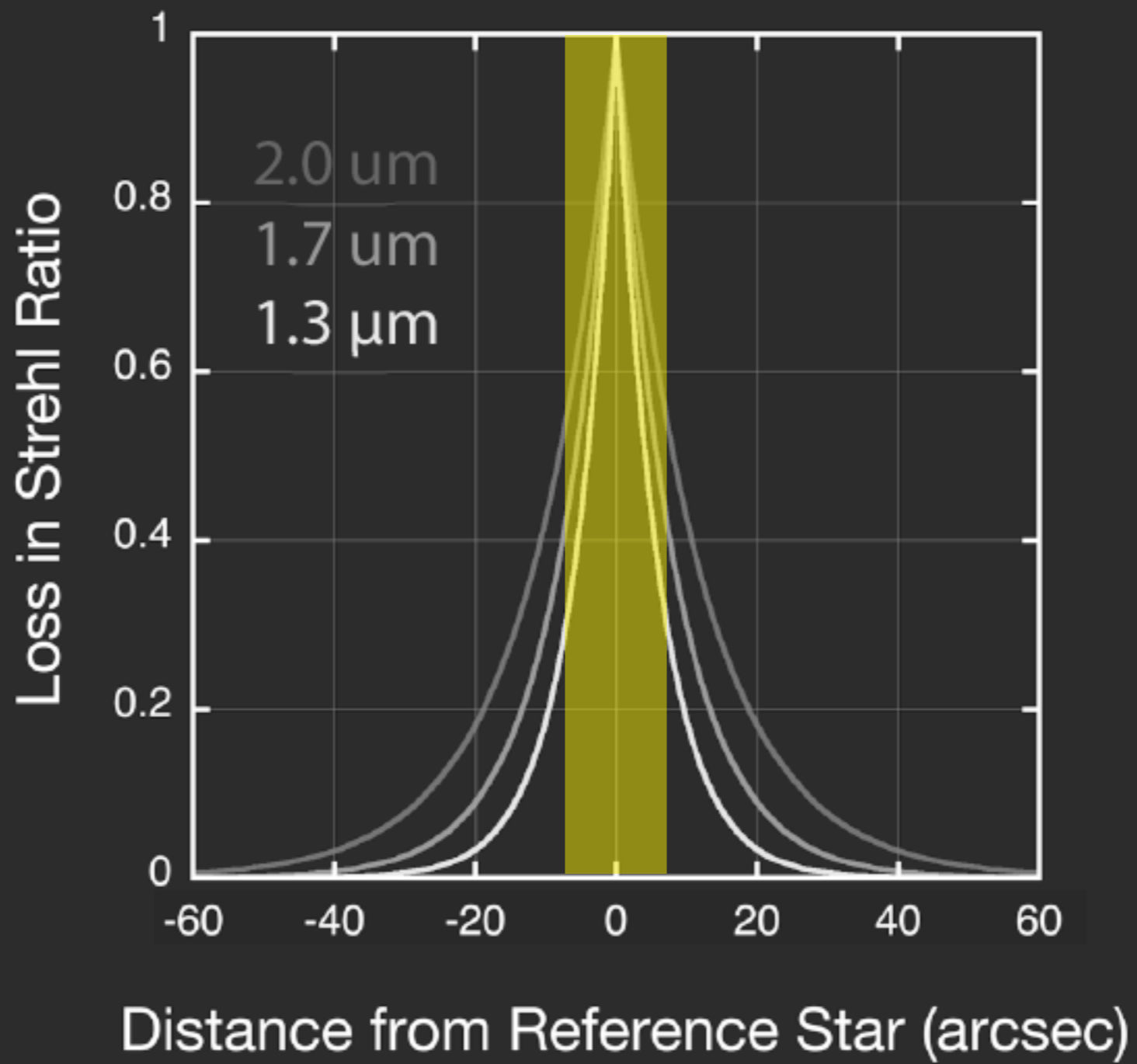


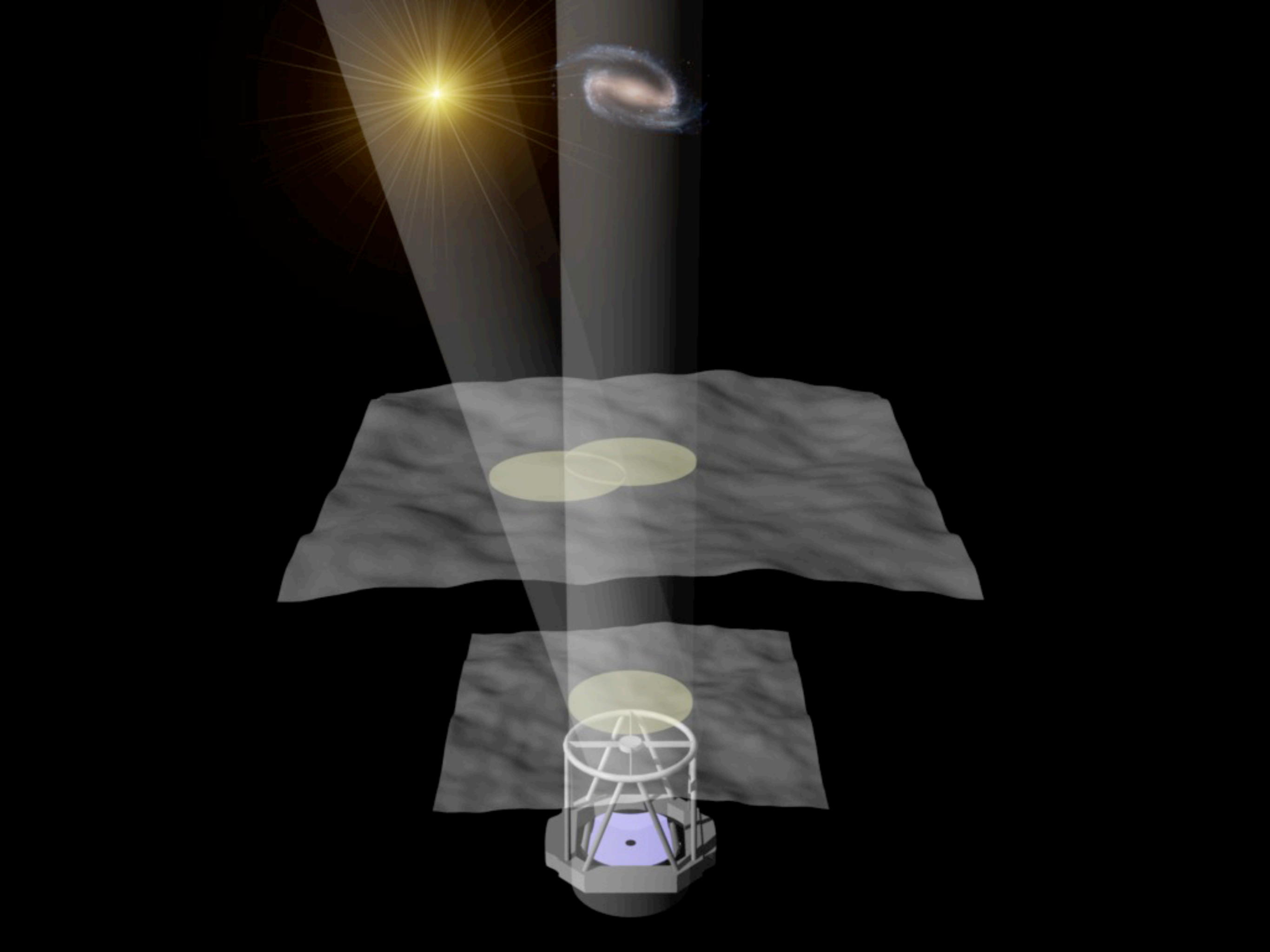


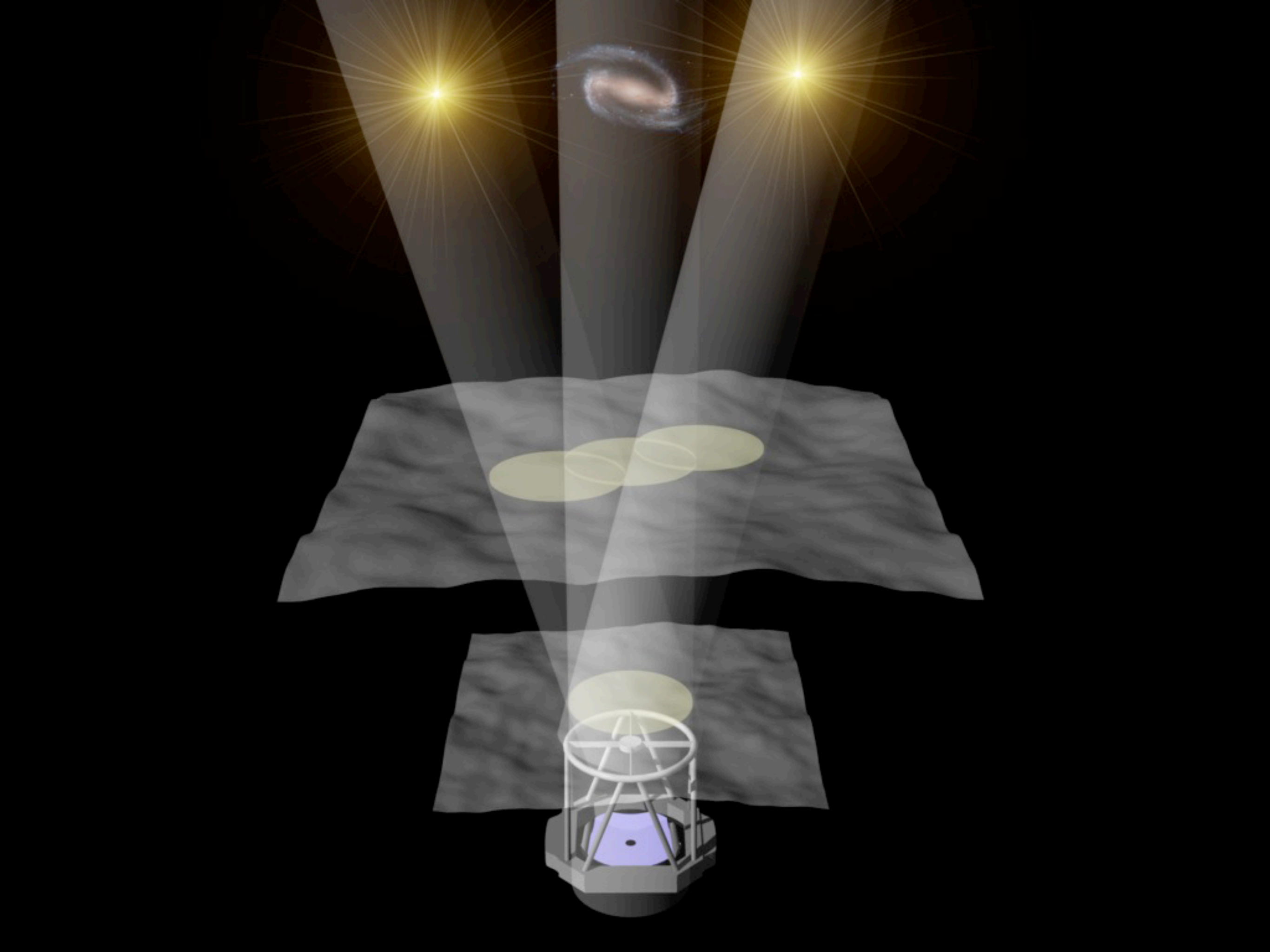














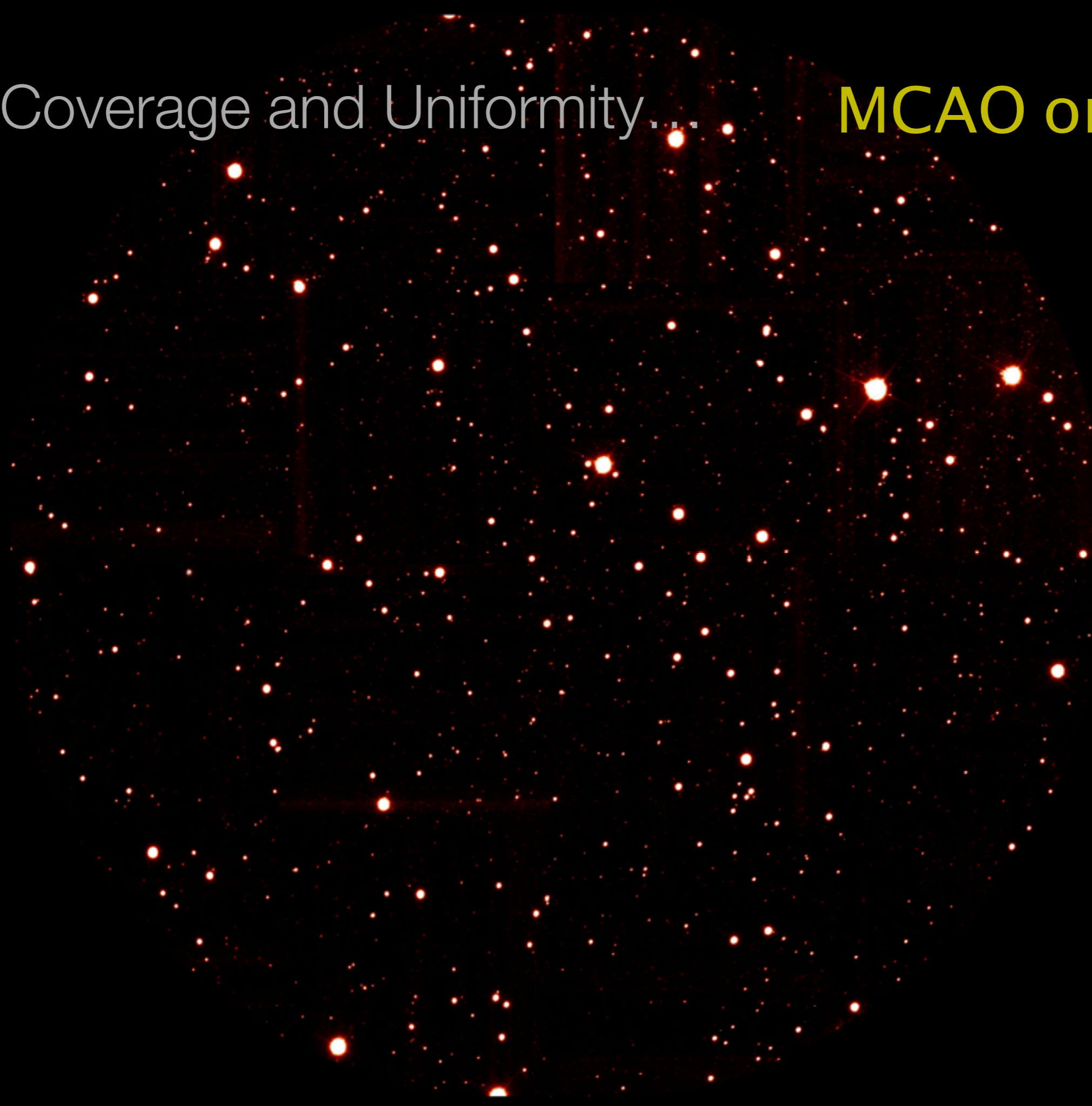
Sky Coverage and Uniformity...

Sky Coverage and Uniformity...

MCAO on VLT

Ω Cen

B_r γ 2' x 2'
4k x 4k



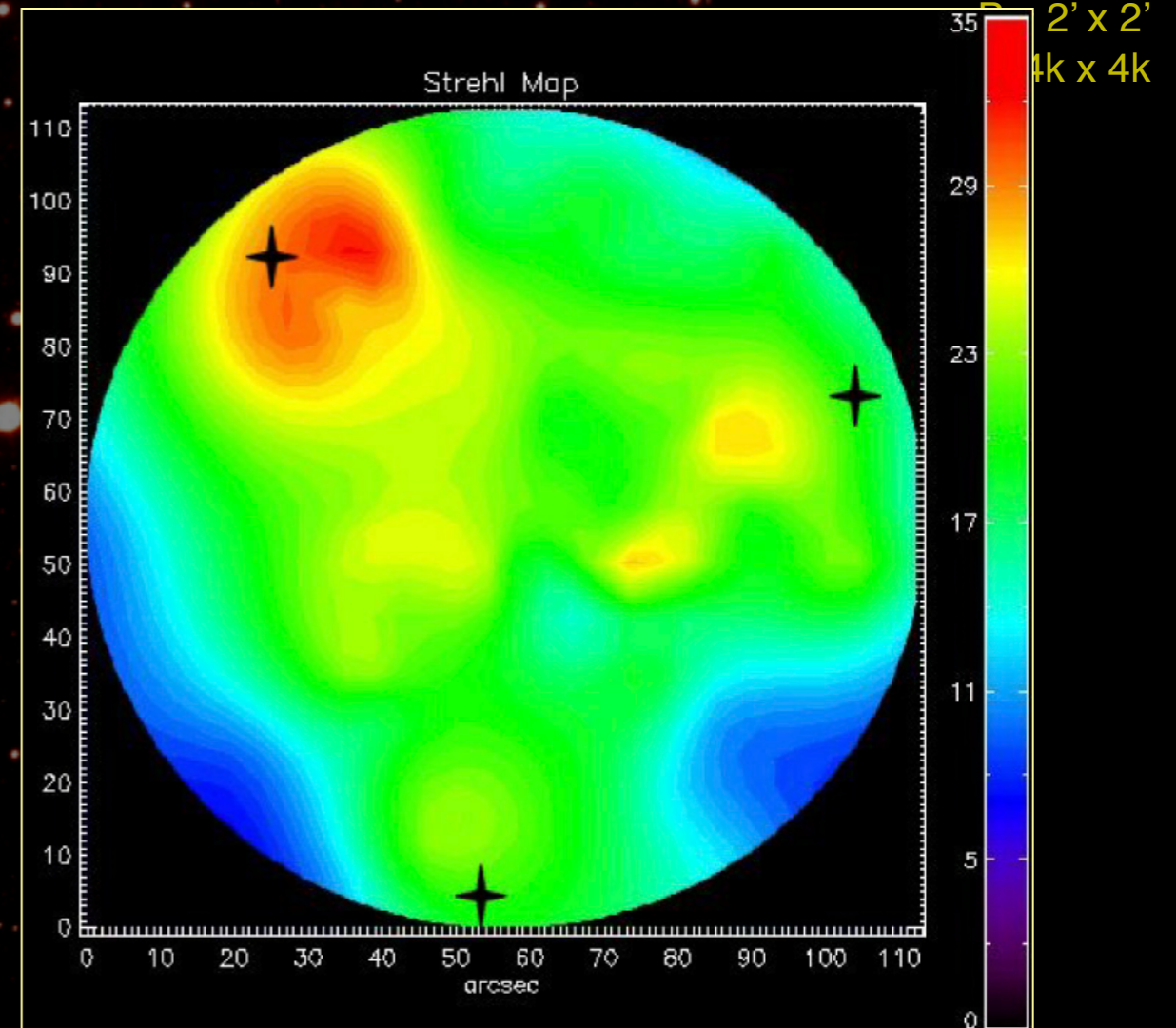
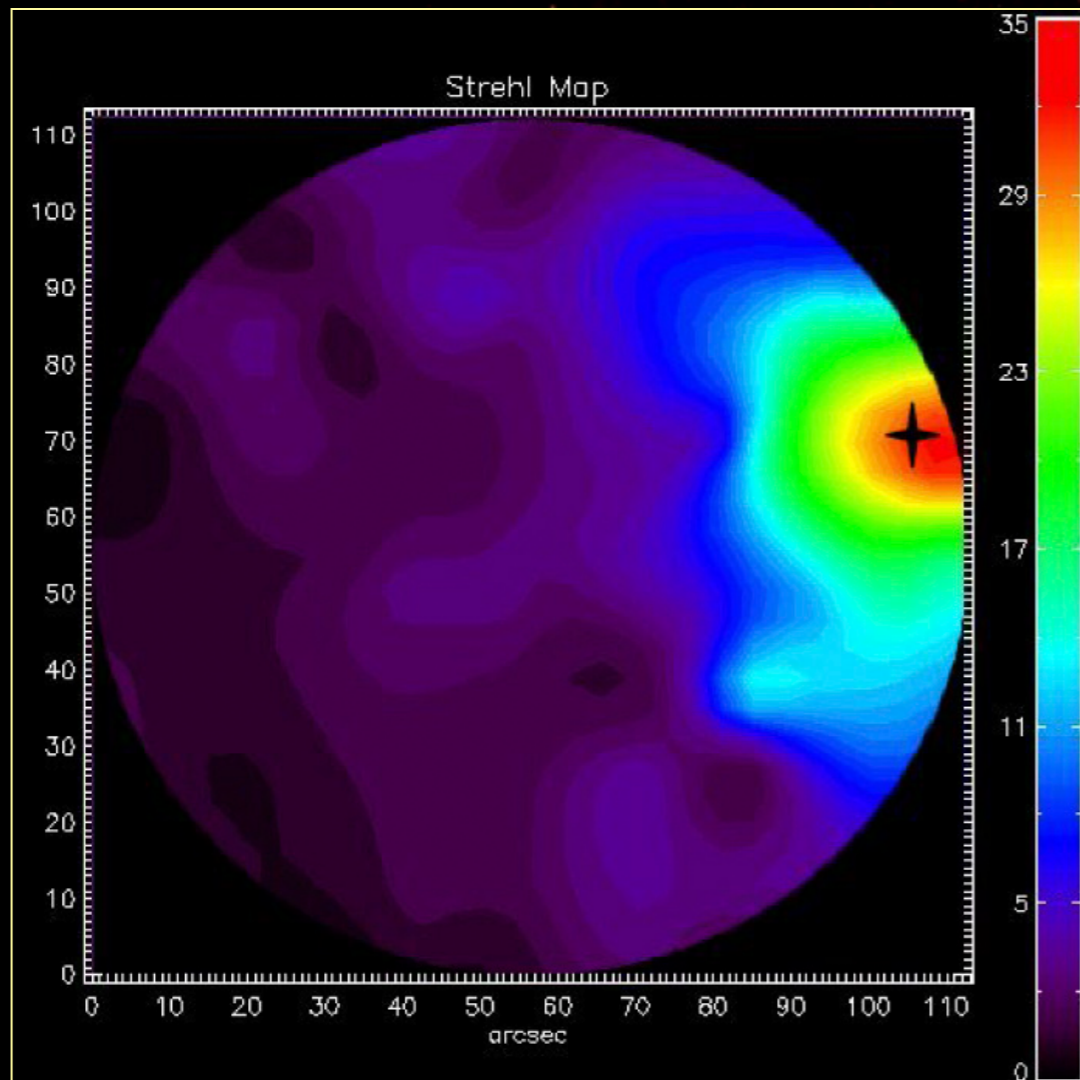
Sky Coverage and Uniformity...

MCAO on VLT

Traditional SCAO

MCAO

Ω Cen



Why MCAO? – Science



MPIK
Heidelberg
8 May 2013

Why MCAO? – Science



MPIK
Heidelberg
8 May 2013

Sky Coverage

Sky Coverage

	SCAO	MCAO
Galactic Plane	~10%	99%
NGP	<5%	48%

Sky Coverage for @2 μm $\text{SR} > 10\%$

(and uniformity)

What is LINC-NIRVANA?

