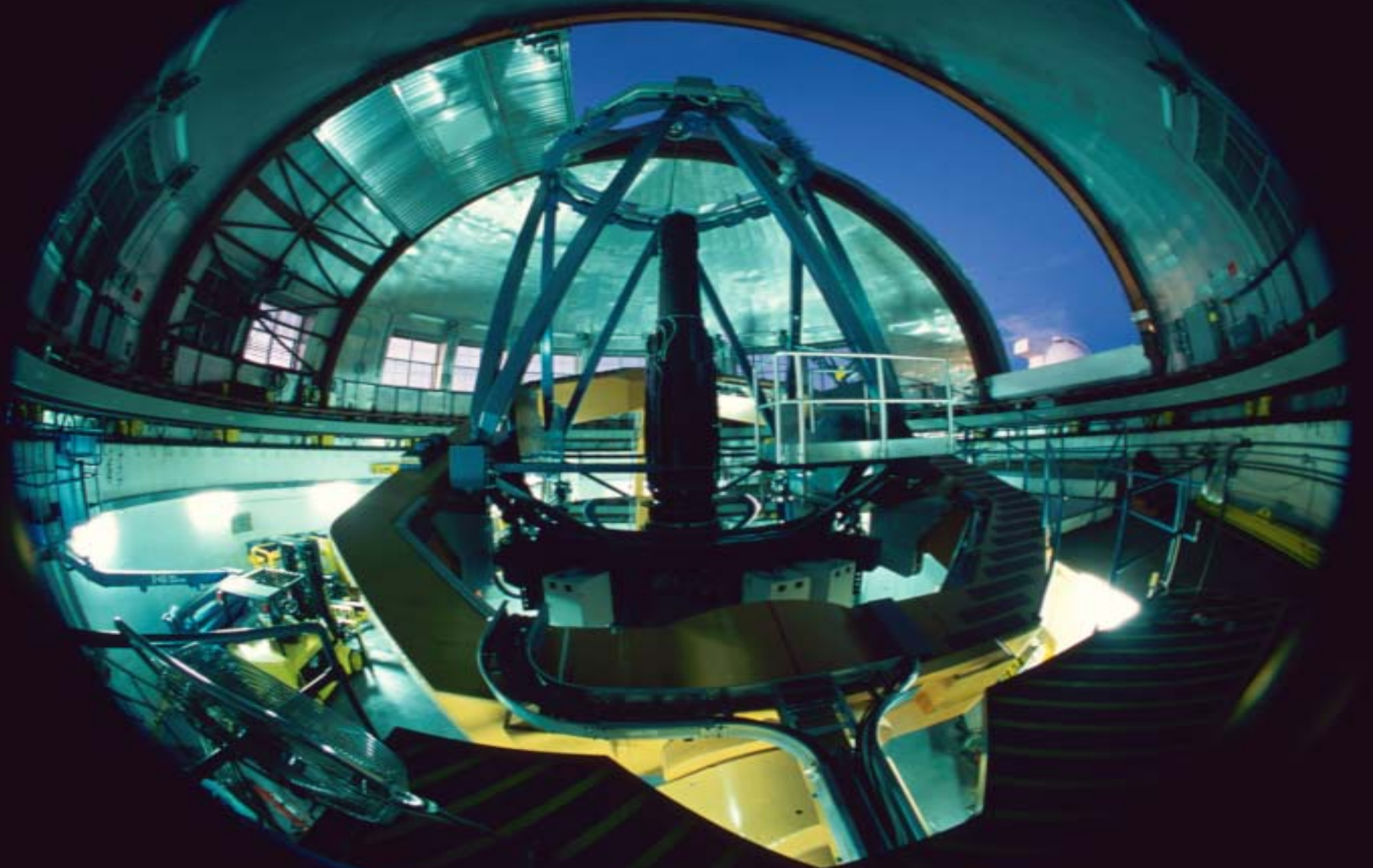


# WFCAM



# WFCAM

Optical design : D.Henry, D.Lee, E.Atad

Mechanical design/Assembly: D.Montgomery, K.Burch, Jim Eliot

Management : D.Lunney, I.Robson, S.Brierley

Electronics : D.Ives, K.Laidlaw, B.Woodward

Software : A.Vick, A.Pickup, M.Folger, S.MacLay

Commissioning : ATC + JAC staff

Science/requirements/data analysis : M.Casali, A.Lawrence, S.Warren, M.Hastie

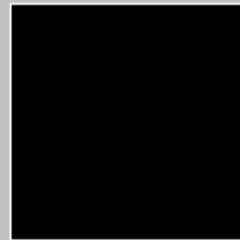
JAC Interface : A.Adamson, P.Hirst, N.Rees, T.Chuter

Pipeline/Archiving : M.Irwin, J.lewis, N.Hambly, M.Read

13.7'



12.9'



WFCAM



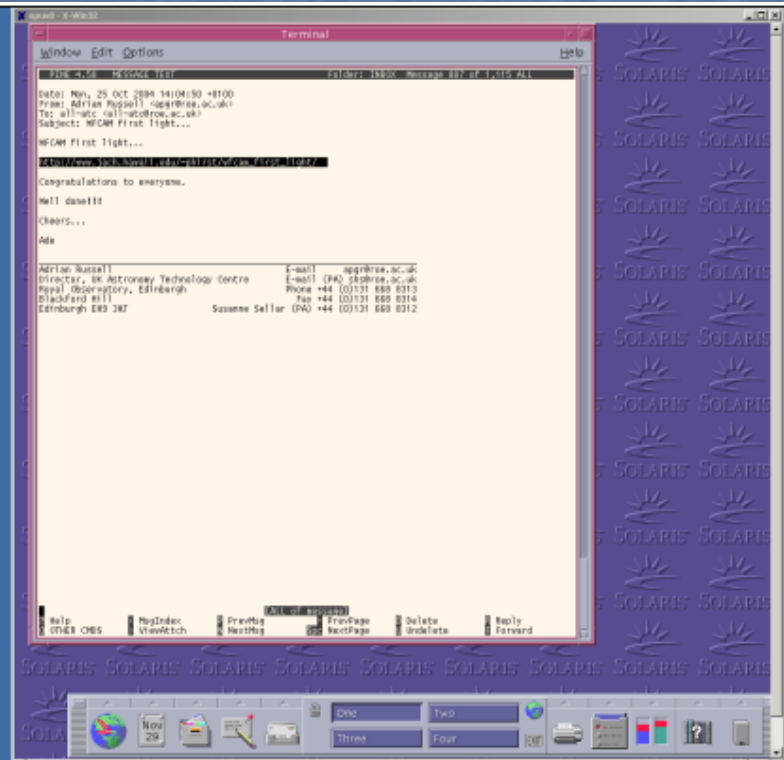
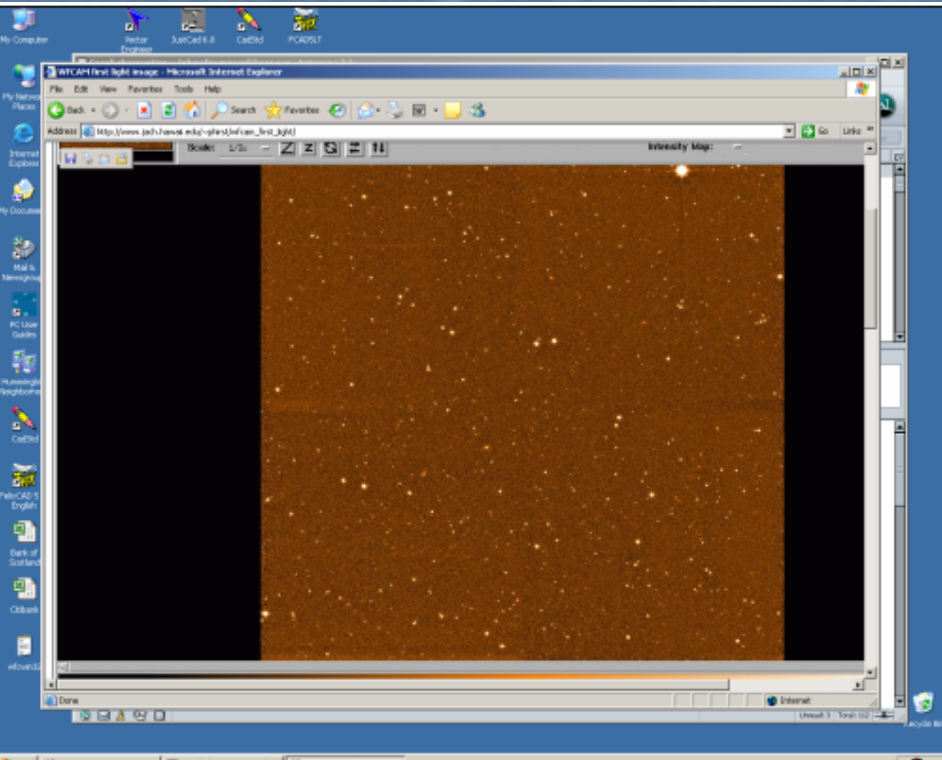
2MASS

0.4" pixels

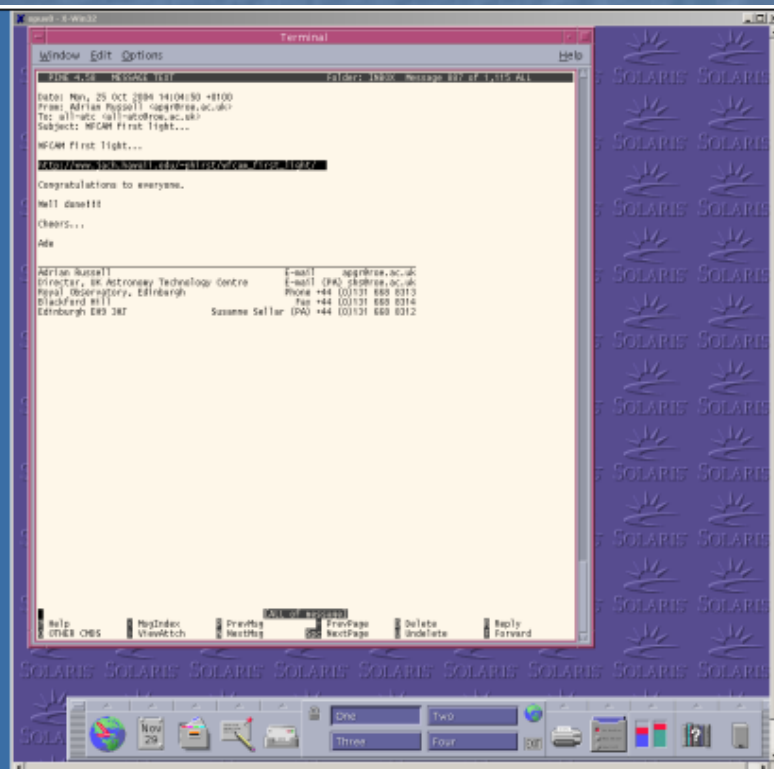
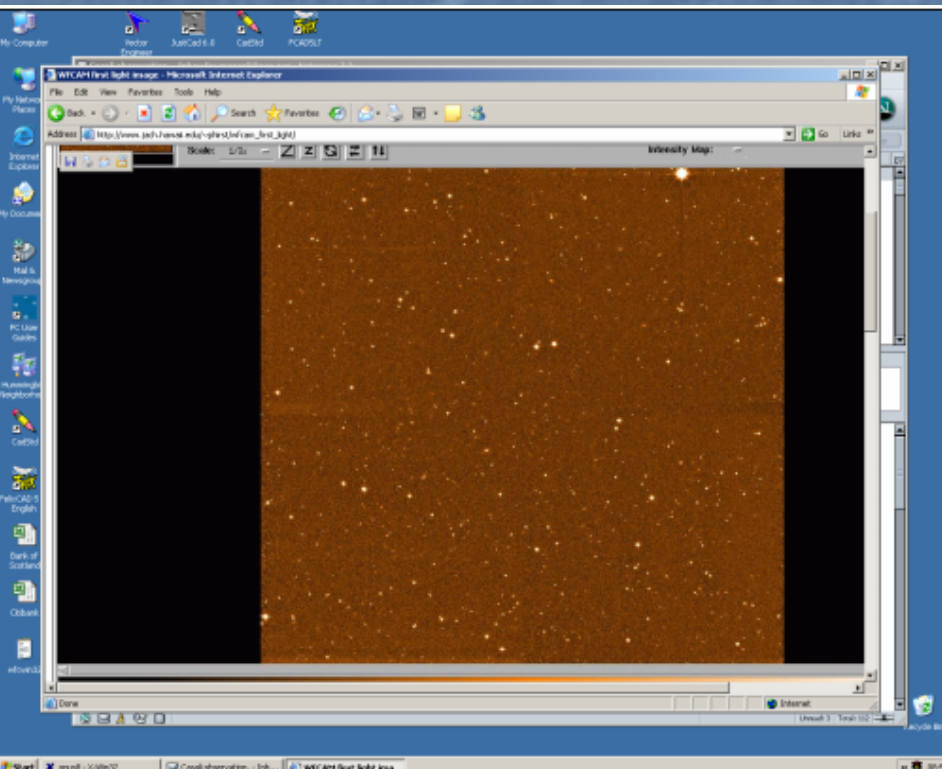
3.8m telescope



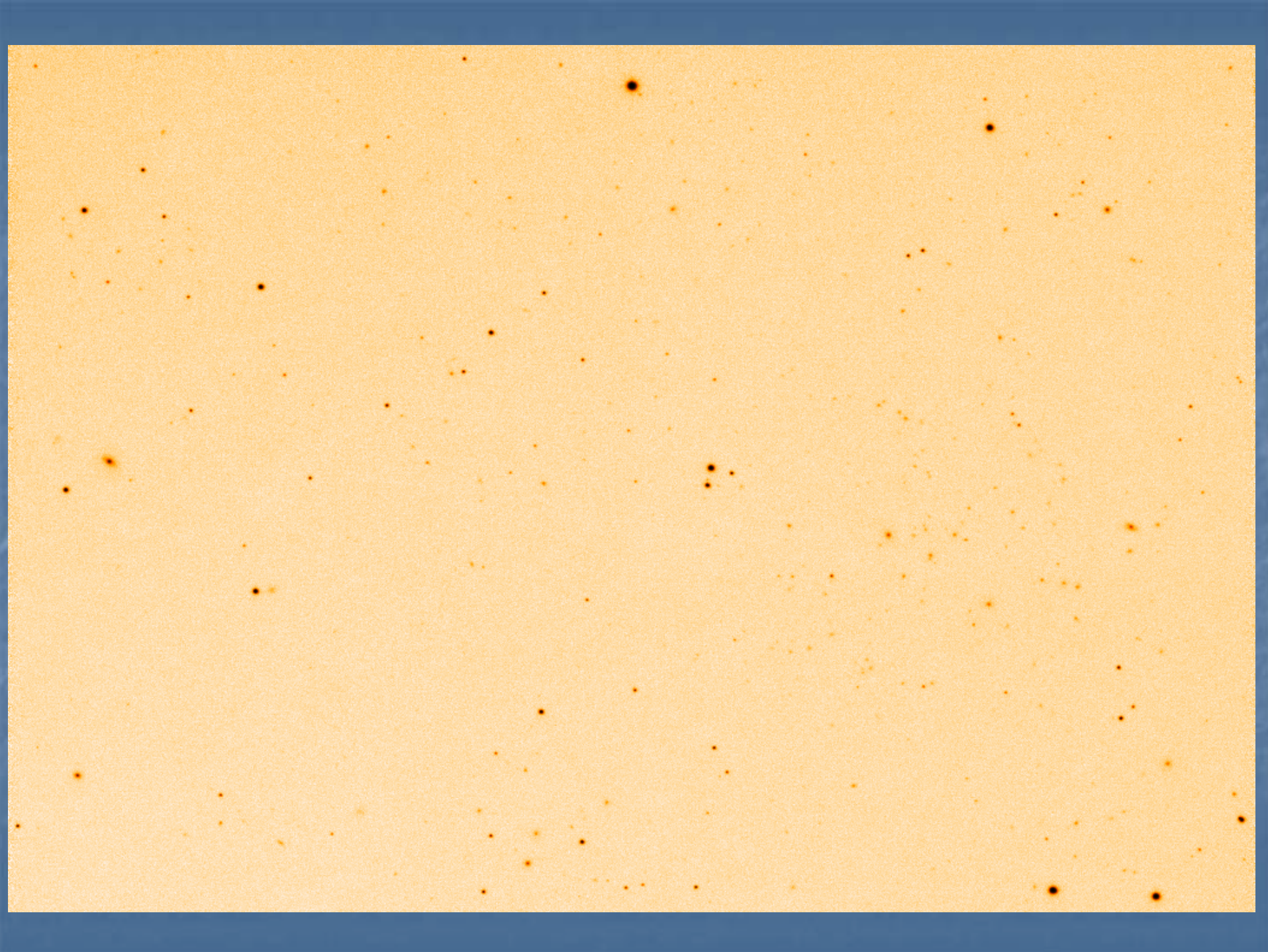
- project kickoff in late 1999
- delivery to JAC Hawaii in June 2004
- first light October 2004



- project kickoff in late 1999
- delivery to JAC Hawaii in June 2004
- first light October 2004
- subsequent commissioning and science verification
  - instrument/M2 alignment with respect to telescope axis
  - focal plane orthogonality to optical axis

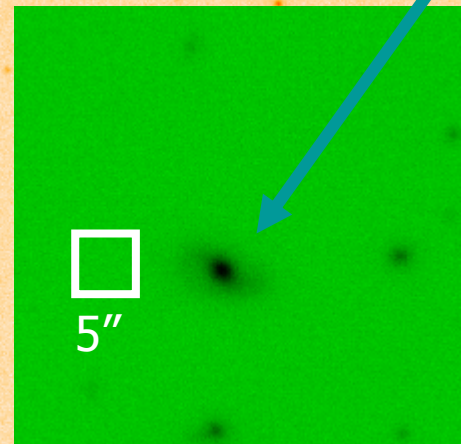






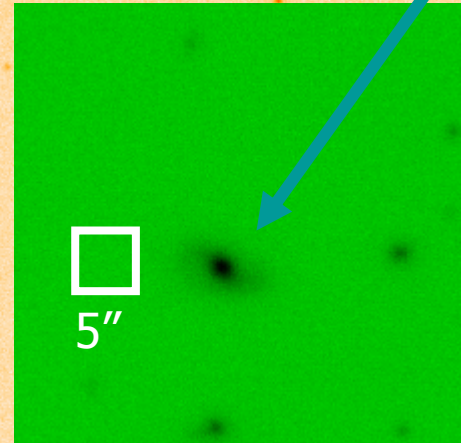
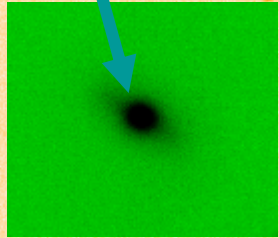


Galaxies !



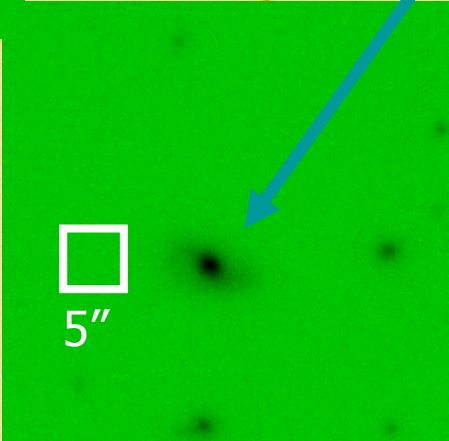
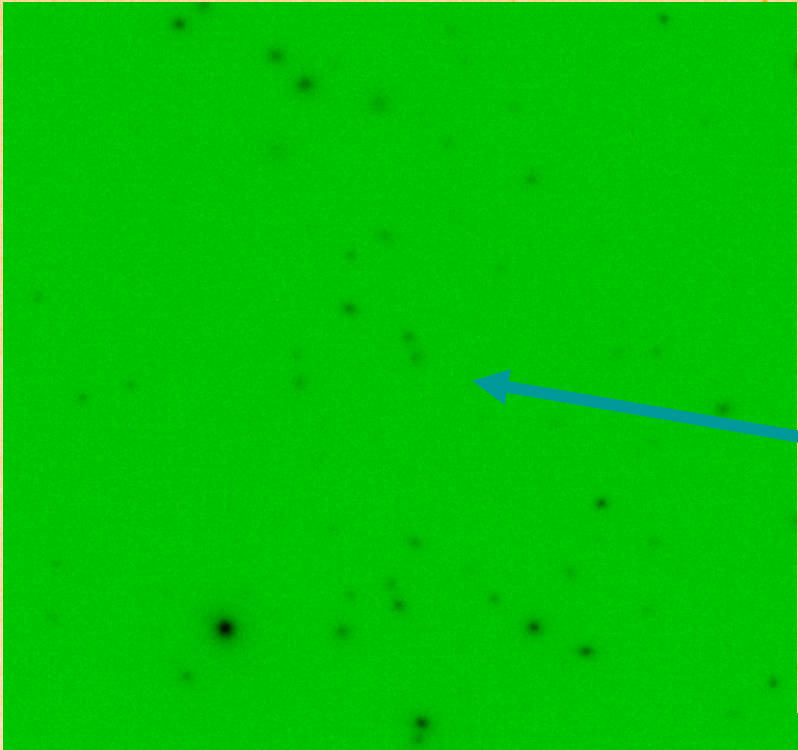
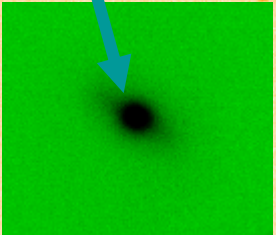


Galaxies !



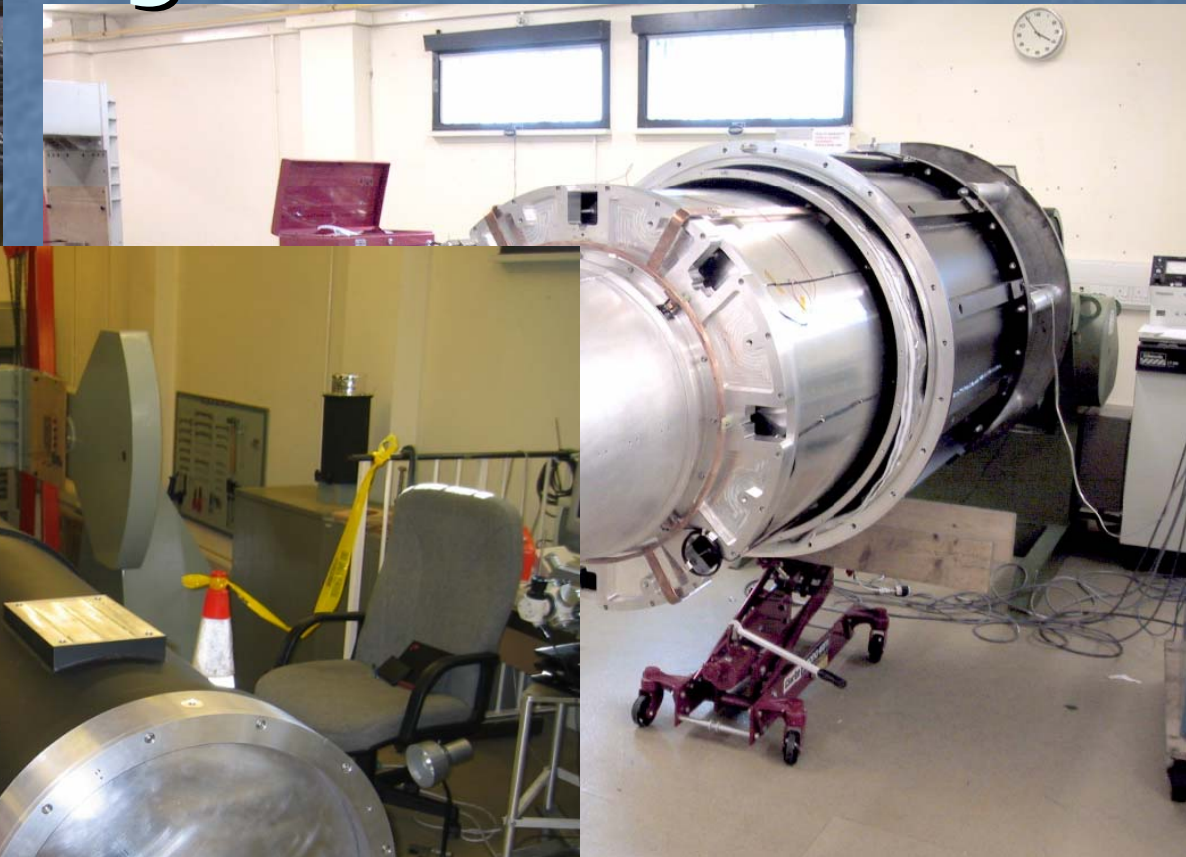
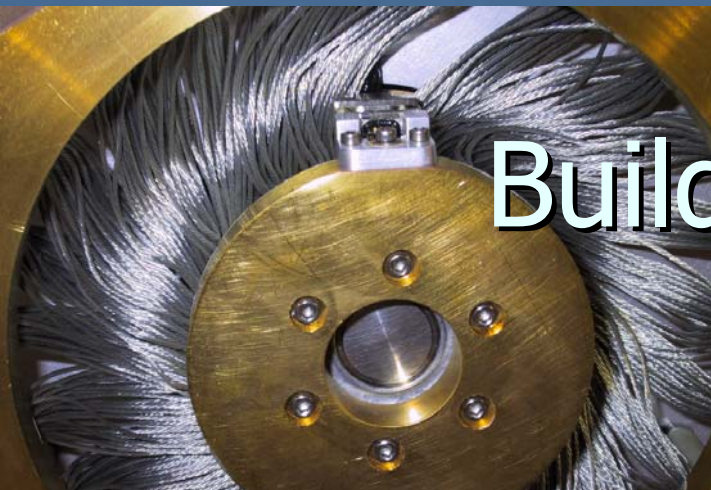


Galaxies !





# Building WFCAM

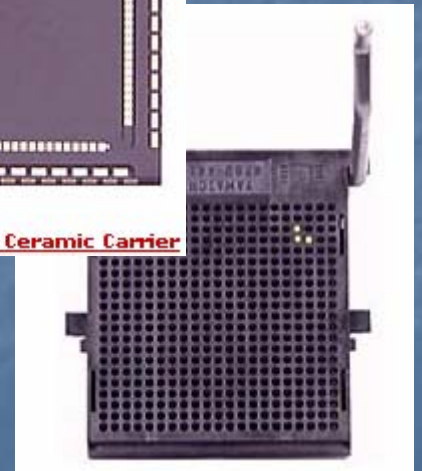
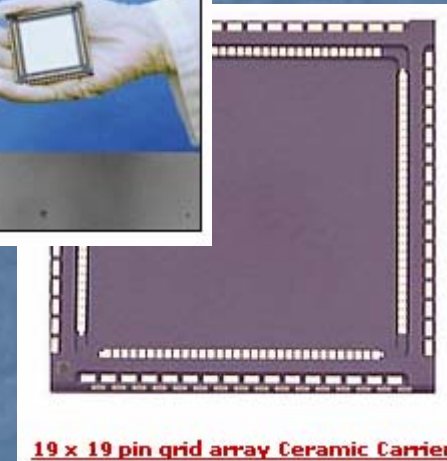
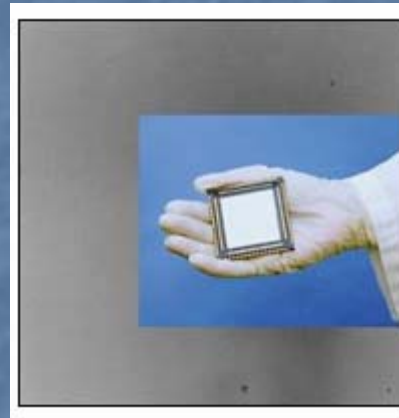




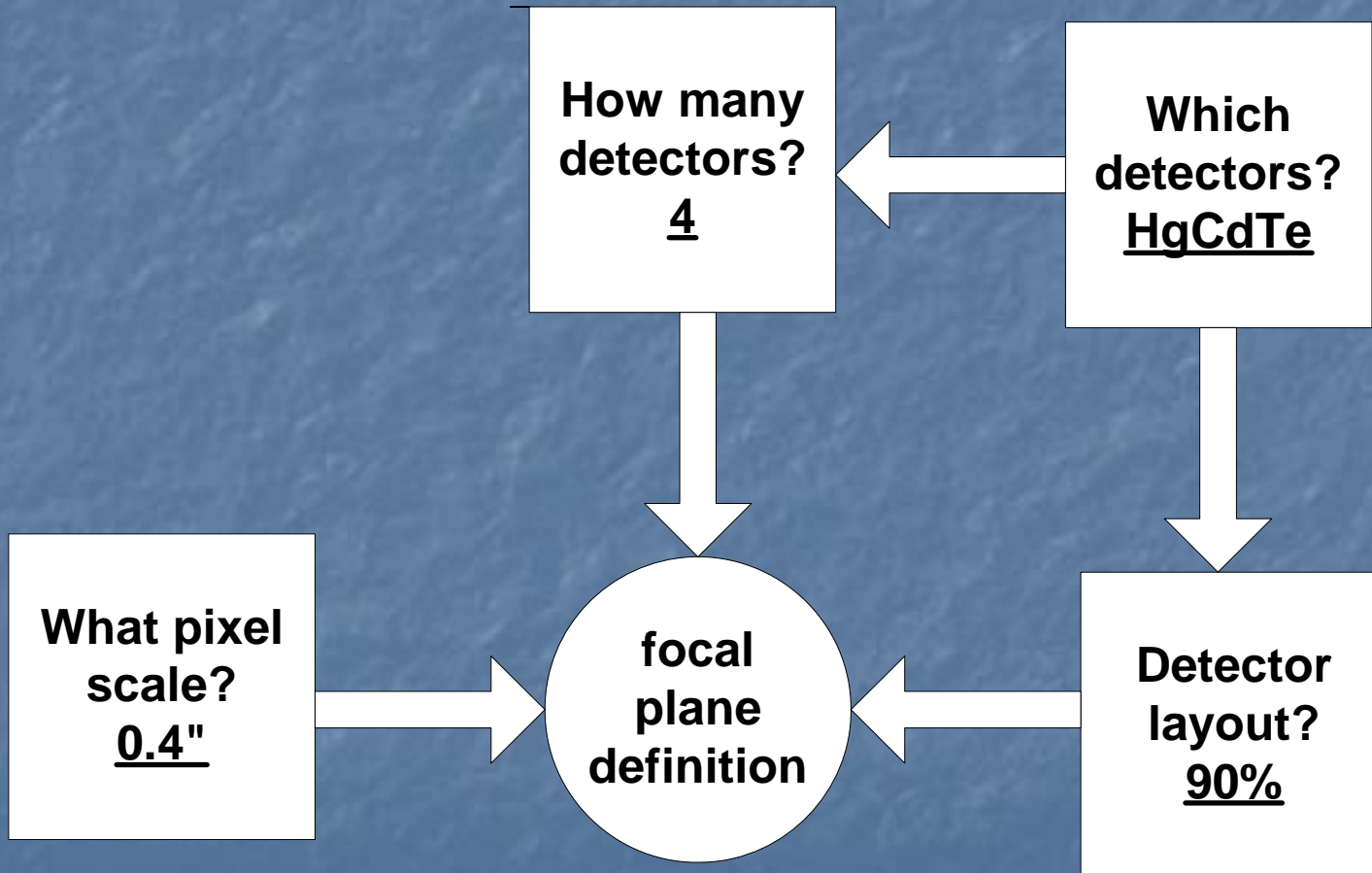
# Field requirement

4 Rockwell Hawaii-II devices

- HgCdTe hybrids
- PACE
- 0.8 - 2.5  $\mu\text{m}$  response
- 2048 x 2048 18  $\mu\text{m}$  pixels

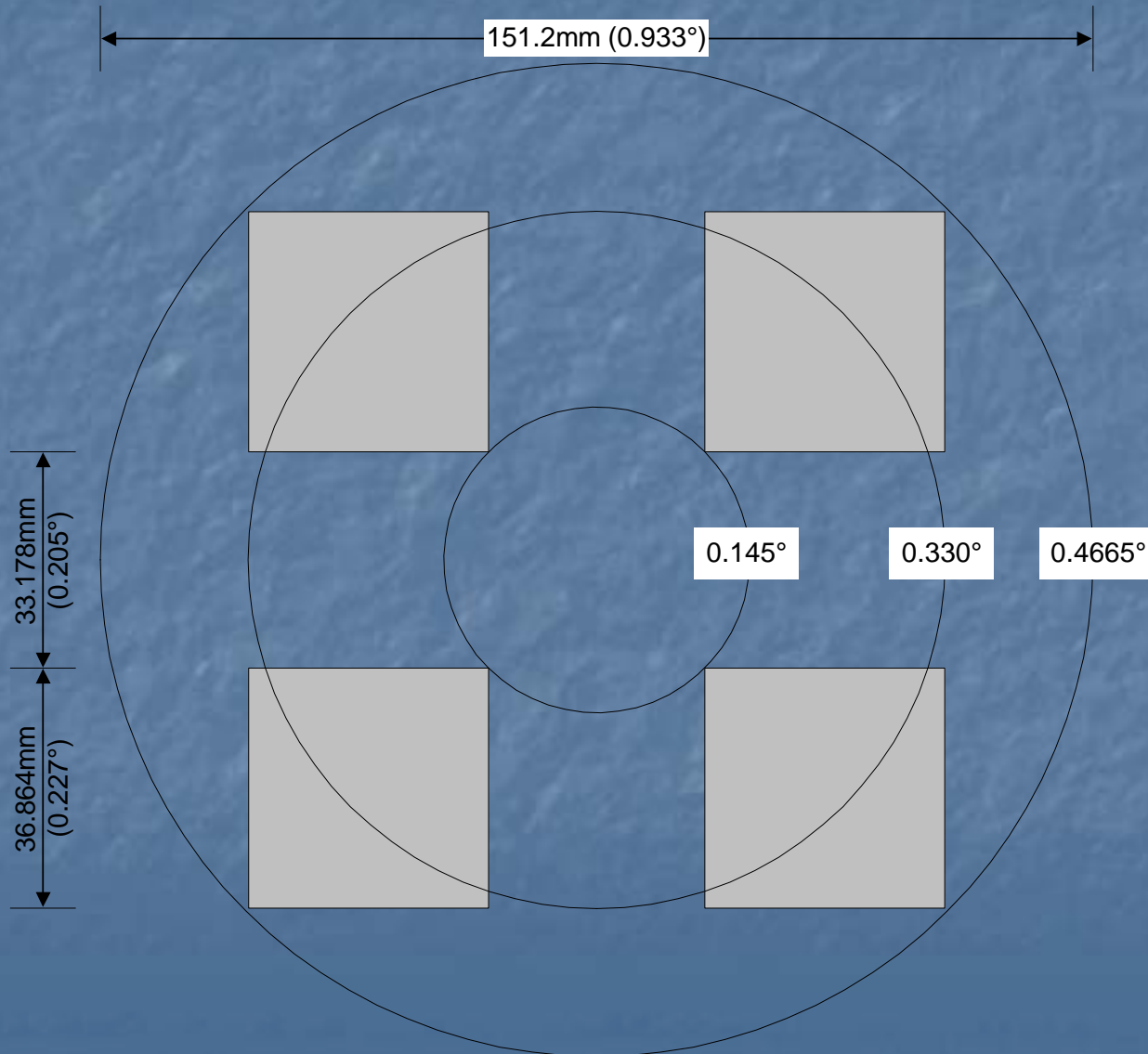


# Focal plane requirement





# Field requirement



0.93  
degrees fov

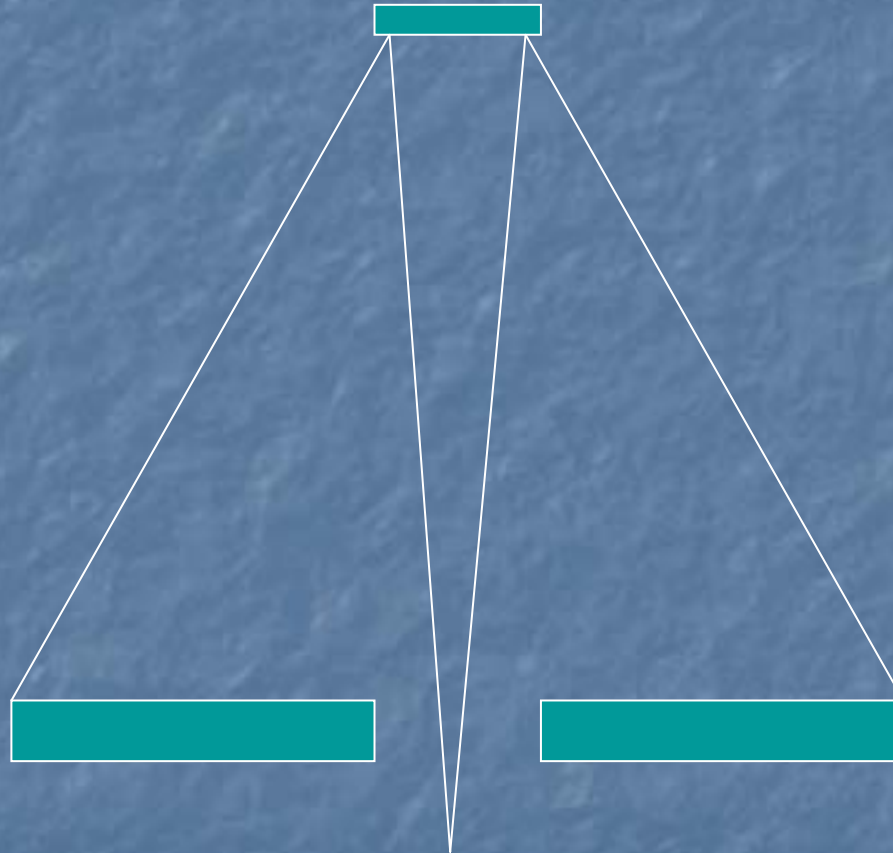
0.21 sq.deg  
in single  
shot

# very tough specs

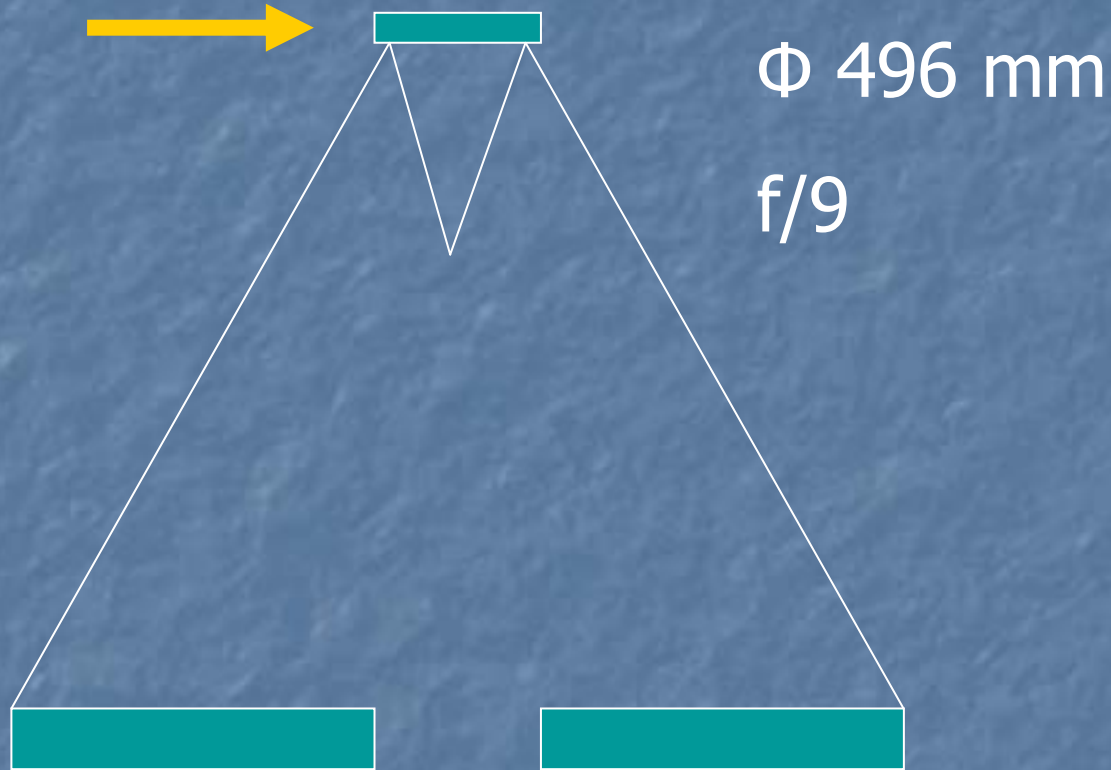
- f/2.4 and  $0.93^\circ$  field
- ~ 1 year of conceptual design
- > dozen designs tried



start with UKIRT f/36

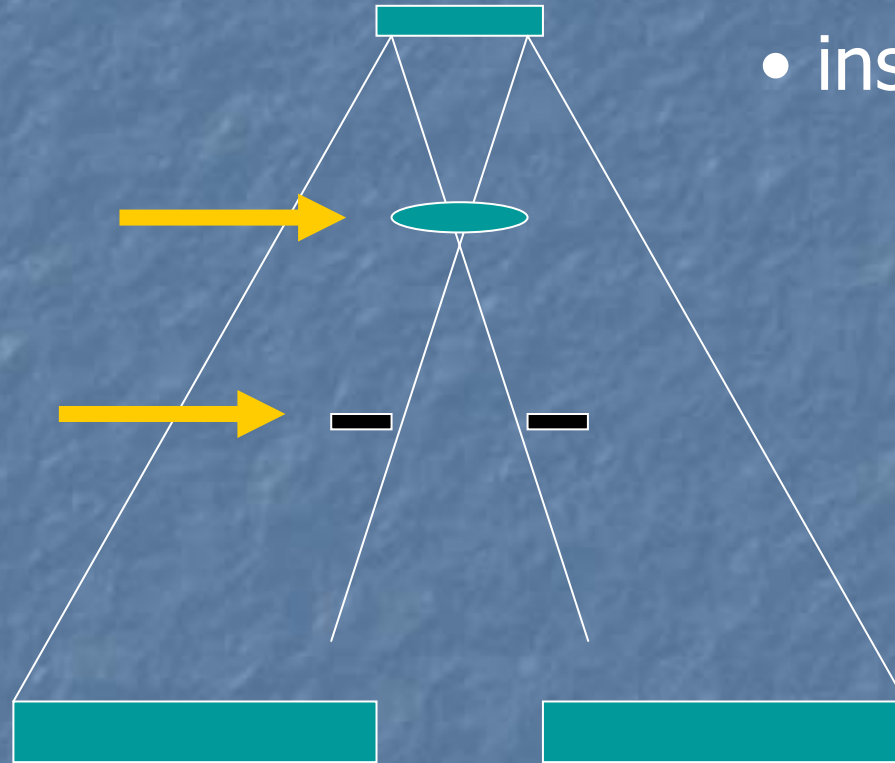


# add new M2



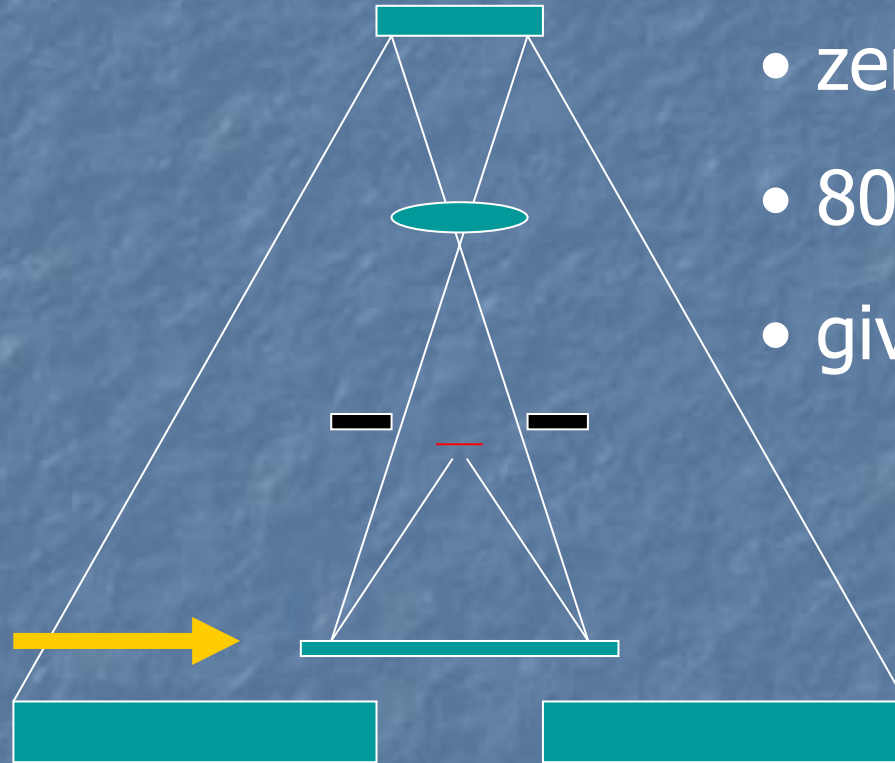


# need cold pupil stop



- inside cryostat

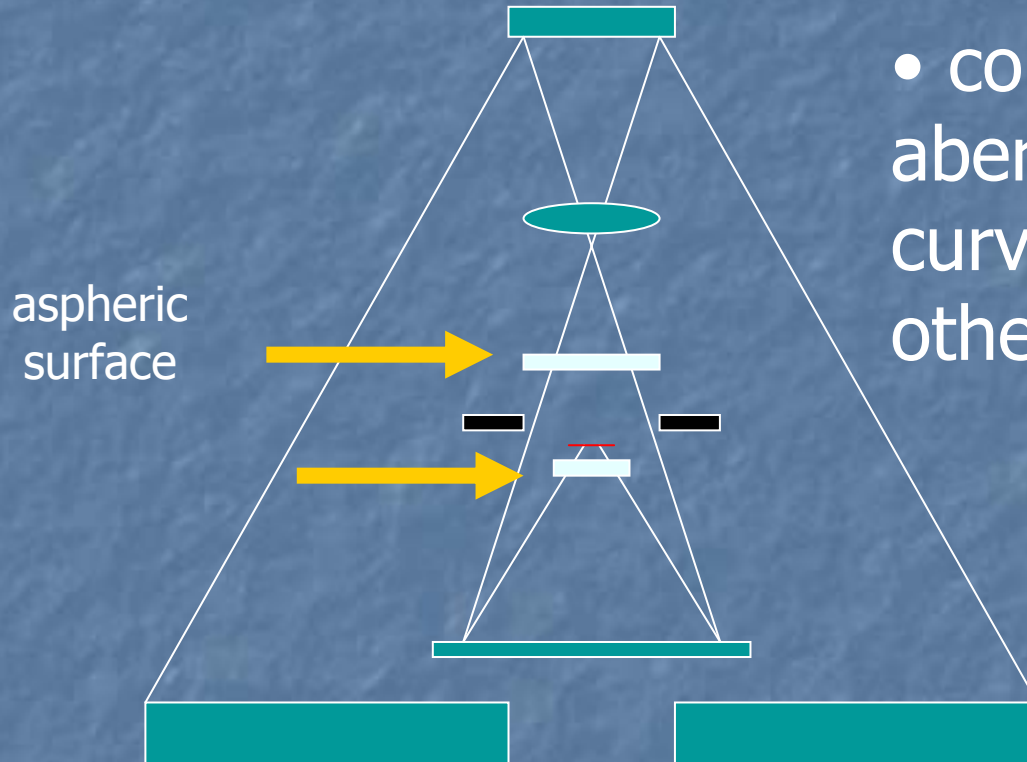
# ellipsoidal tertiary mirror



- zerodur, cryogenic
- 802 mm
- gives  $f/2.4$

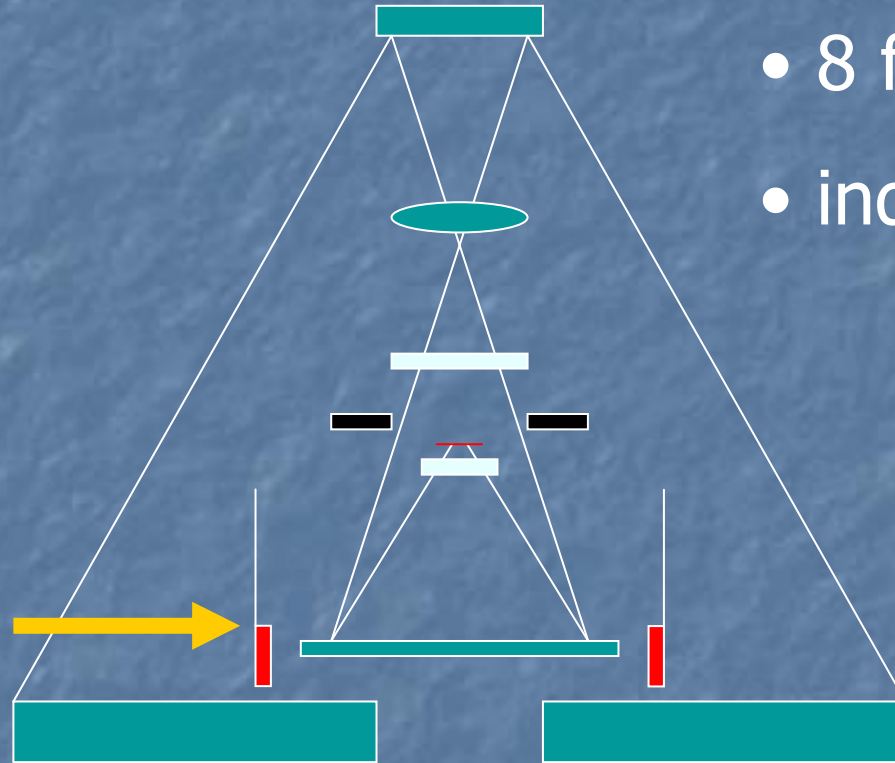


# + aberration correction



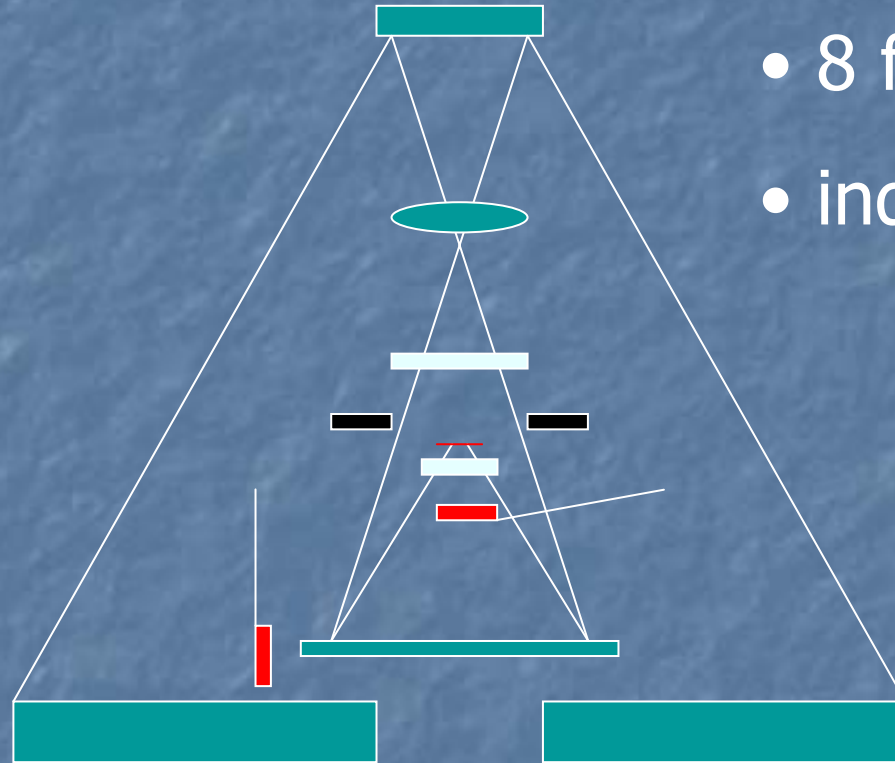
- corrects spherical aberration, field curvature and other aberrations

# filter paddles



- 8 filter paddles
- individual motors

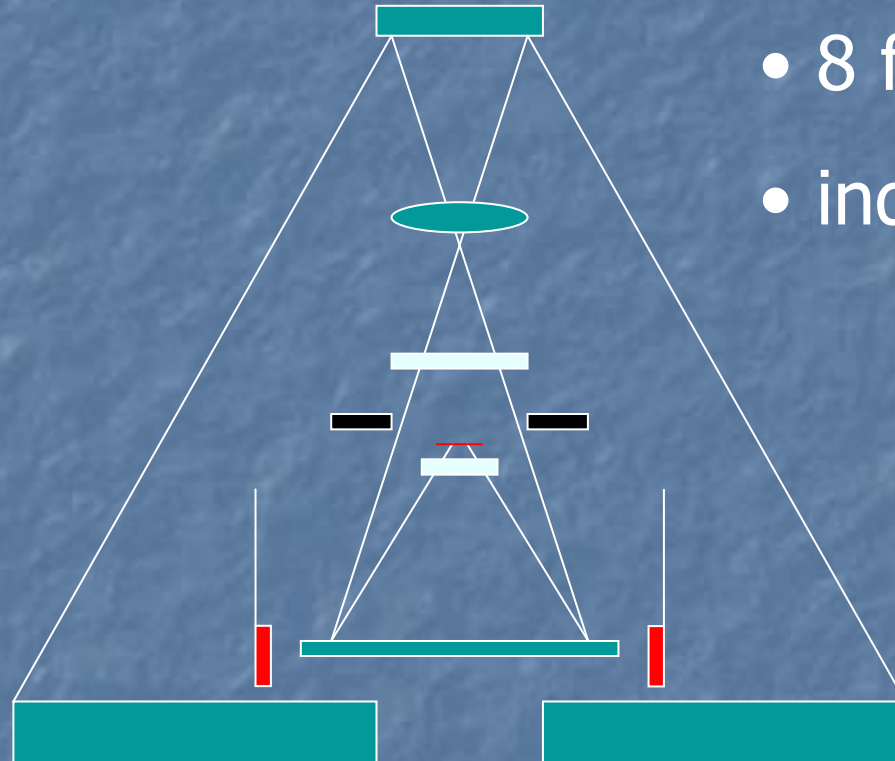
# filter paddles



- 8 filter paddles
- individual motors

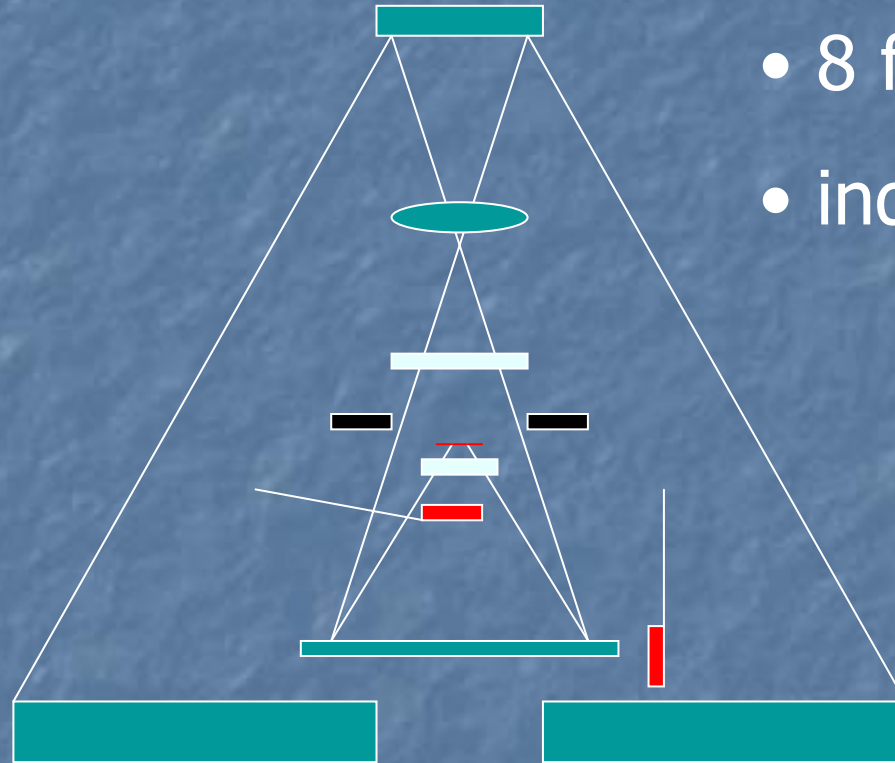


# filter paddles



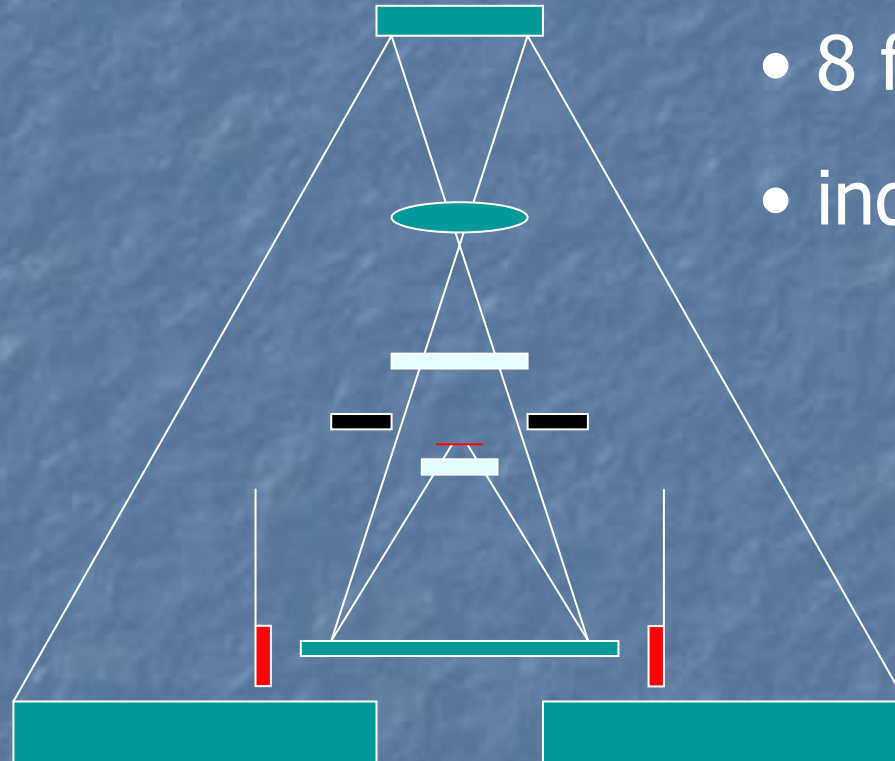
- 8 filter paddles
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# filter paddles



- 8 filter paddles
- individual motors

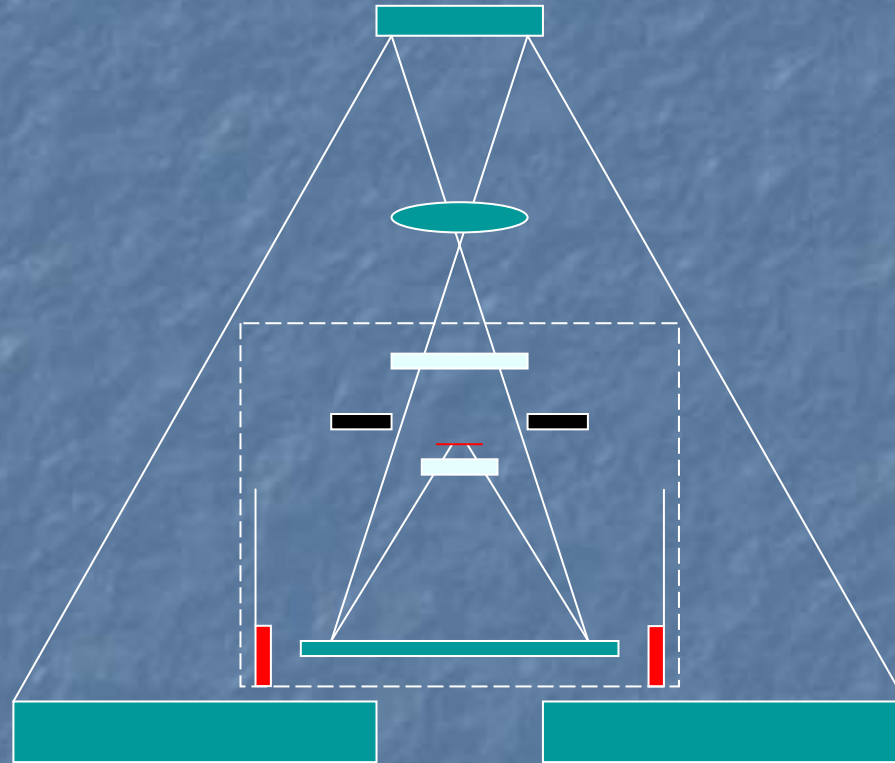
# filter paddles



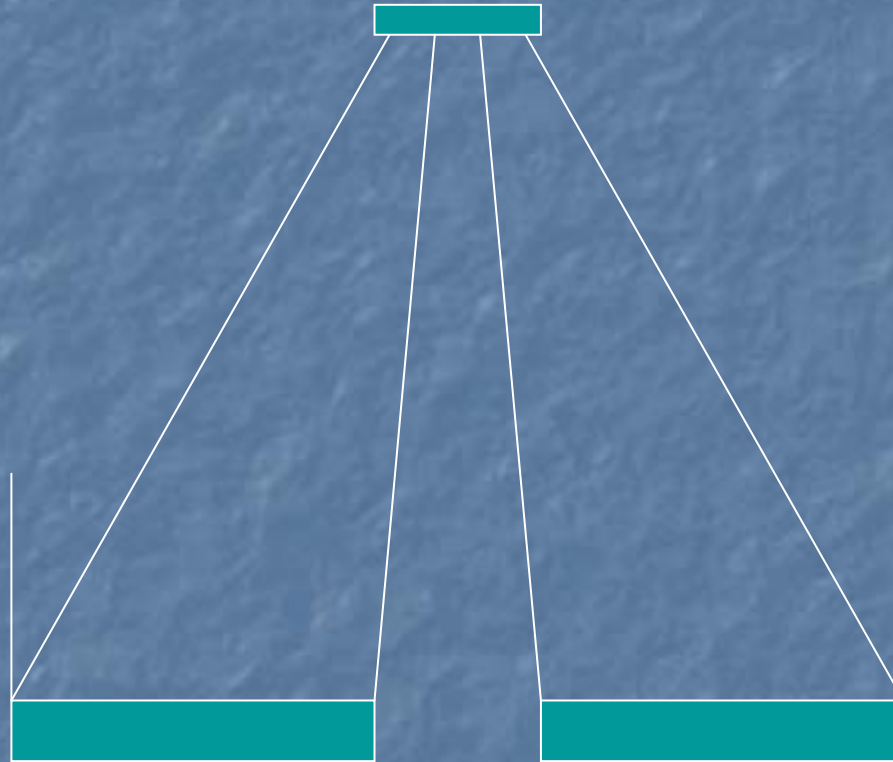
- 8 filter paddles
- individual motors



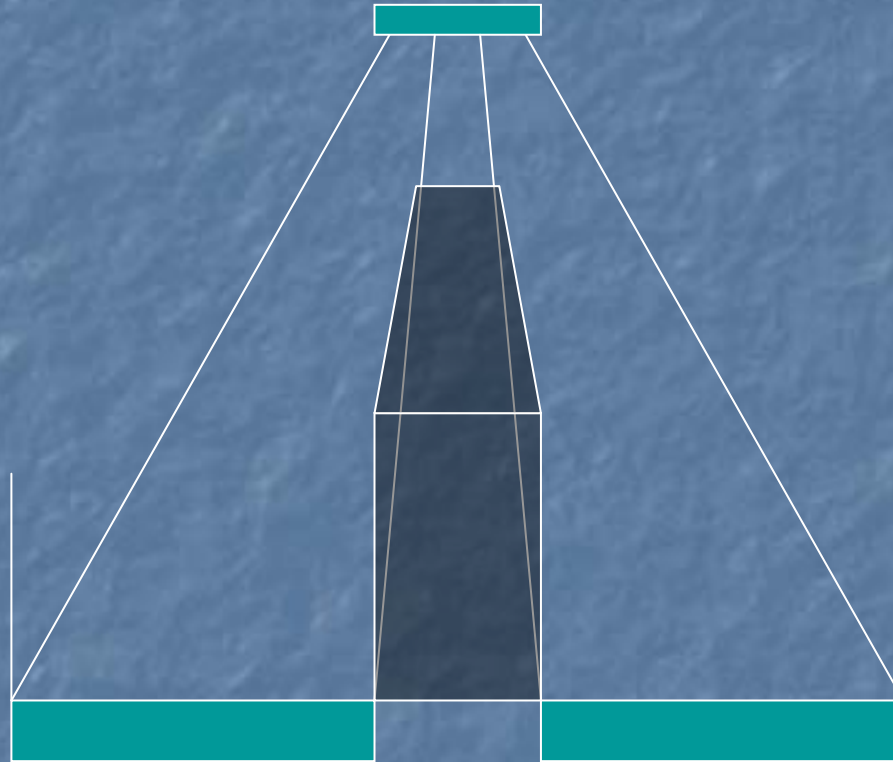
# Cryostat



# instrument fits shadow cone

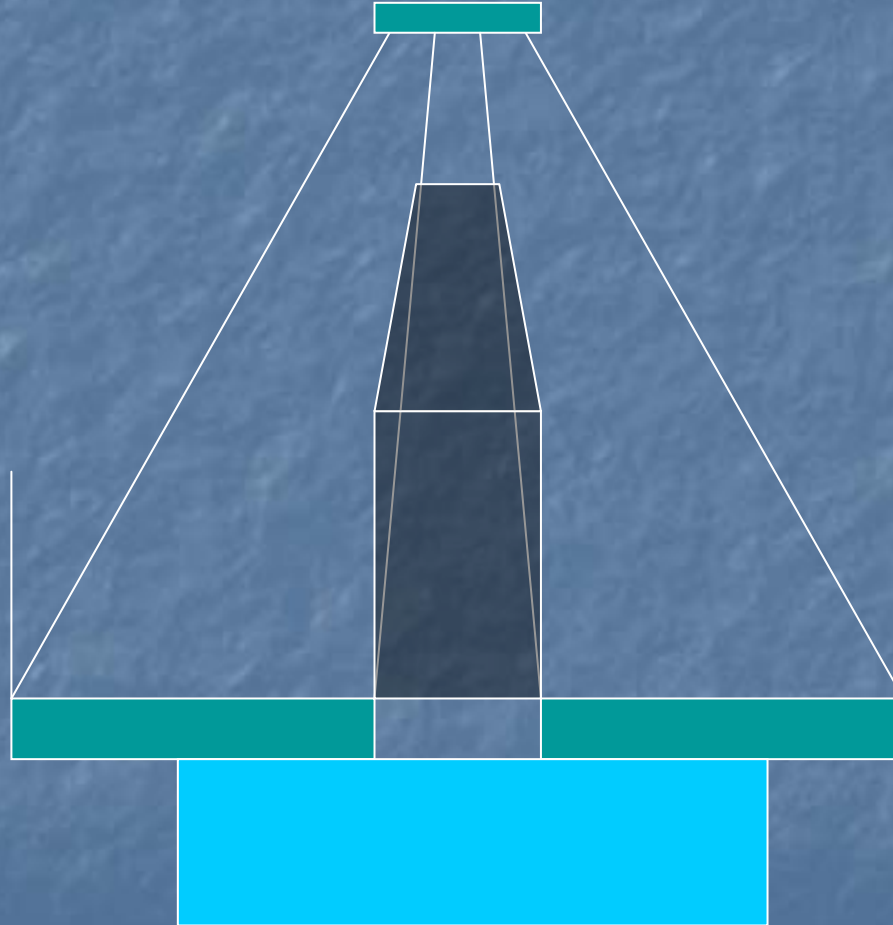


# instrument fits shadow cone

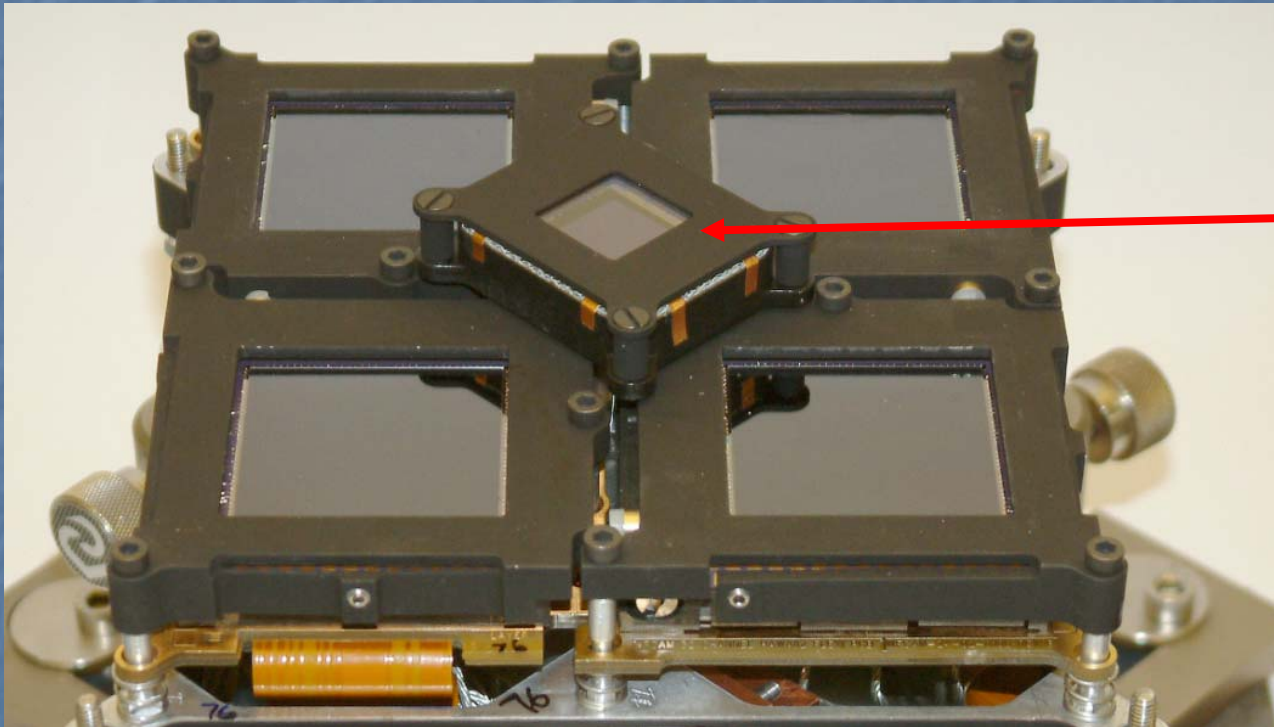




# cass instruments unaffected



# A final problem - autoguiding



CCD

47-10

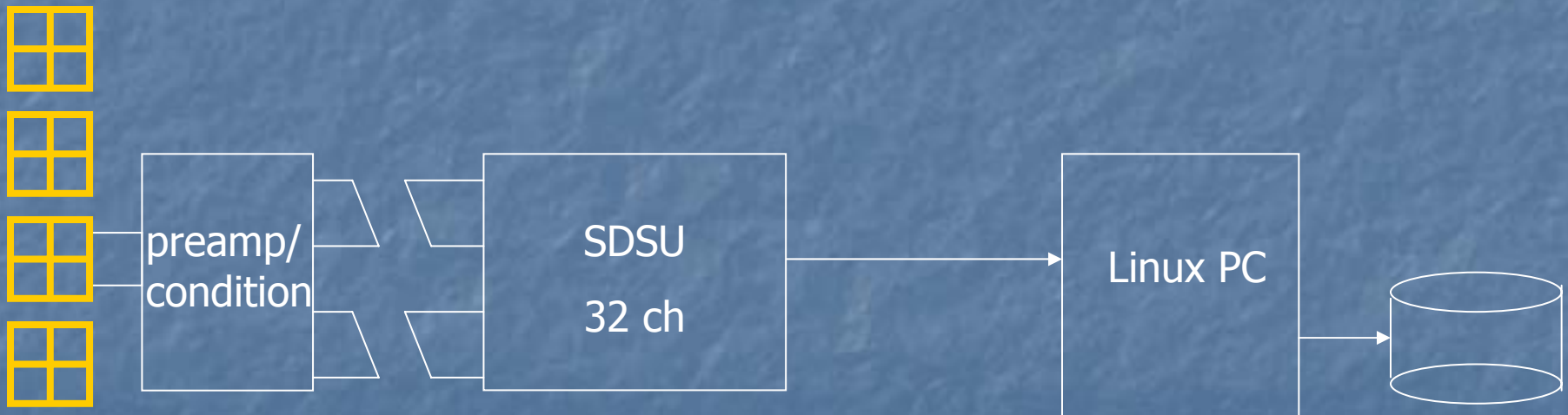
12x12@100Hz

# Data Path

fast final f-ratio  $\Rightarrow$  high background flux  $\Rightarrow$  fast readout

$\Rightarrow$  128 parallel channels

$\Rightarrow$  0.7 second readout time for 16 Mpixels



4 quadrants  
x 8 channels

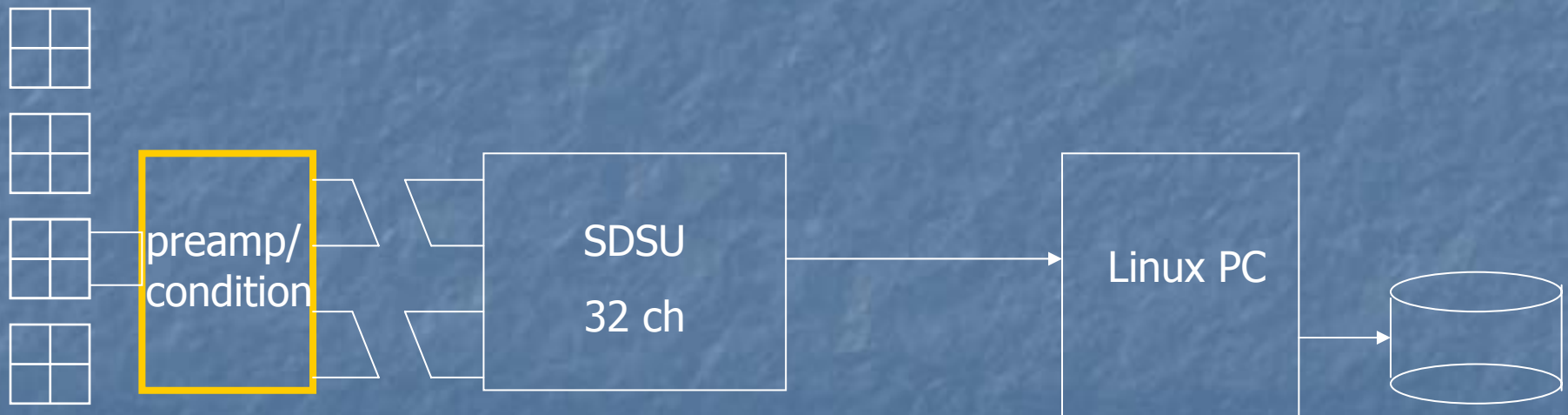


# Data Path

fast final f-ratio  $\Rightarrow$  high background flux  $\Rightarrow$  fast readout

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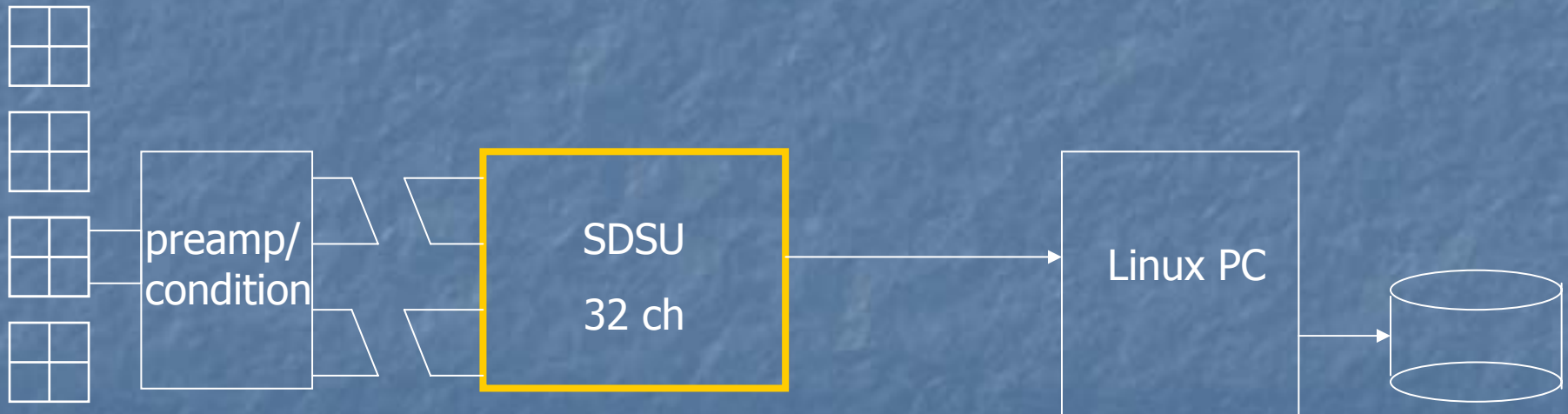
preamp & signal conditioning

# Data Path

fast final f-ratio  $\Rightarrow$  high background flux  $\Rightarrow$  fast readout

$\Rightarrow$  128 parallel channels

$\Rightarrow$  0.7 second readout time for 16 Mpixels



clock generation, A/D,  
coadding

# Data Path

fast final f-ratio  $\Rightarrow$  high background flux  $\Rightarrow$  fast readout

$\Rightarrow$  128 parallel channels

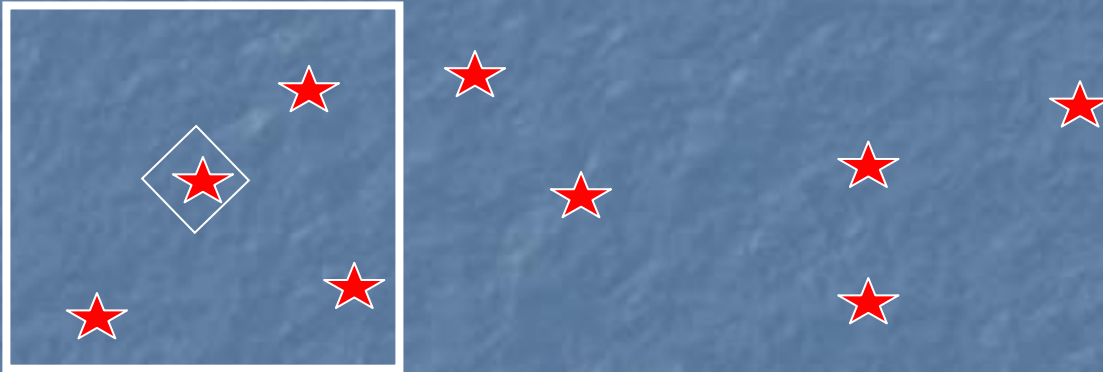
$\Rightarrow$  0.7 second readout time for 16 Mpixels



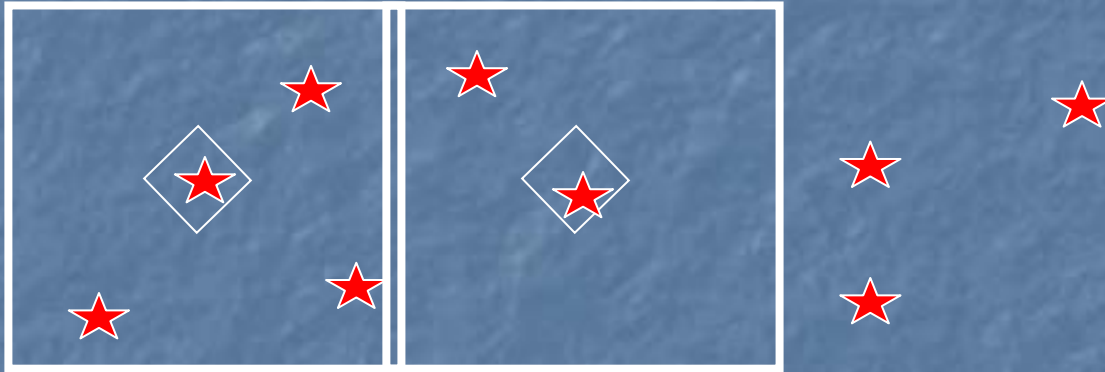
raw data storage (local  
disk + ULTRIUM LTO-2)



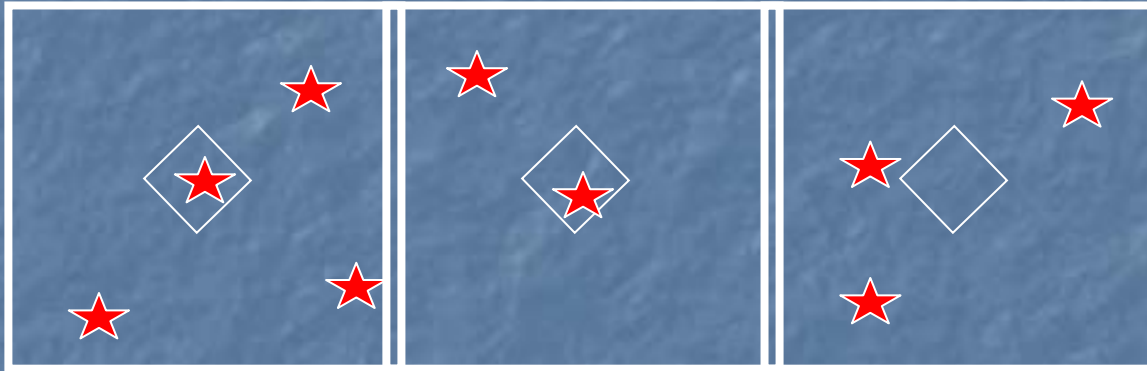
# WFCAM features - autoguiding



# WFCAM features - autoguiding

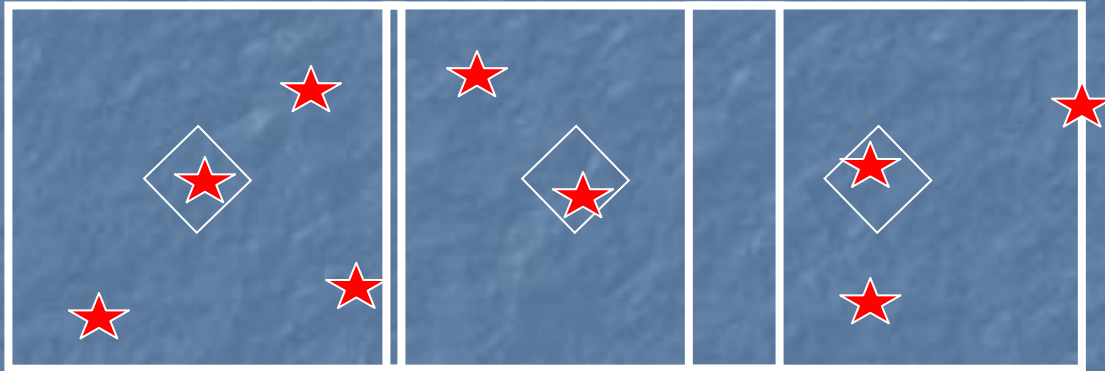


# WFCAM features - autoguiding





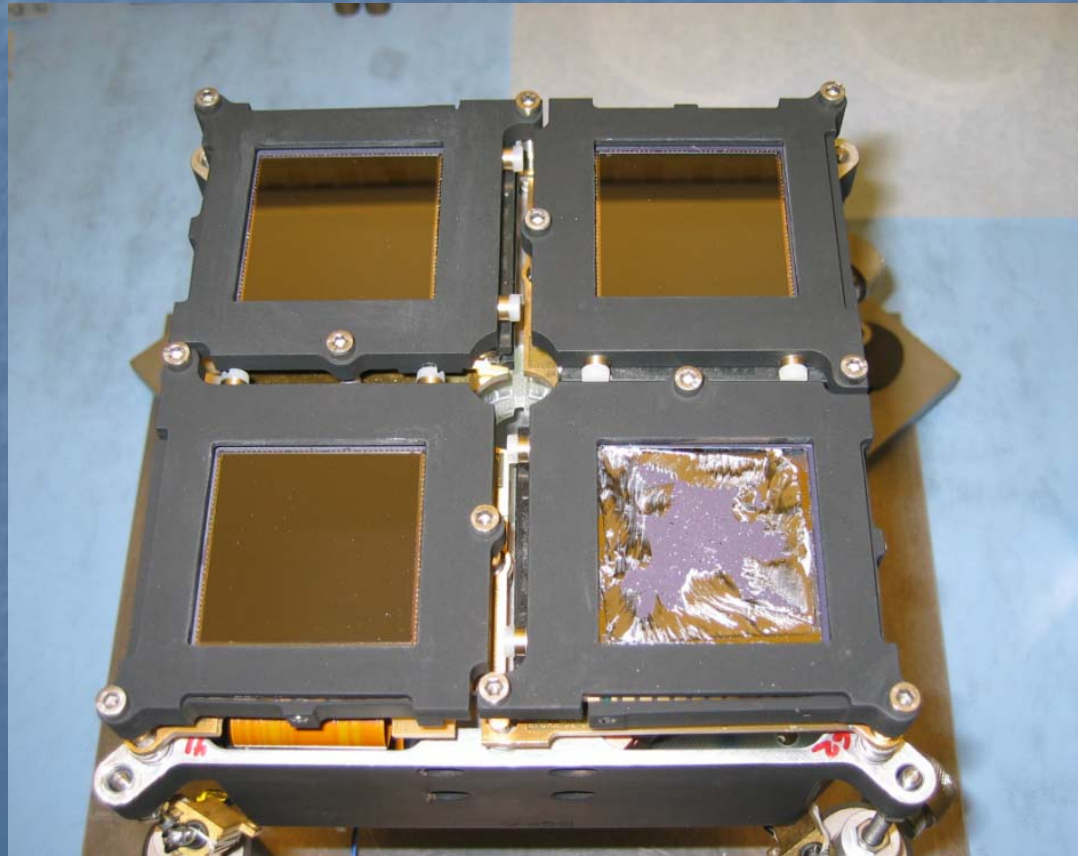
# WFCAM features - autoguiding



major setbacks

# major setbacks

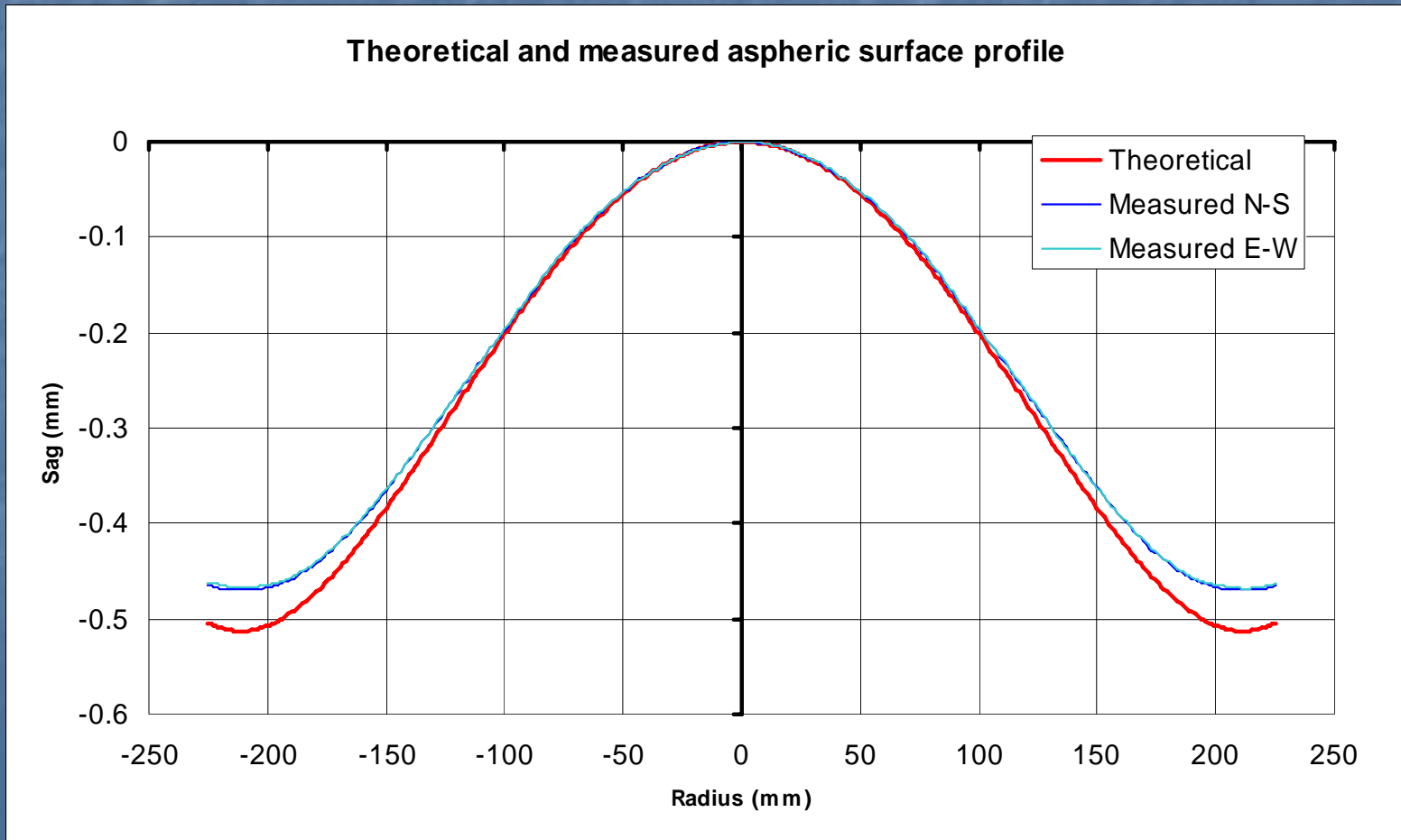
- exploding detectors





# major setbacks

- corrector plate









The beginning.....

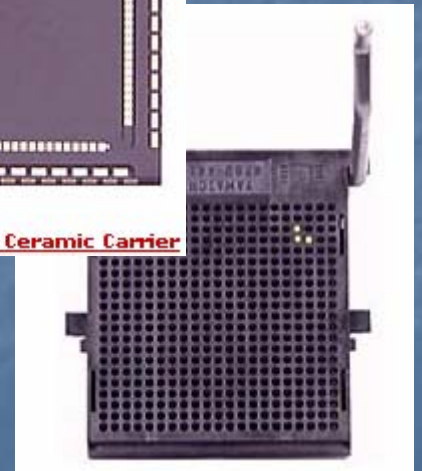
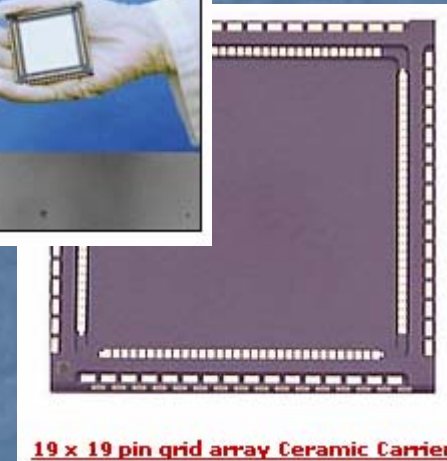
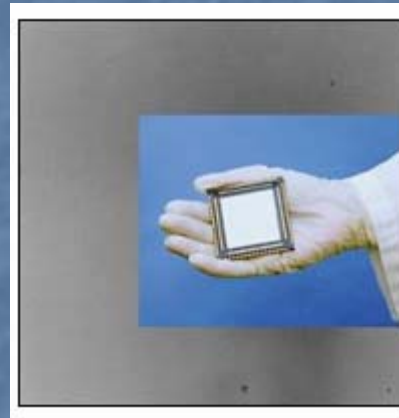




# Field requirement

4 Rockwell Hawaii-II devices

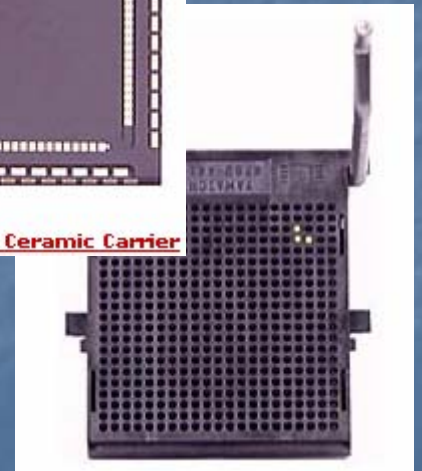
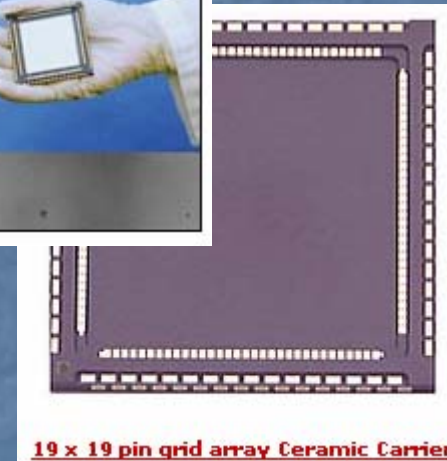
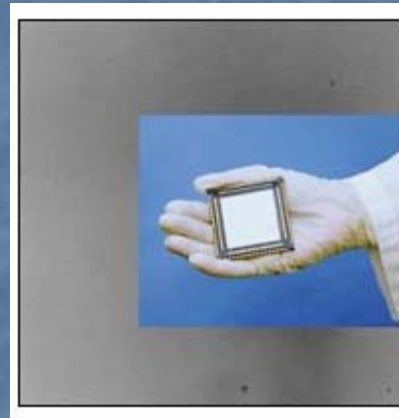
- HgCdTe hybrids
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- 0.8 - 2.5  $\mu\text{m}$  response
- 2048 x 2048 18  $\mu\text{m}$  pixels



# Field requirement

4 Rockwell Hawaii-II devices

- HgCdTe hybrids
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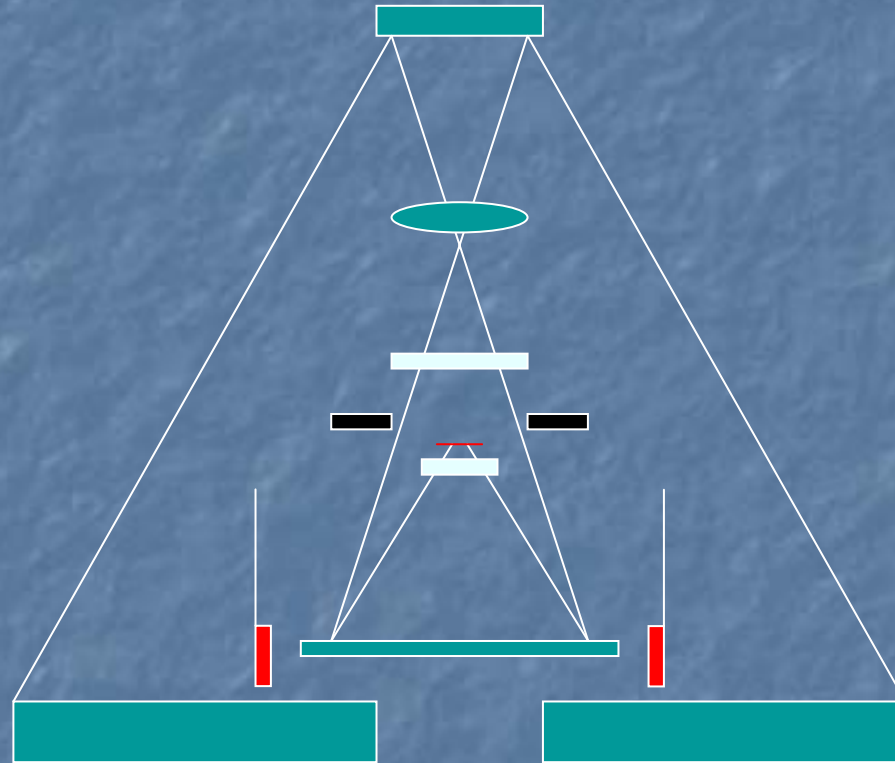
0.4"

3.8 m

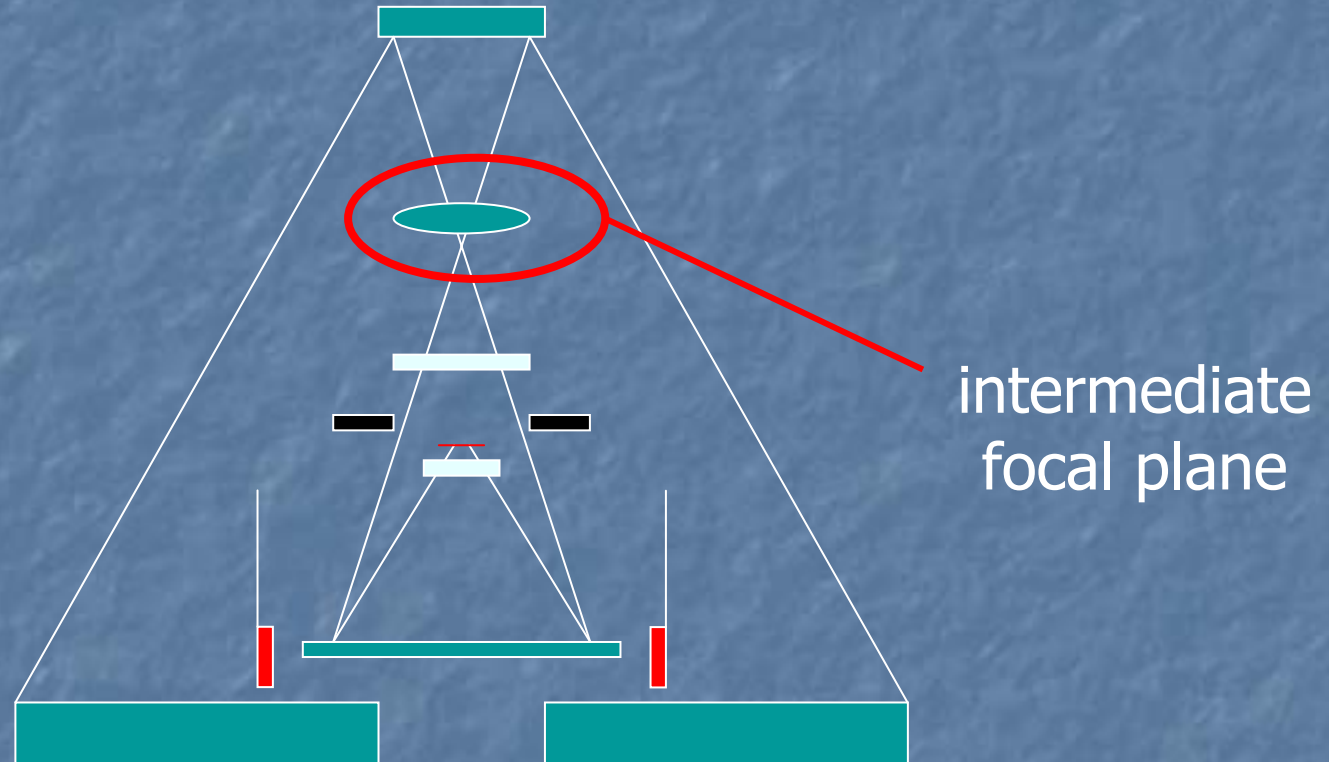
f/2.4

c.f. normal UKIRT cass operation at f/36

# A final problem - autoguiding

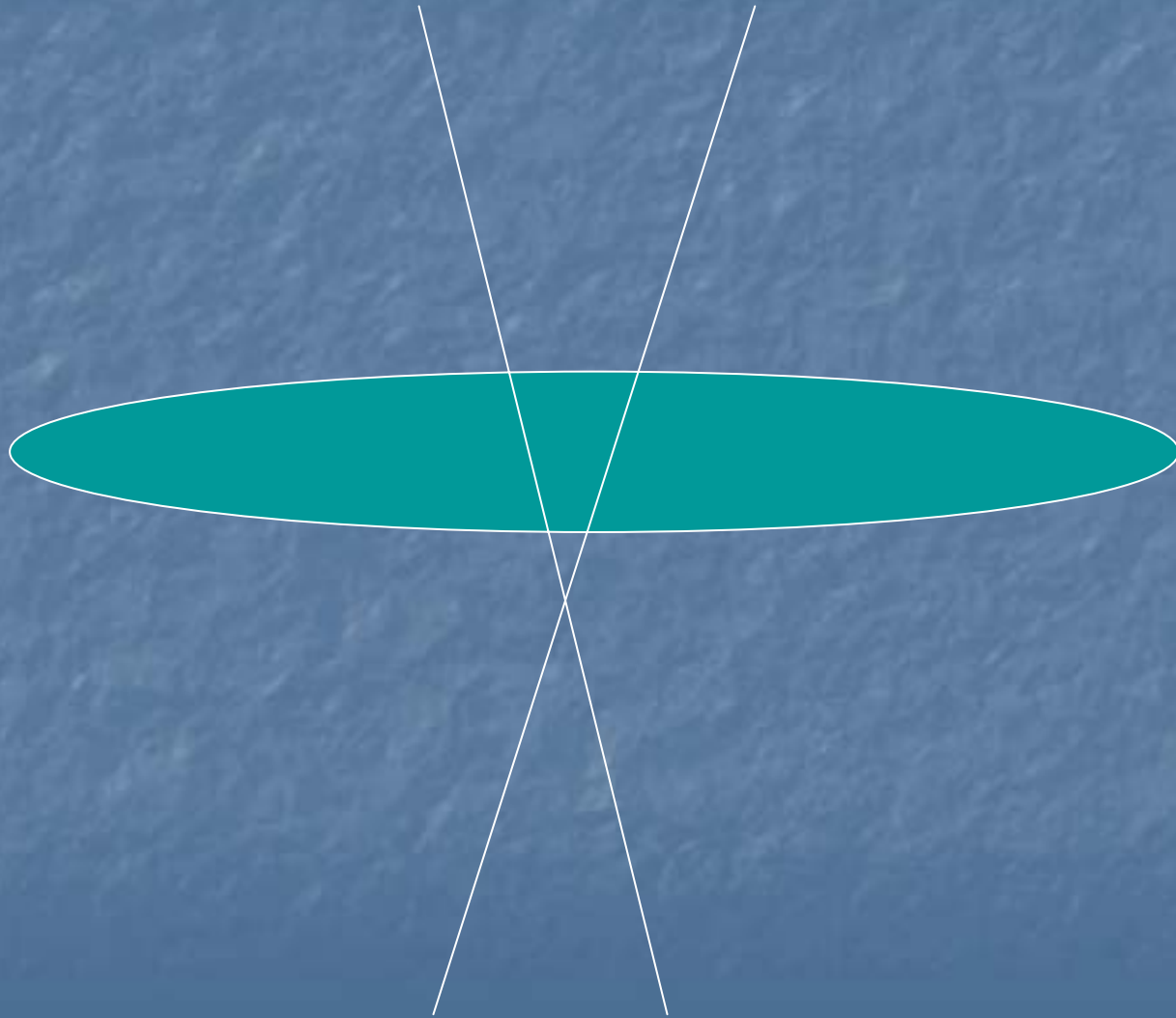


# A final problem - autoguiding

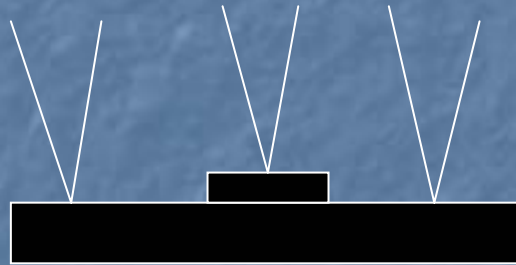




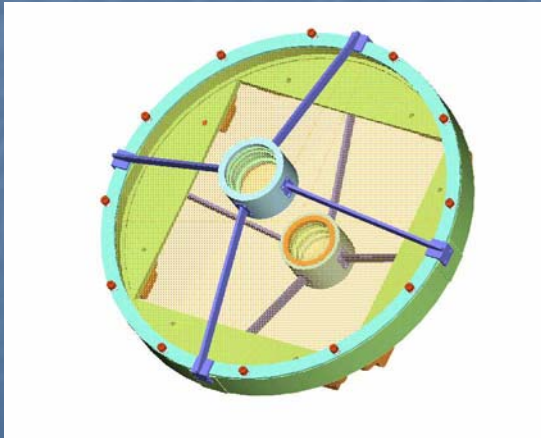
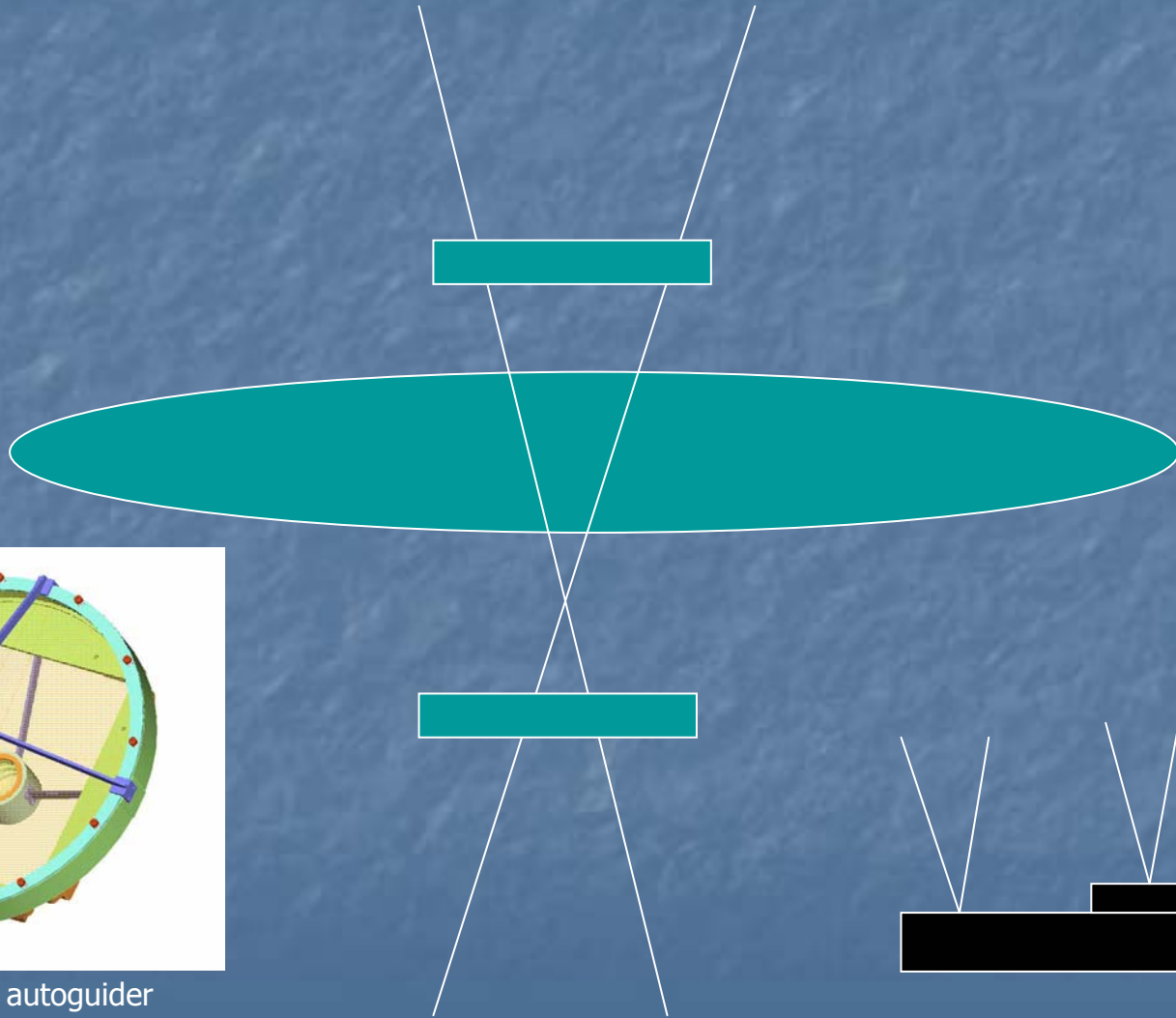
# A final problem - autoguiding



# A final problem - autoguiding

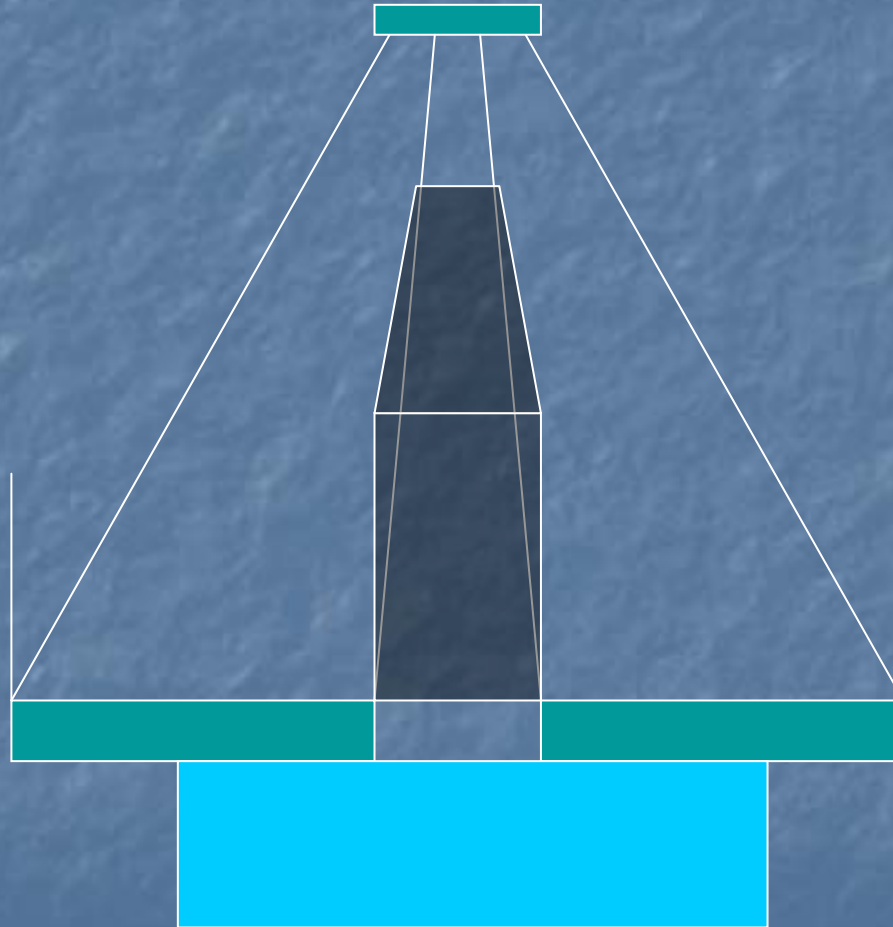


# A final problem - autoguiding



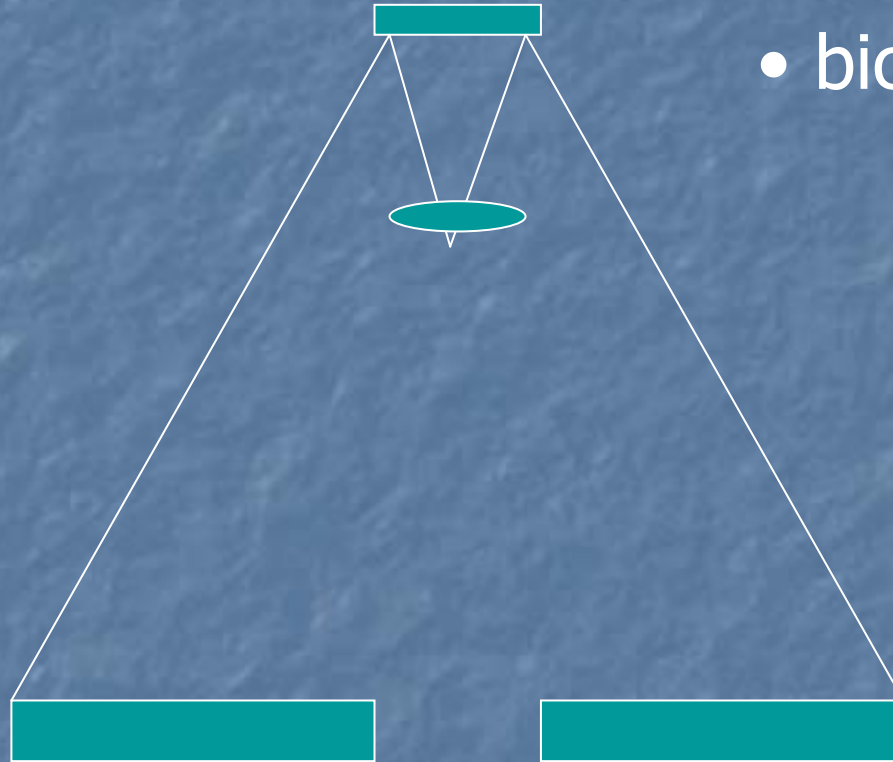
Field lens with autoguiding optics

# A final problem - autoguiding



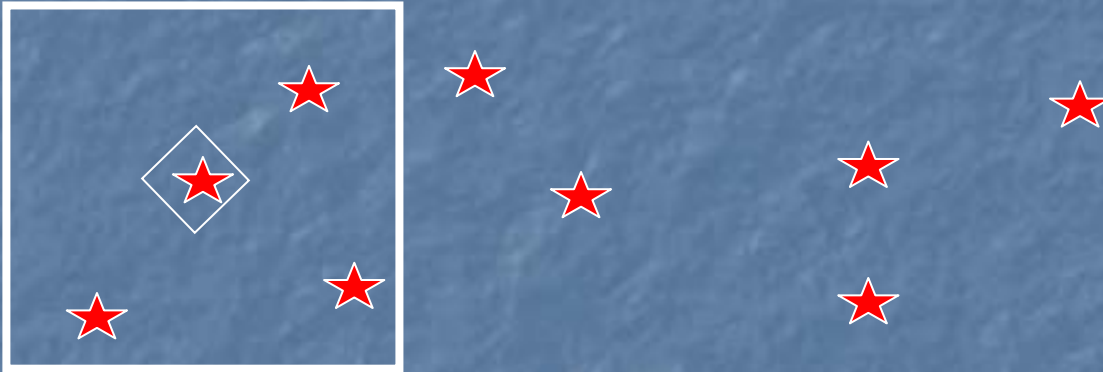


# field lens

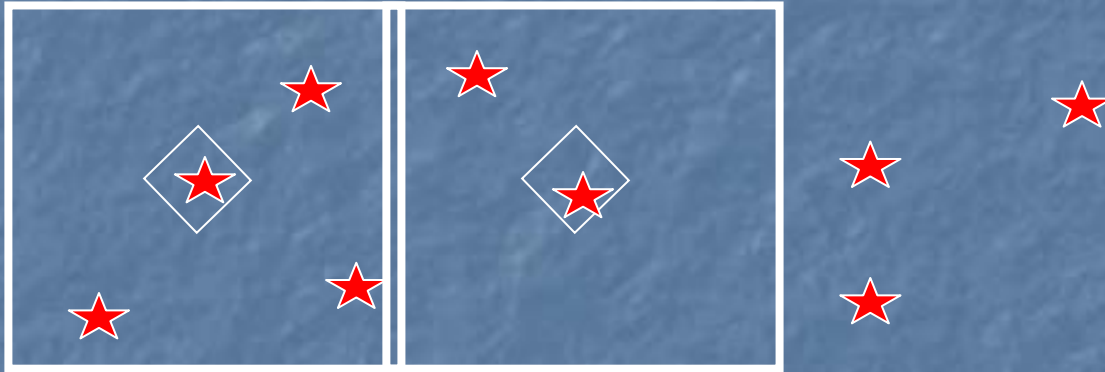


- biconvex lens

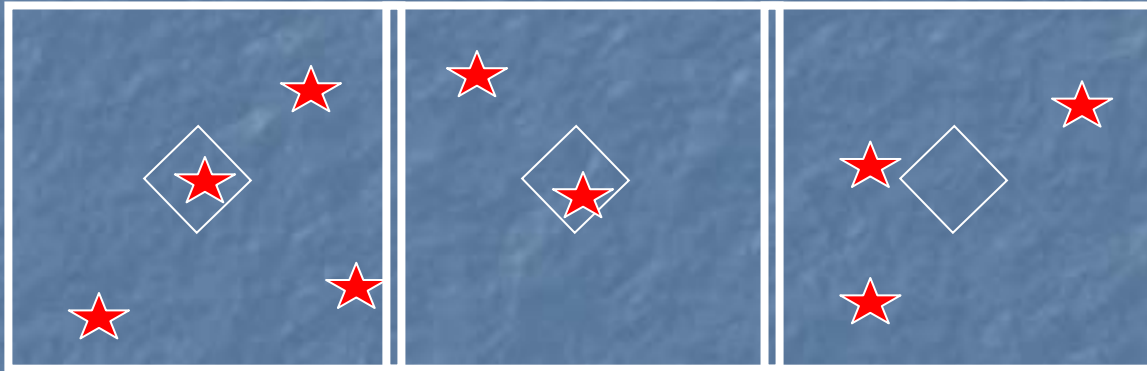
# WFCAM features - autoguiding



# WFCAM features - autoguiding



# WFCAM features - autoguiding





# WFCAM features - autoguiding

