3D-NTT : 3D double TF spectrometer

3D-NTT : 3D double TF spectrometer

Olivier Hernandez, instrument scientist
3D-NTT team

3D-NTT : 3D double TF spectrometer

Olivier Hernandez, instrument scientist
3D-NTT team

3D-NTT : 3D double TF spectrometer

Olivier Hernandez, instrument scientist

3D-NTT team

Laboratoire d'Astrophysique Expérimentale

CRAQ

ImmerVision

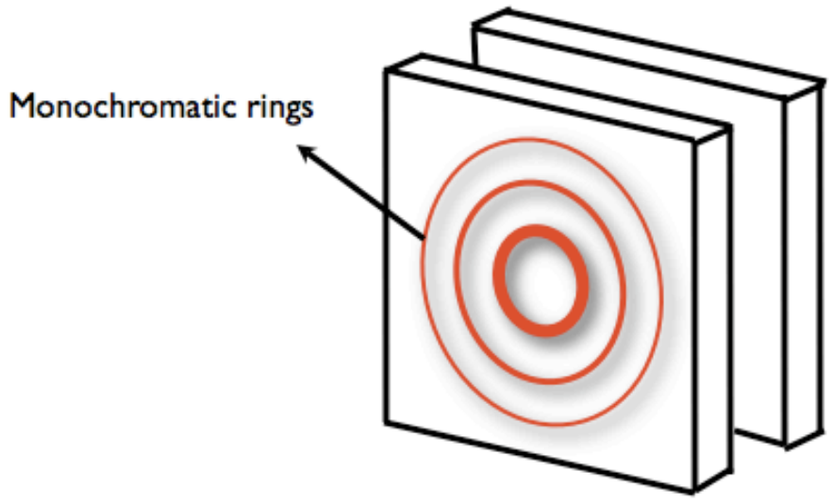
LAM LABORATOIRE D'ASTROPHYSIQUE DE MARSEILLE

l'Observatoire de Paris GEPI

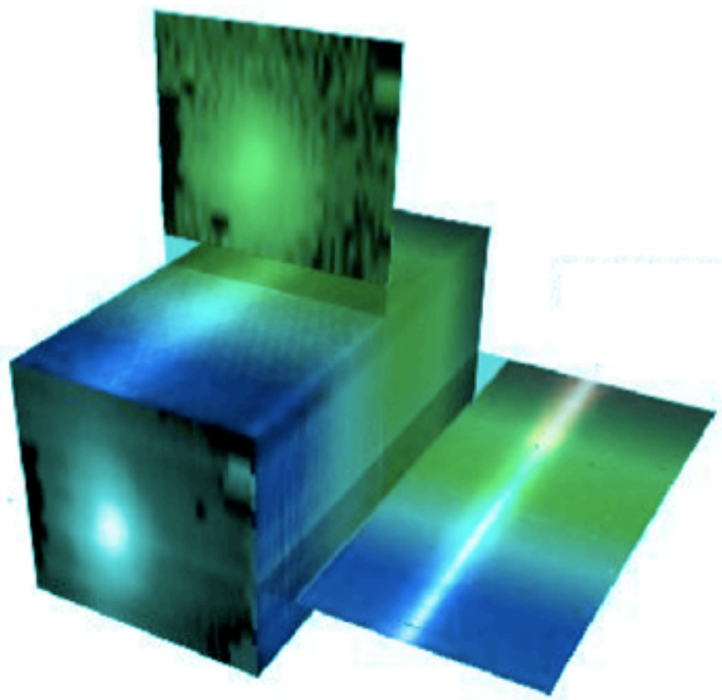
Dual Fabry-Perot or dual Tunable Filter

(a) High Order Fabry-Perot

High resolving power, **small** tuning range



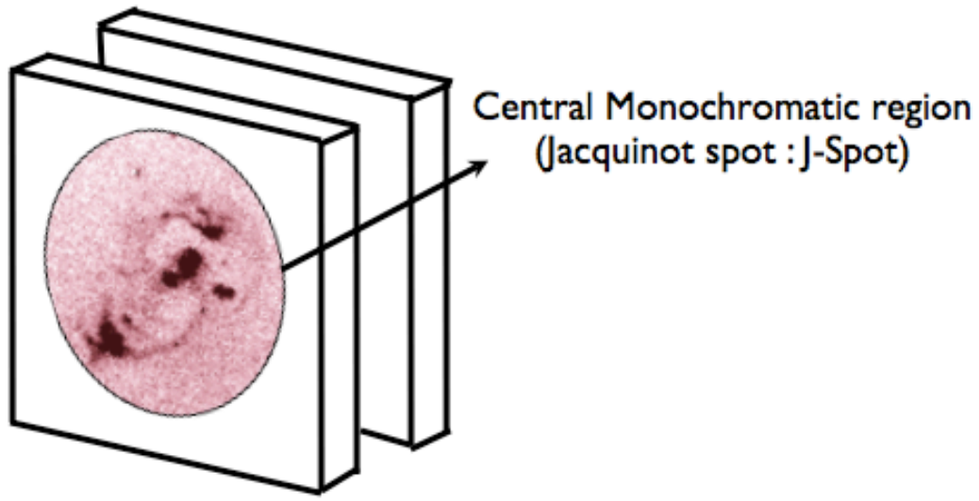
(i) Stack of interferograms @ high R



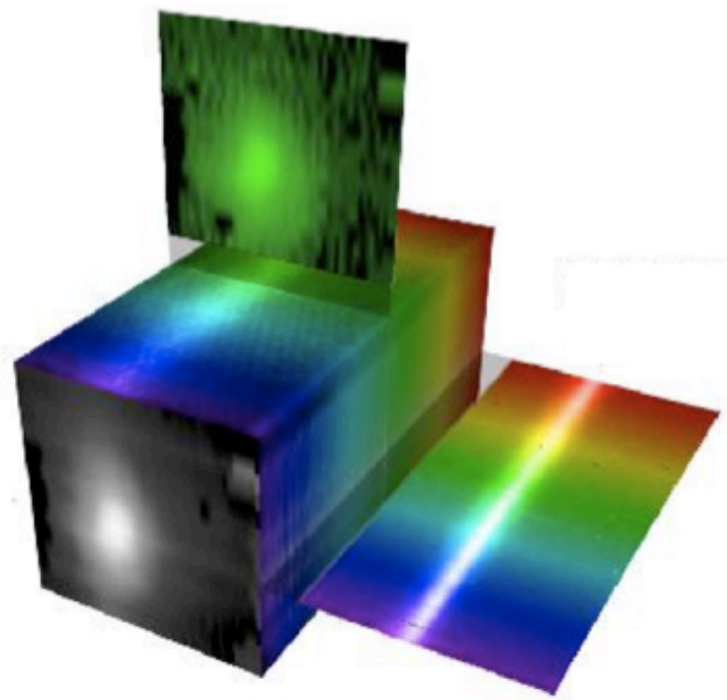
Stack of images and spectra @ high R

(b) Low Order Fabry-Perot

Low resolving power, **large** tuning range

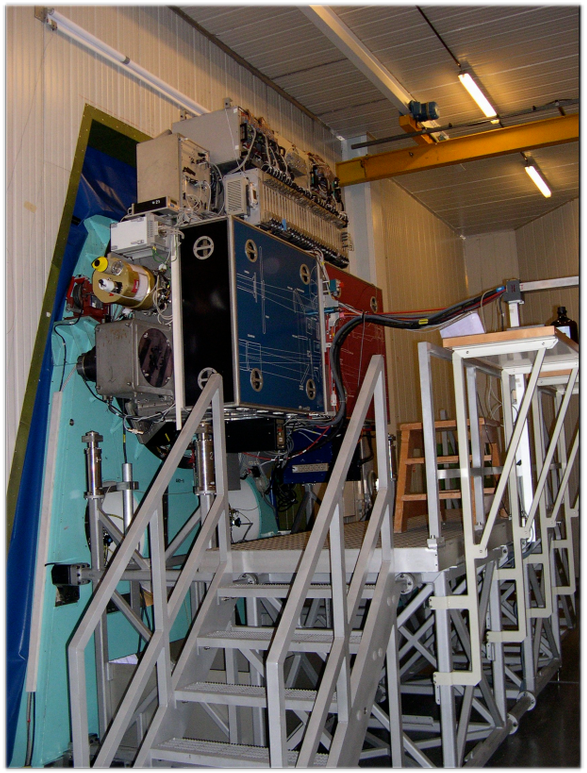


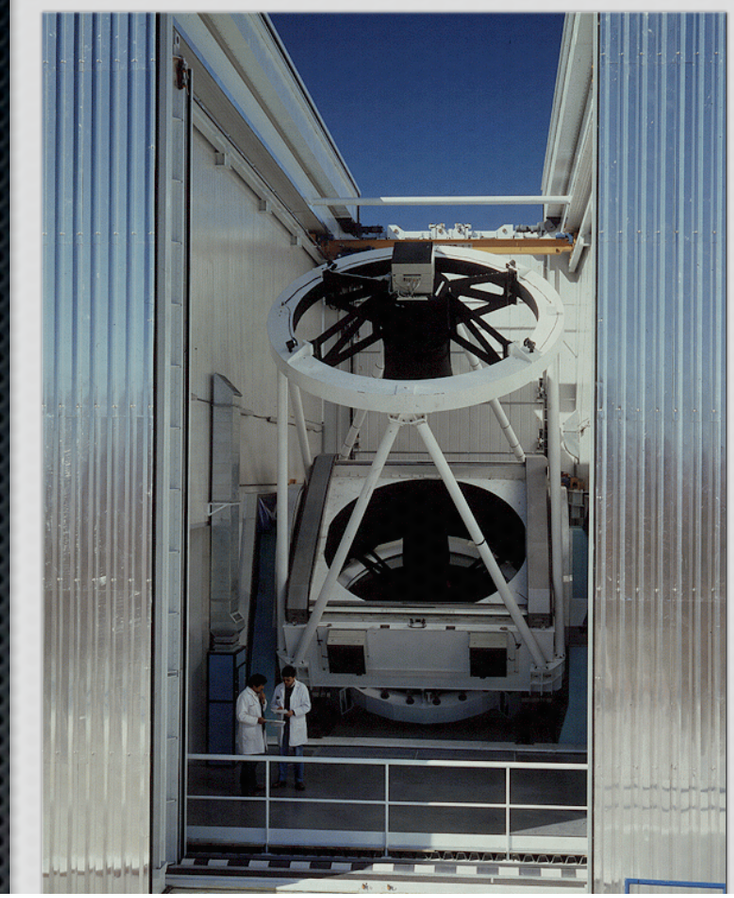
(ii) Stack of monochromatic images @ low R

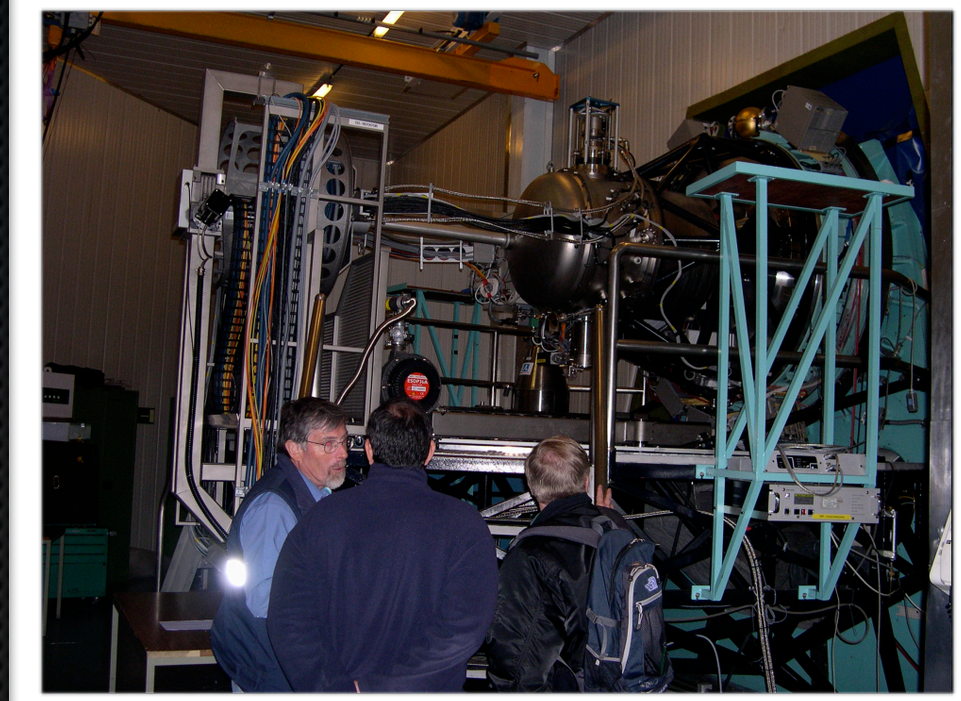


Stack of images and spectra @ low R

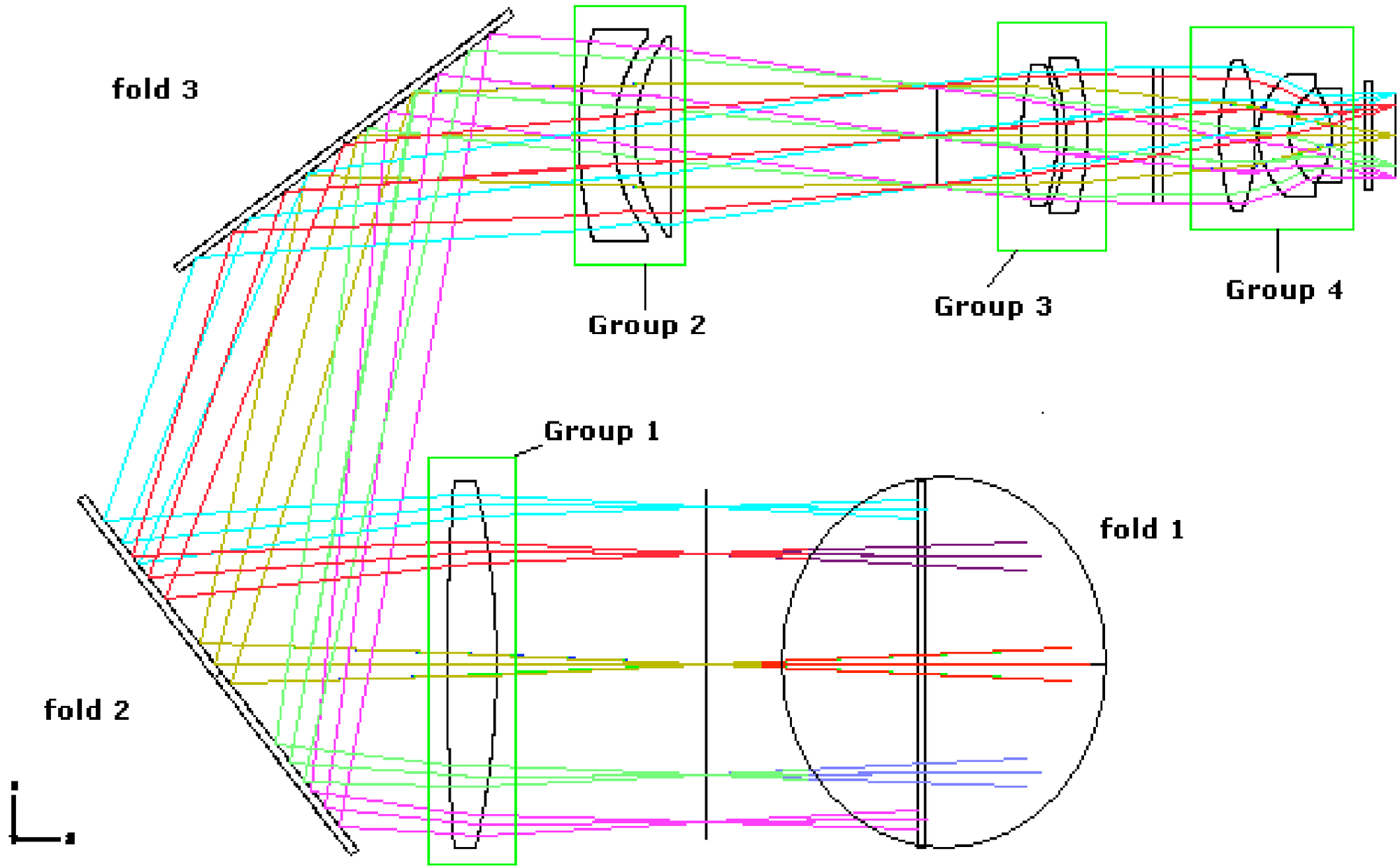
3D NTT : 2 foci available







Nasmyth foci	
Field of view	30arcmin, 336.6mm
Focal Ratio	f/11
Plate scale	5.35905 arcsec/mm
Max.possible load on the Nasmyth adapter	2000Kg at 270mm from the fixation flange of the instrument
Distance adapter-focal plane of the telescope	500mm from the fixation flange
Lateral displacement at the focal plane for max. load on adapter	6.2microns
Max. allowable tilt of the hub	3" for a load of 800N at 400mm from the fixation flange
Image Quality	80% energy in 0.15" in all telescope position

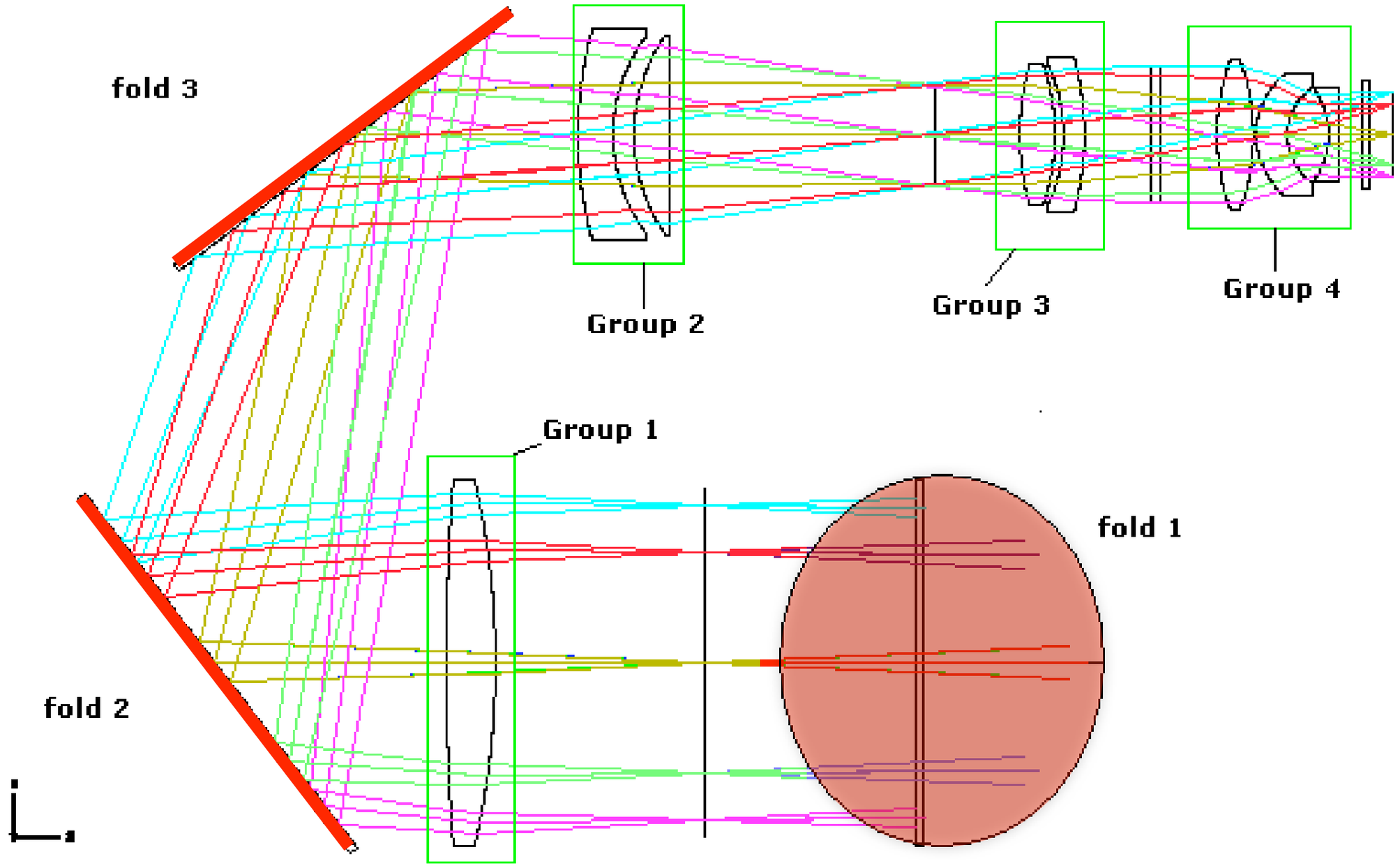


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

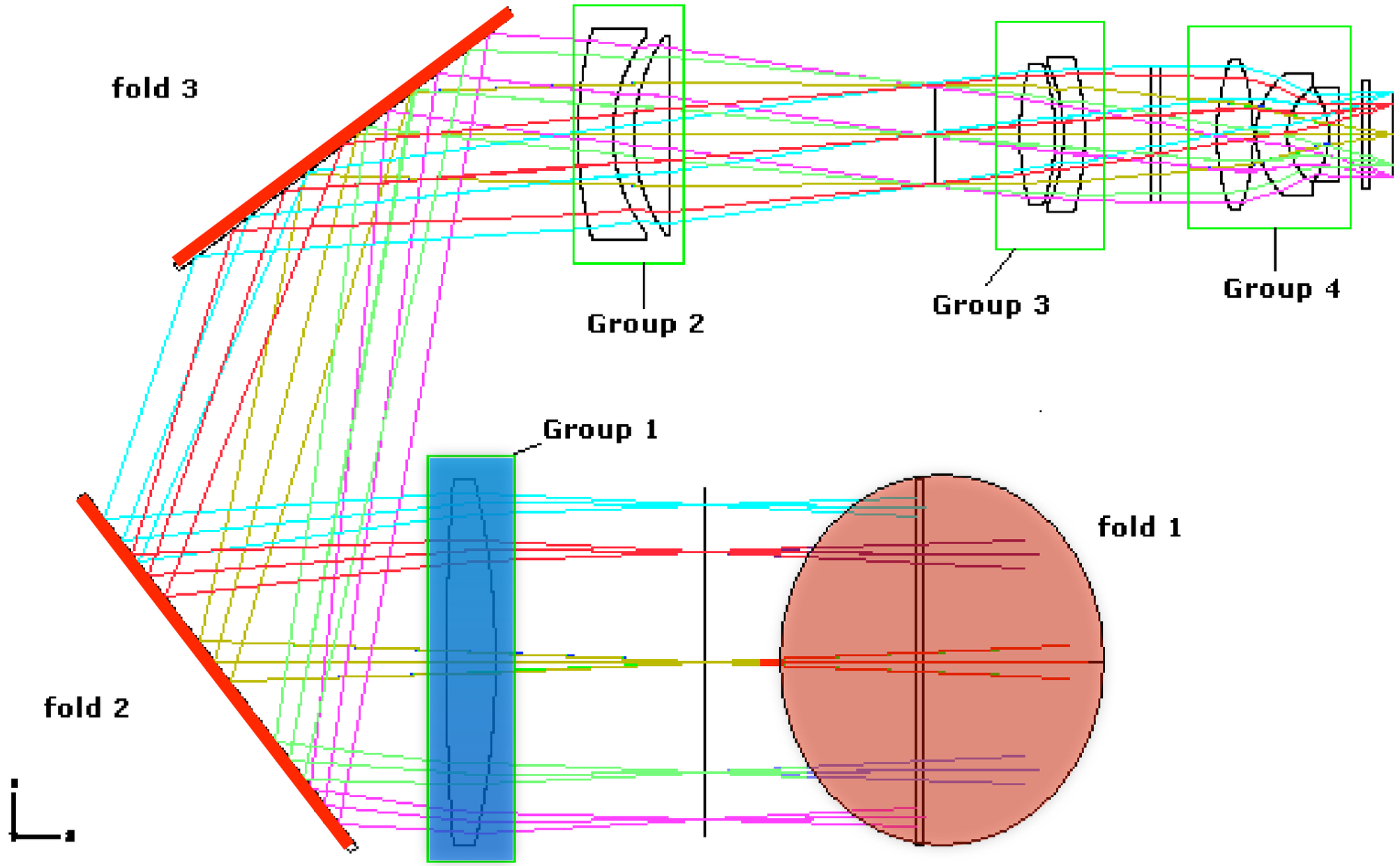


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

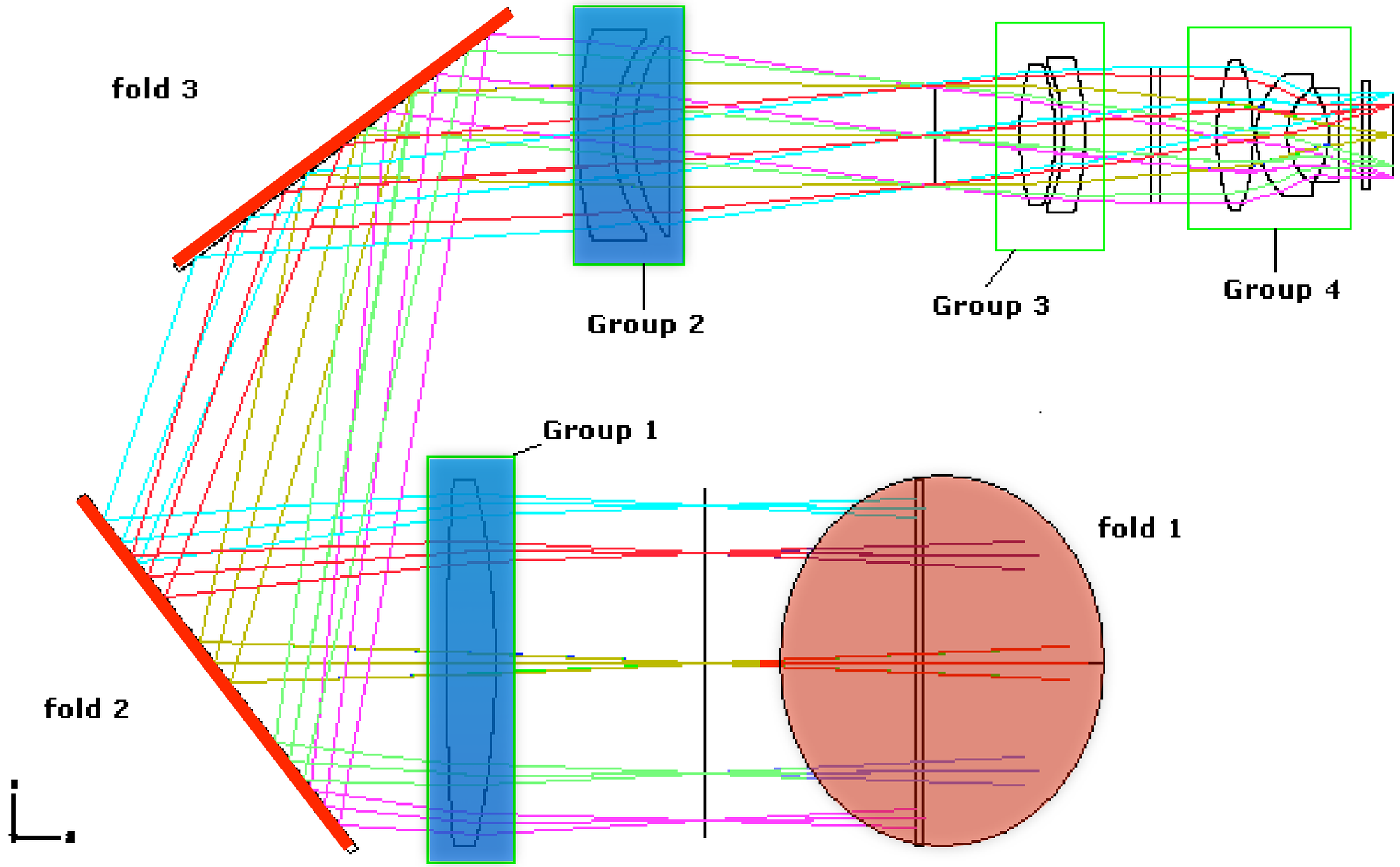


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

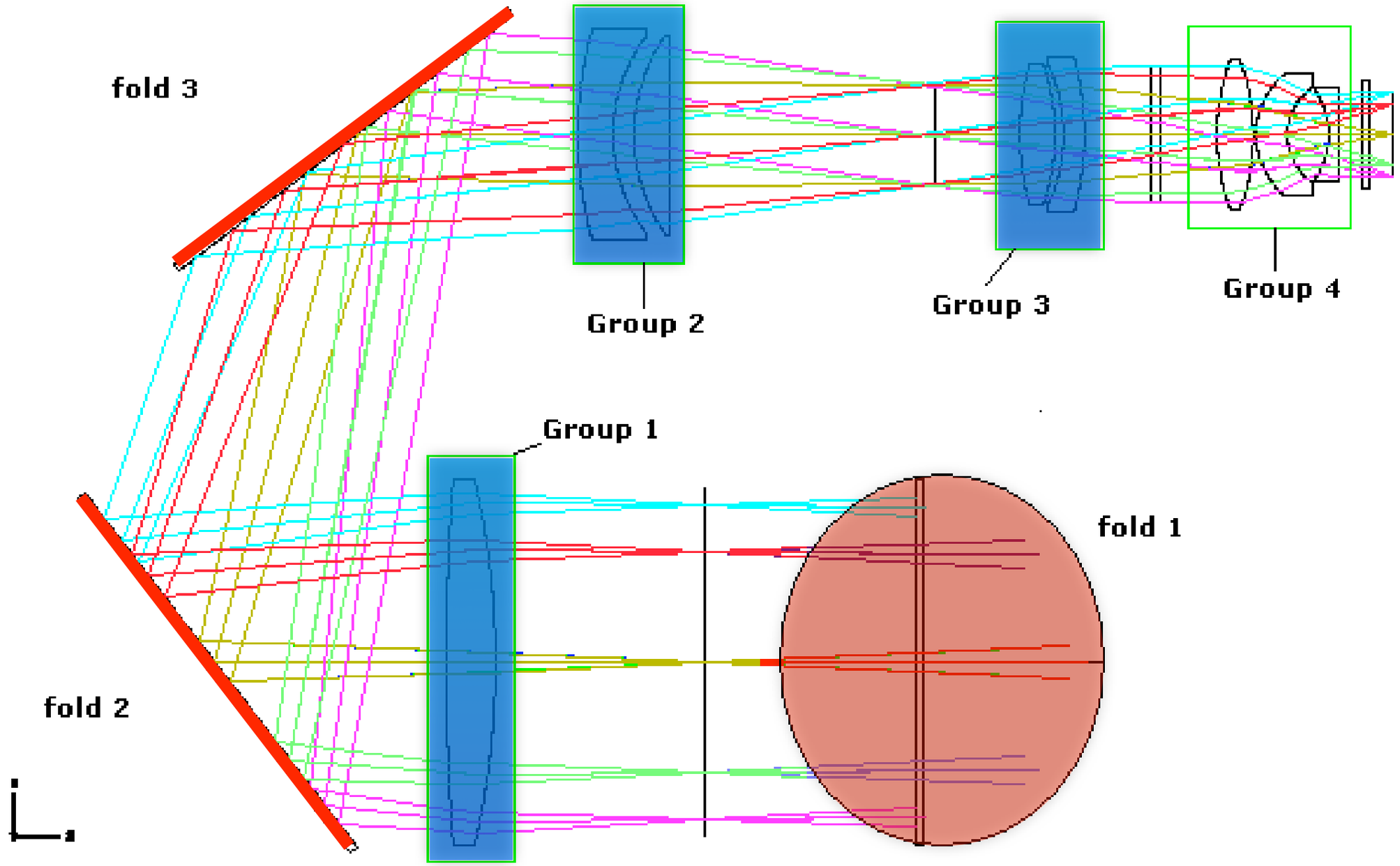


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

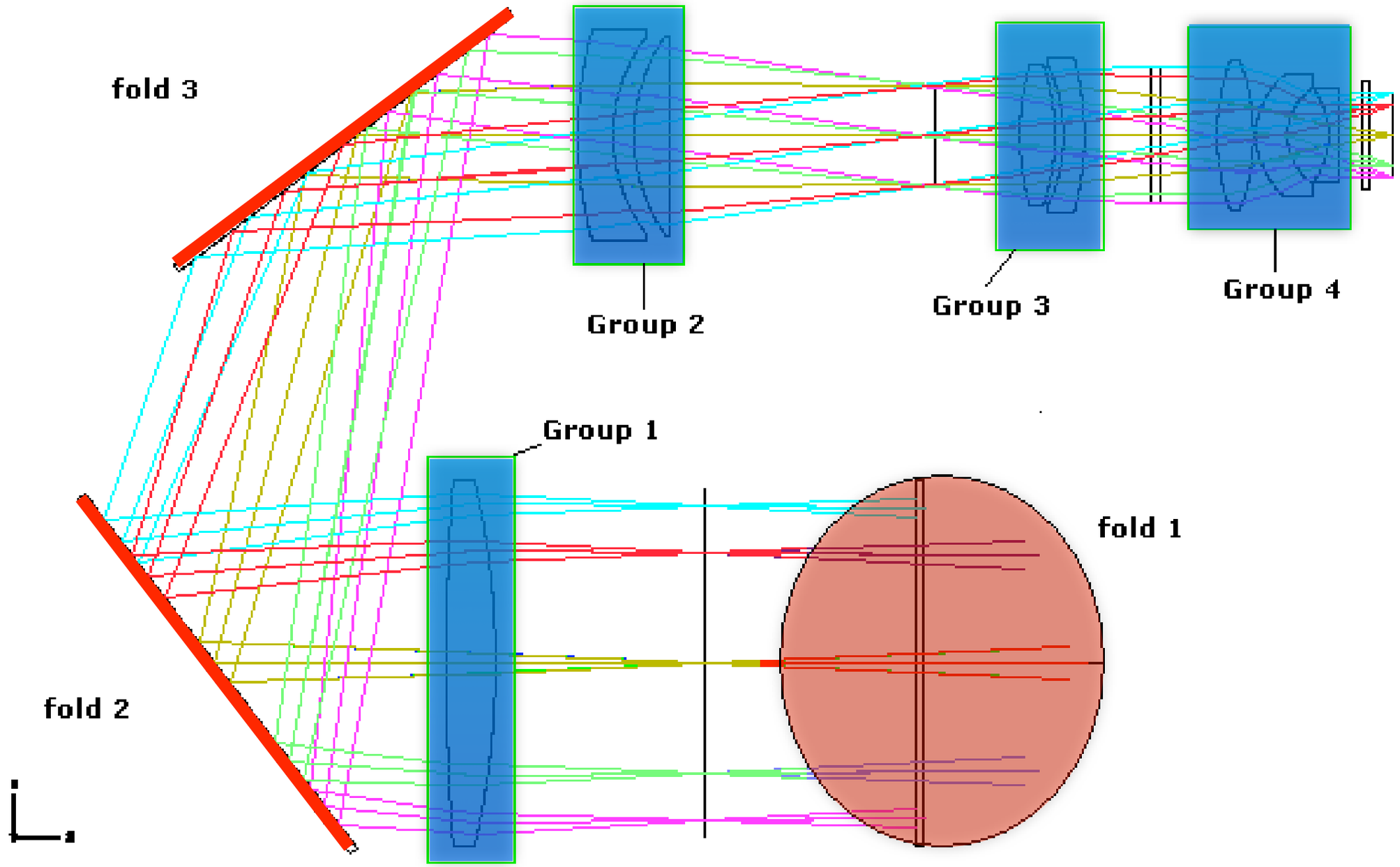
IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX



3D LAYOUT

3D-NTT FINAL DESIGN TUE FEB 12 2008	IMMERVISION DR SIMON THIBAULT
	3D-NTT-COR-A.ZMX

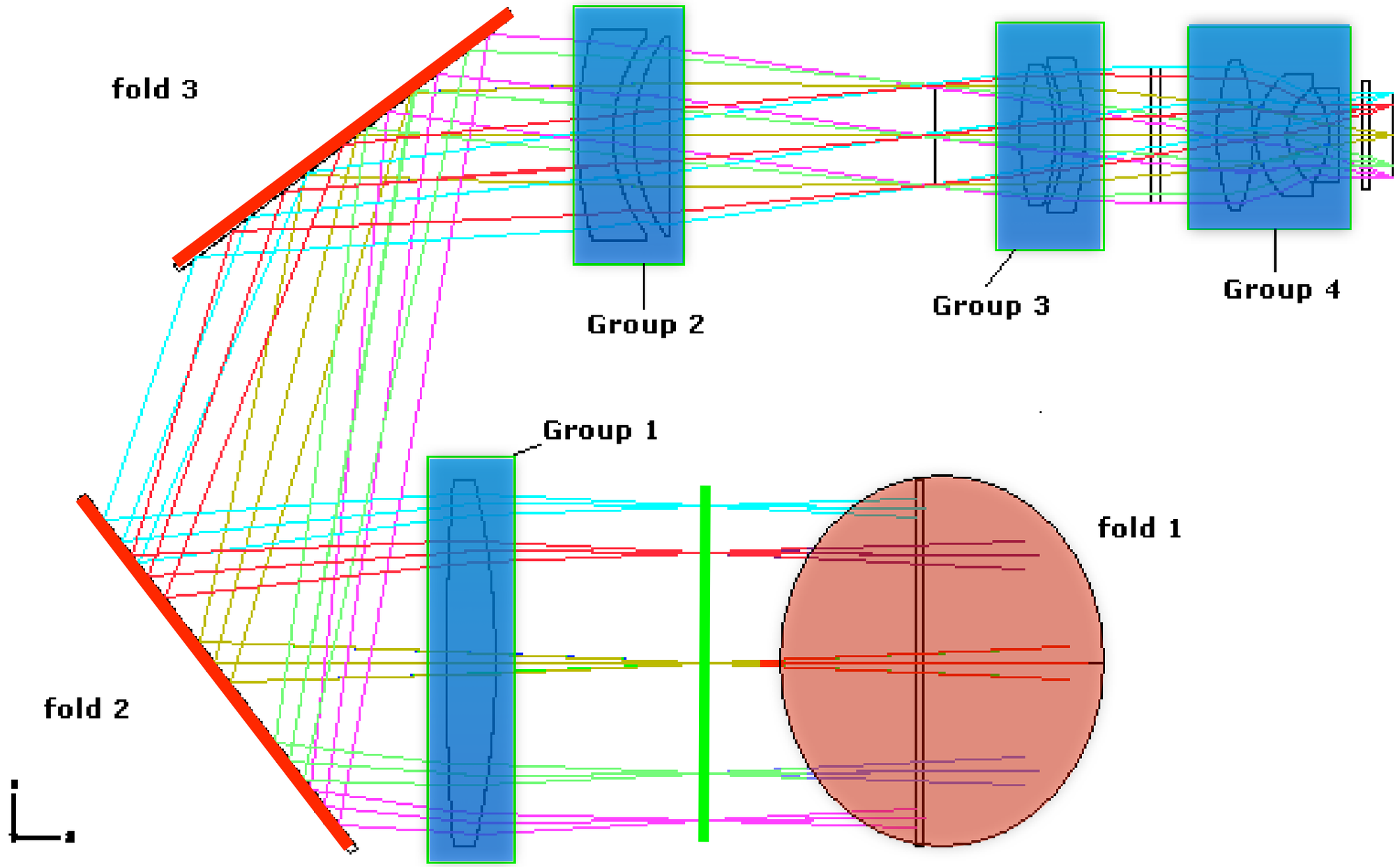


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

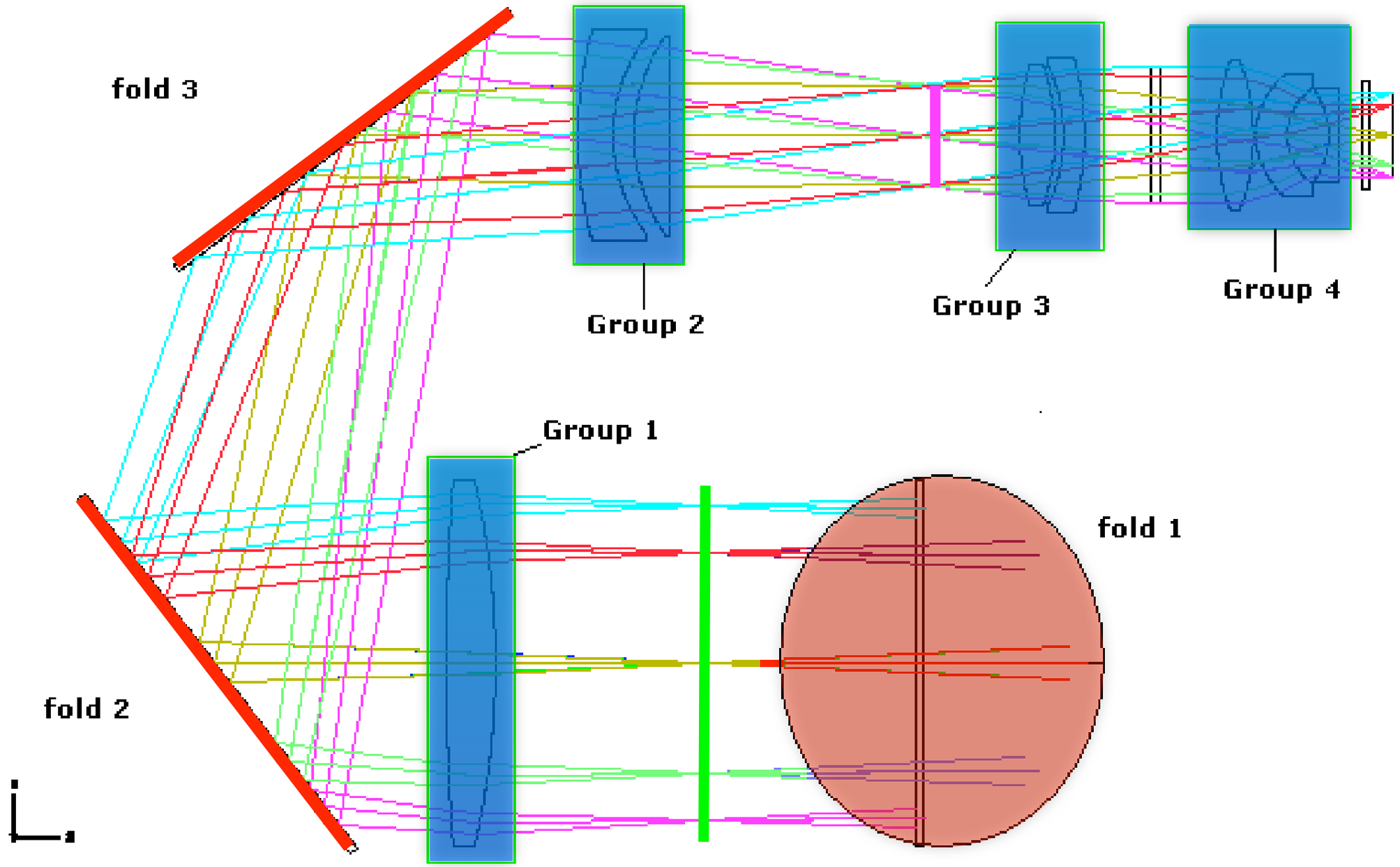


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

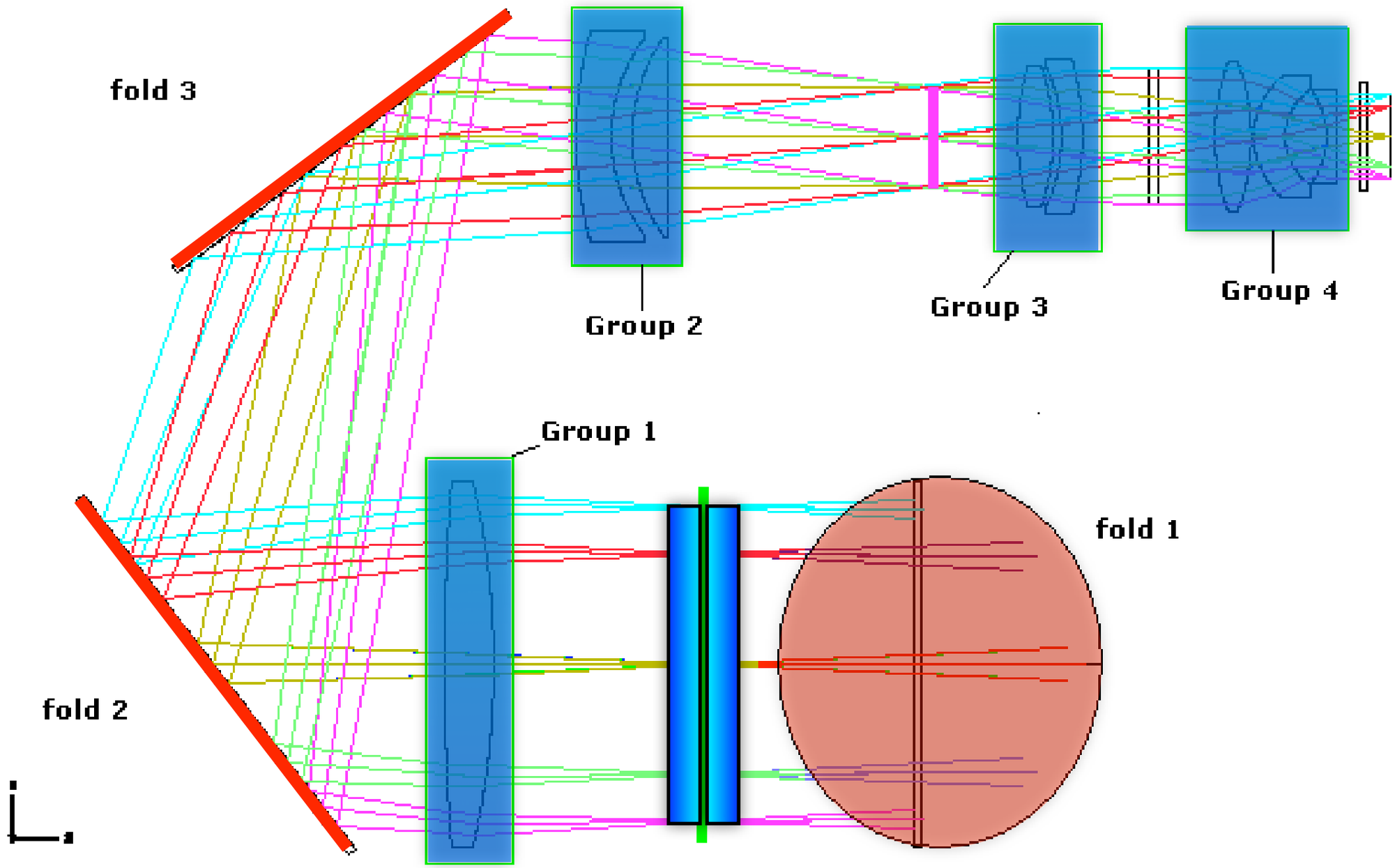


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

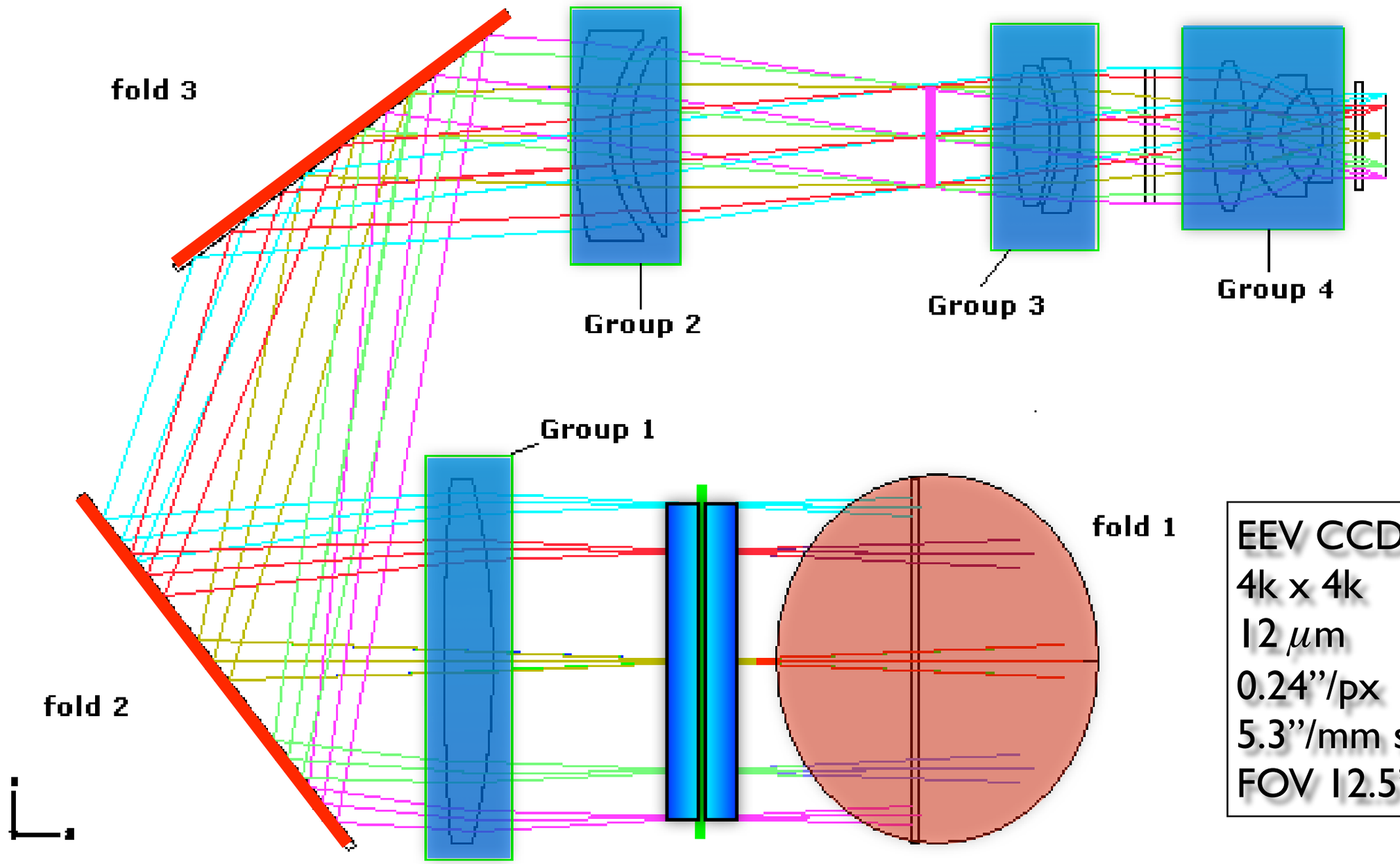


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

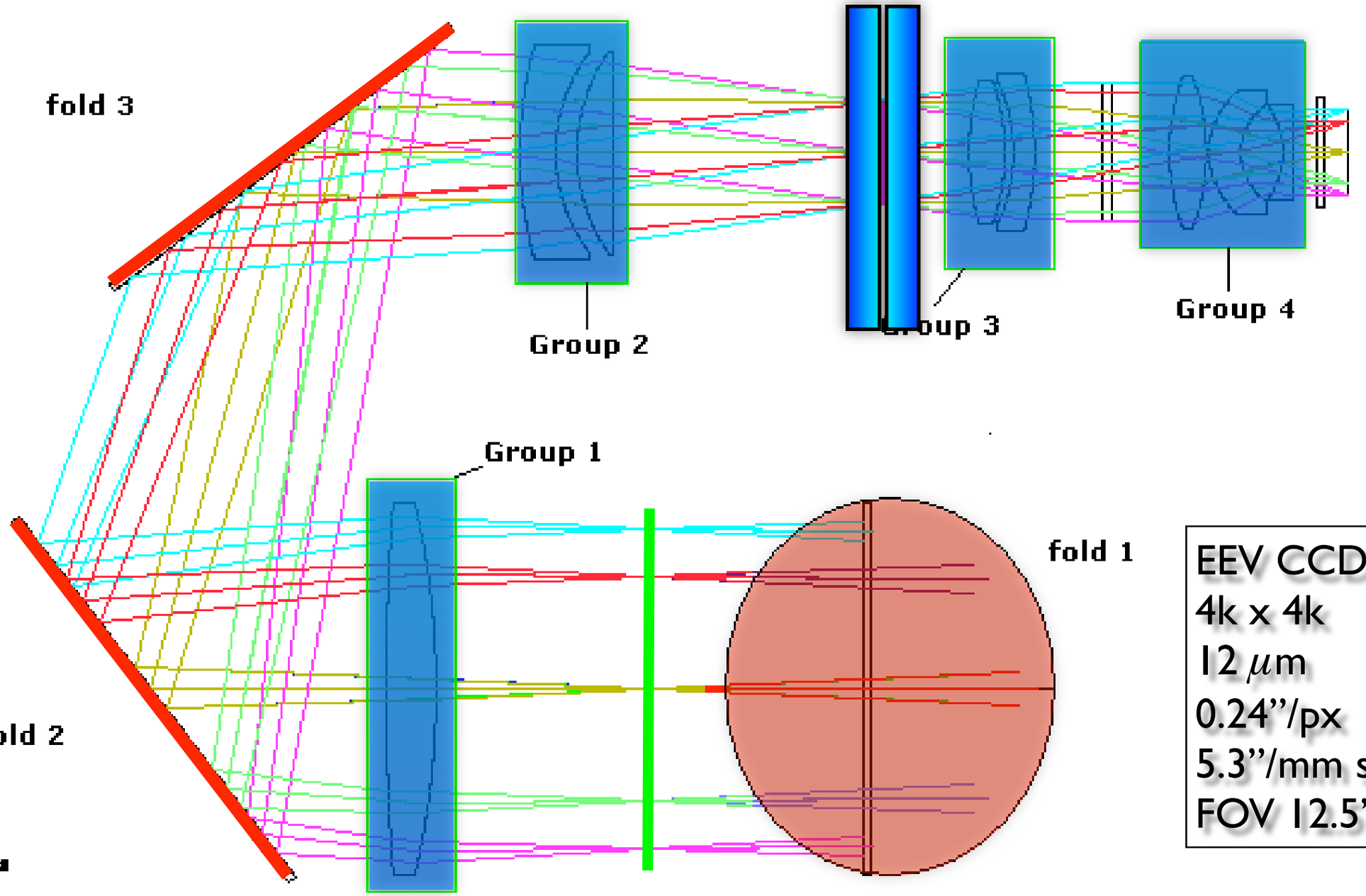


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

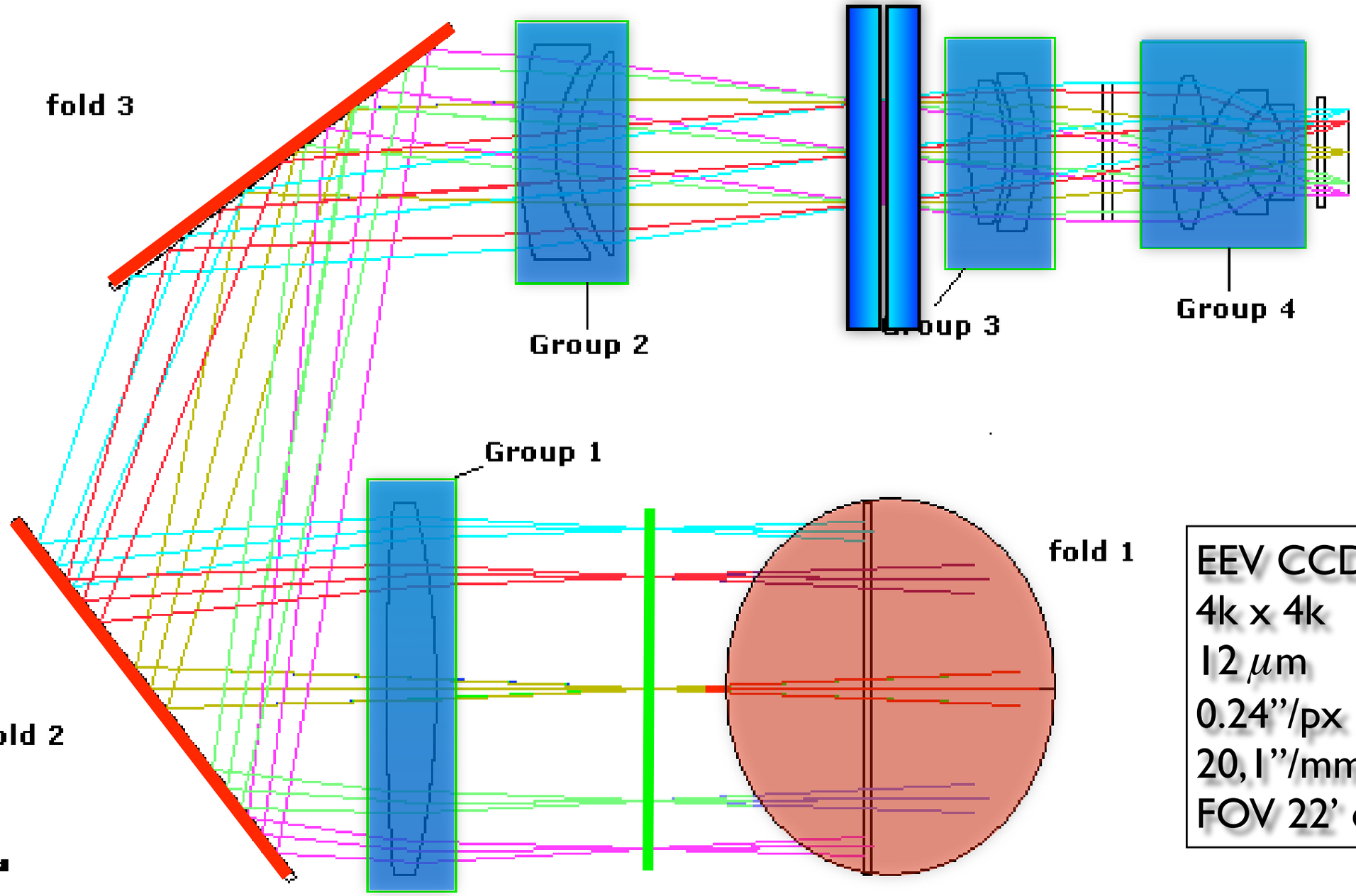


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

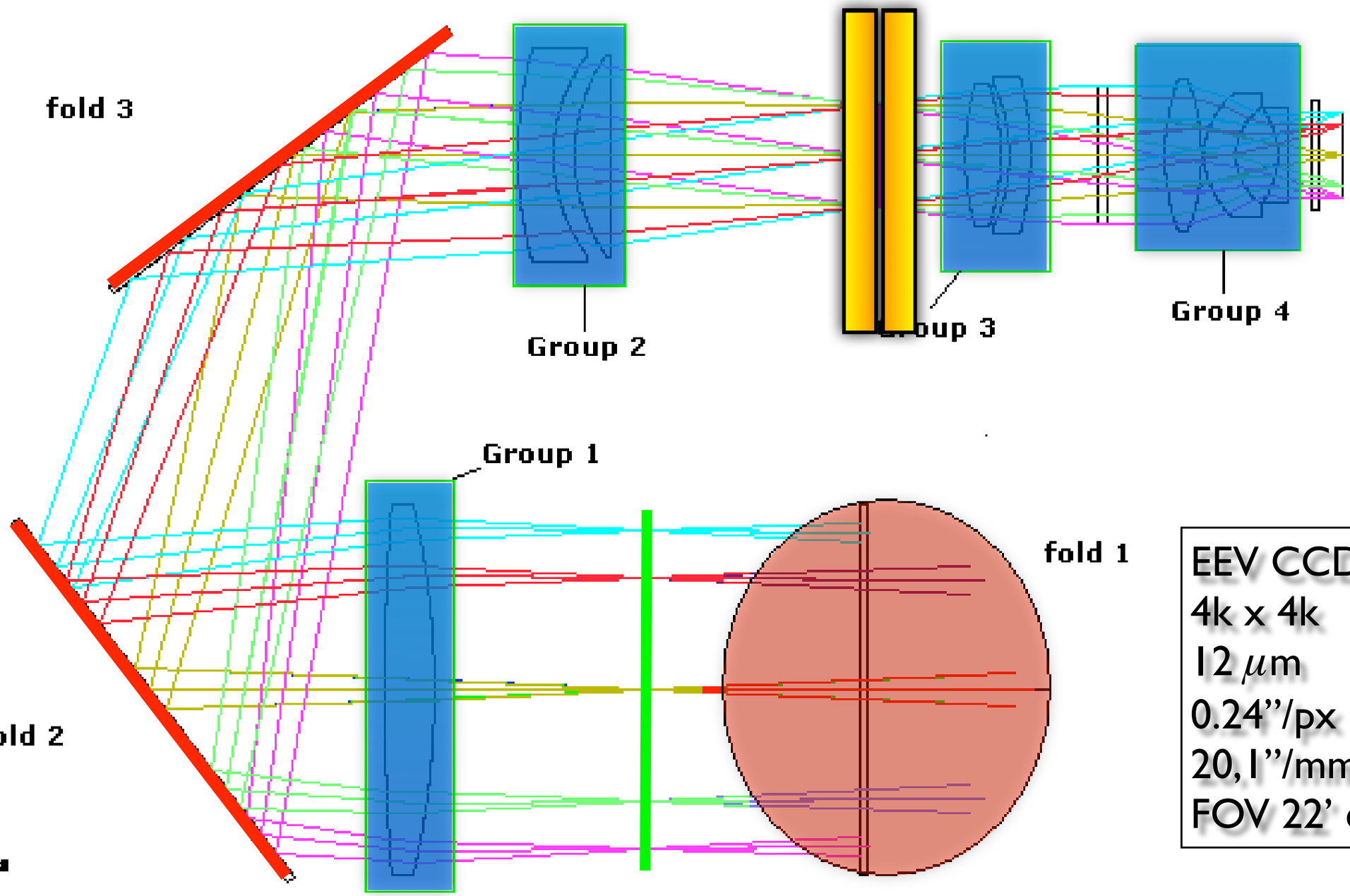


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

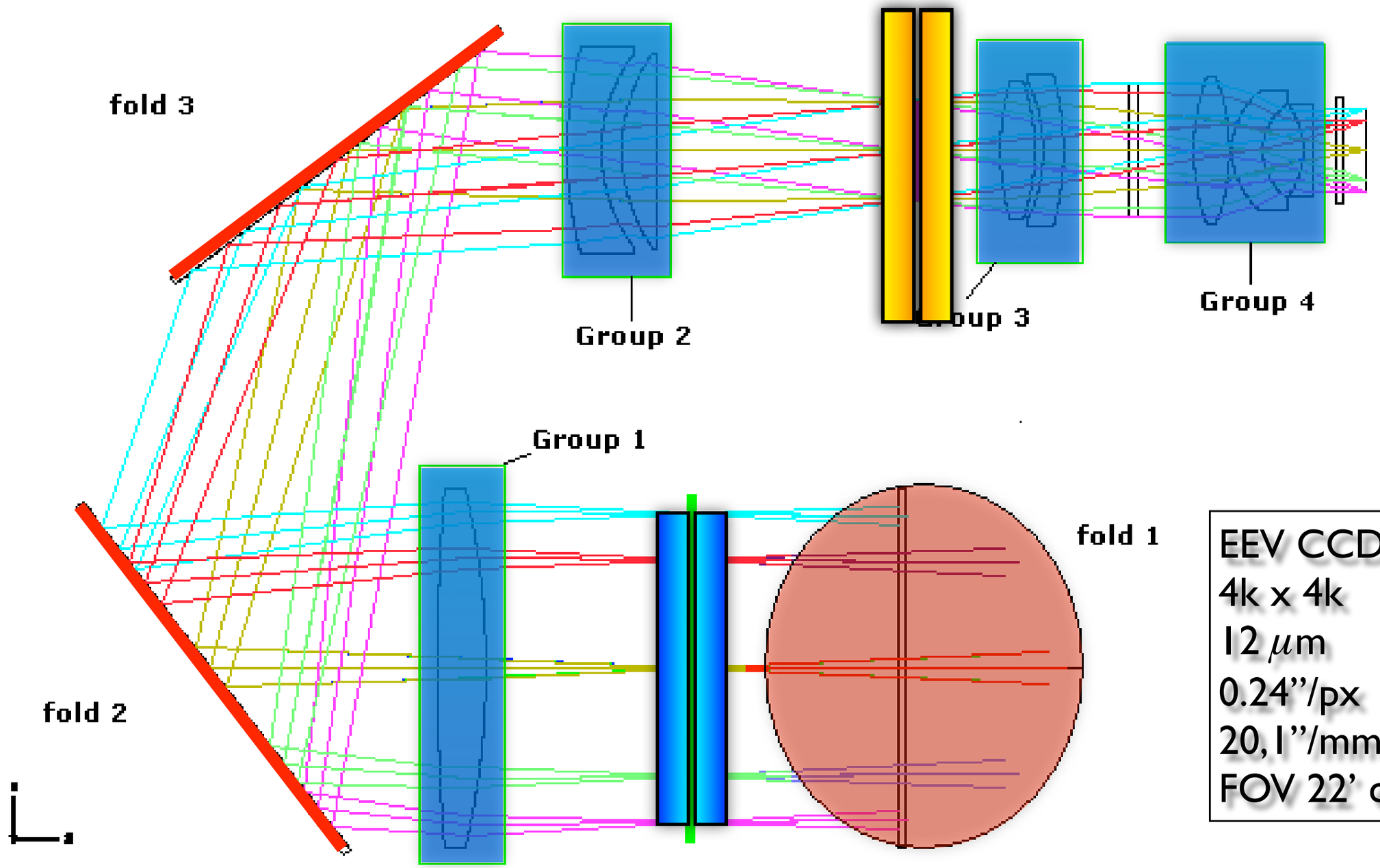


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

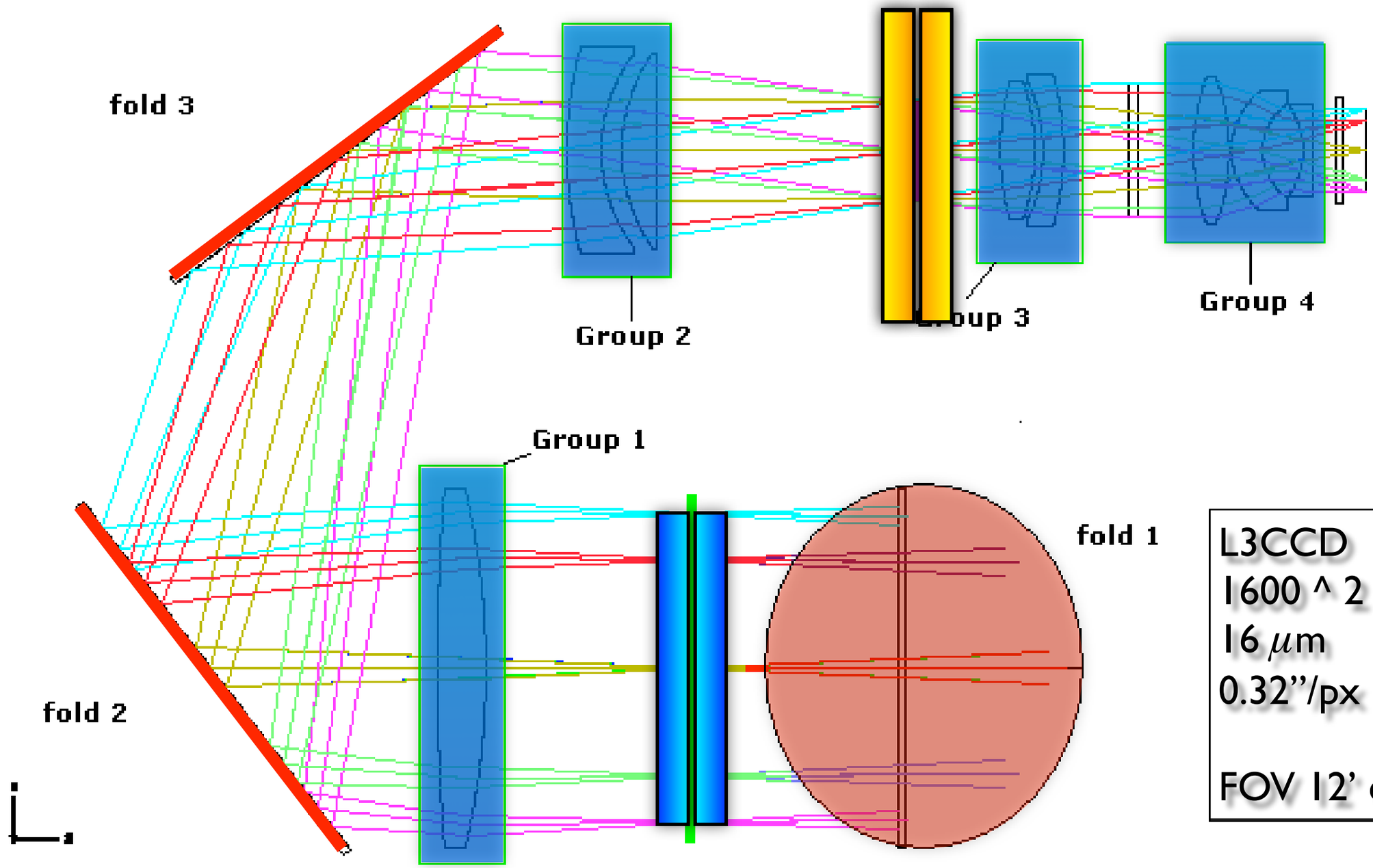
IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX



3D LAYOUT

3D-NTT FINAL DESIGN TUE FEB 12 2008	IMMERVISION DR SIMON THIBAULT
	3D-NTT-COR-A.ZMX

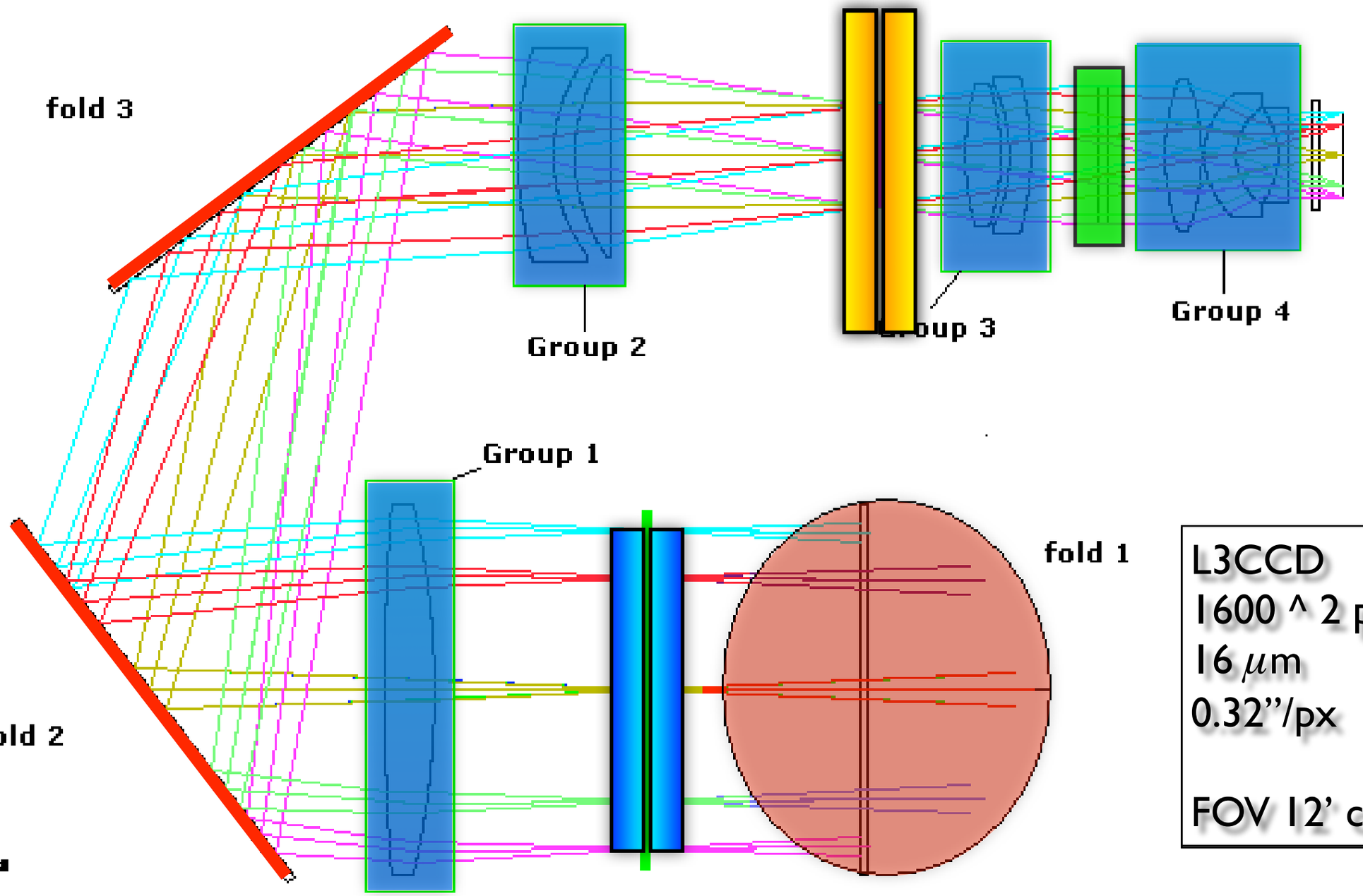


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

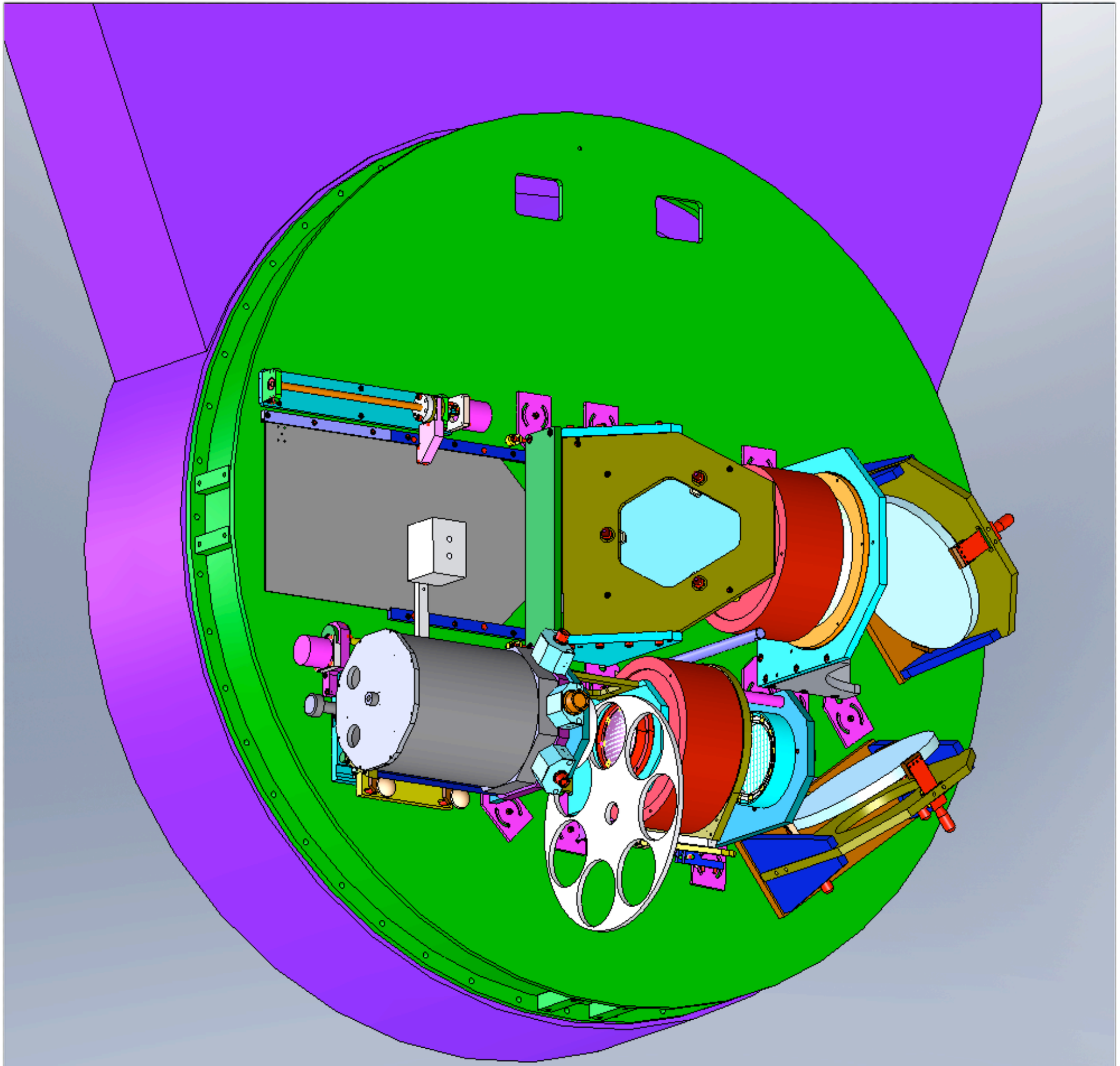


3D LAYOUT

3D-NTT FINAL DESIGN
TUE FEB 12 2008

IMMERVISION
DR SIMON THIBAULT

3D-NTT-COR-A.ZMX

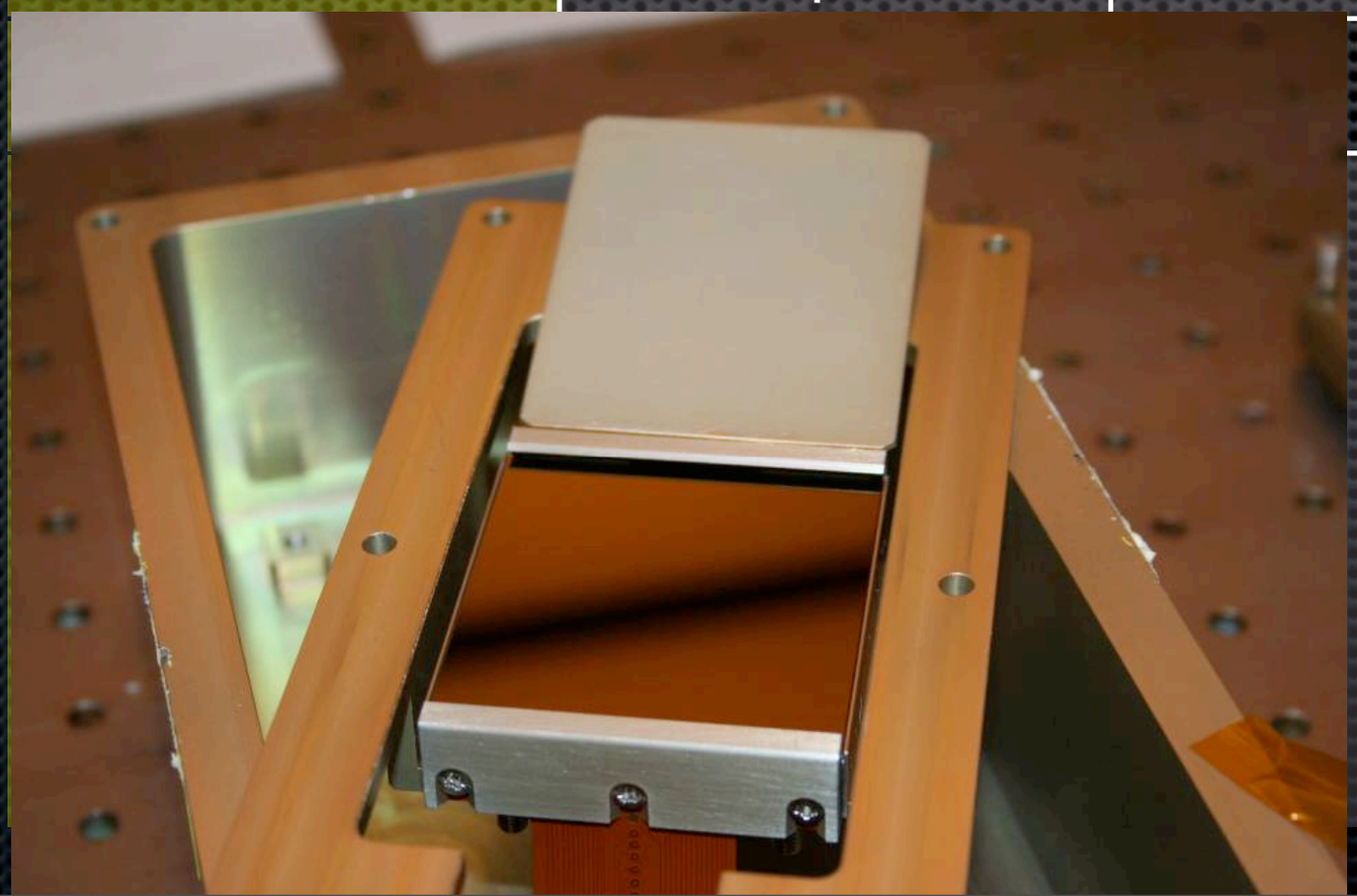


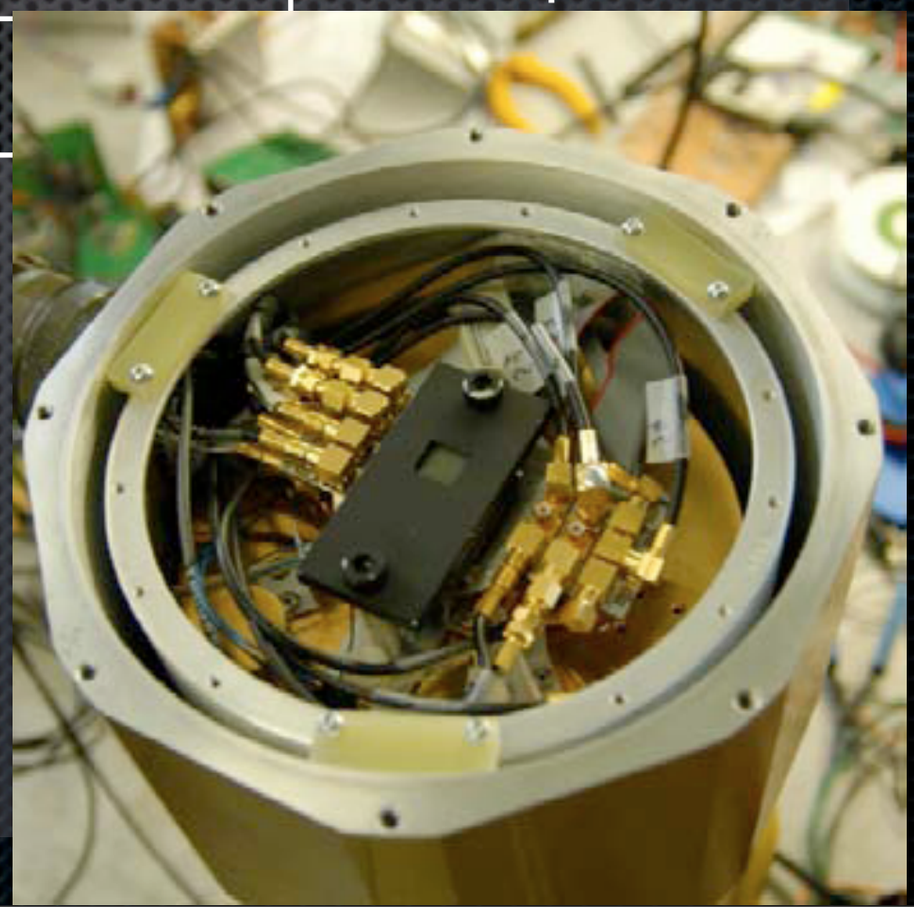
Optical characteristics

	TF focus	TF pupil	TF focus + PF pupil
FOV	12.5’ ⌀	22’ ⌀	12.5’ ⌀
Detector	EEV 4kx4k	EEV 4kx4k	EMCCD 1600x1600
Pixel size	12 µm	12 µm	16 µm
Scale	0.24”/px	0.24”/px	0.32”/px
Wavelength	370 - 900 nm		
TF lines	[OII] 372.7 nm H β 486.1 nm [OIII] 495.9 - 500.7 nm [NII] 654.8 - 658.4 nm H α 656.3 nm		

Optical characteristics

	TF focus	TF pupil	TF focus + PF pupil
FOV	12.5’ ⌀	22’ ⌀	12.5’ ⌀
Detector	EEV 4kx4k	EEV 4kx4k	EMCCD 1600x1600
Pixel size	12 µm	12 µm	16 µm
Scale	0.24”/px	0.24”/px	0.32”/px

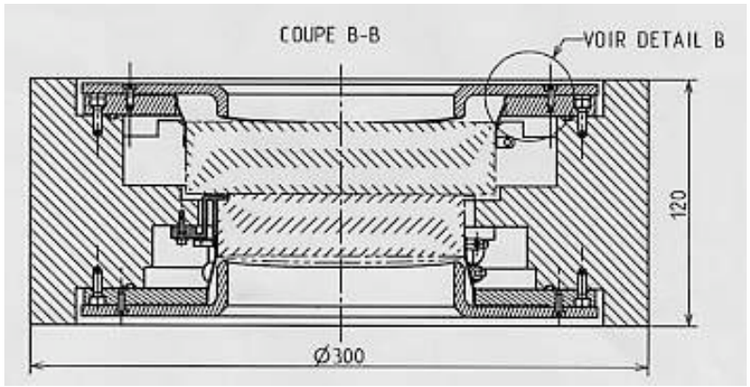




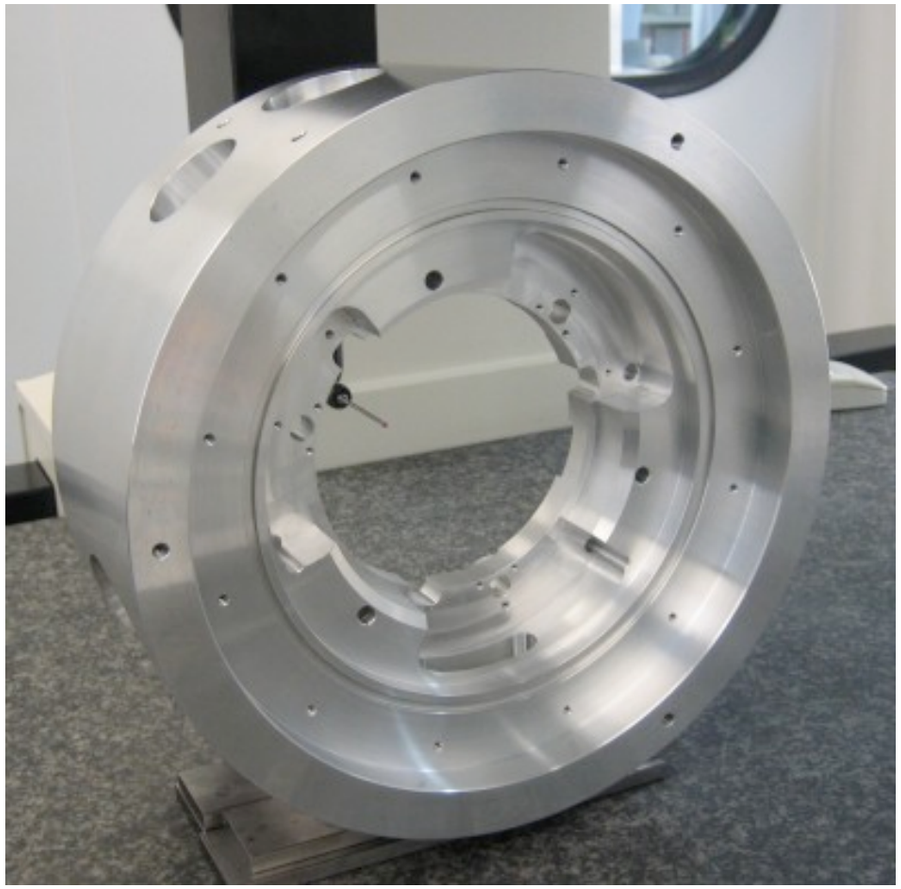
Optical characteristics

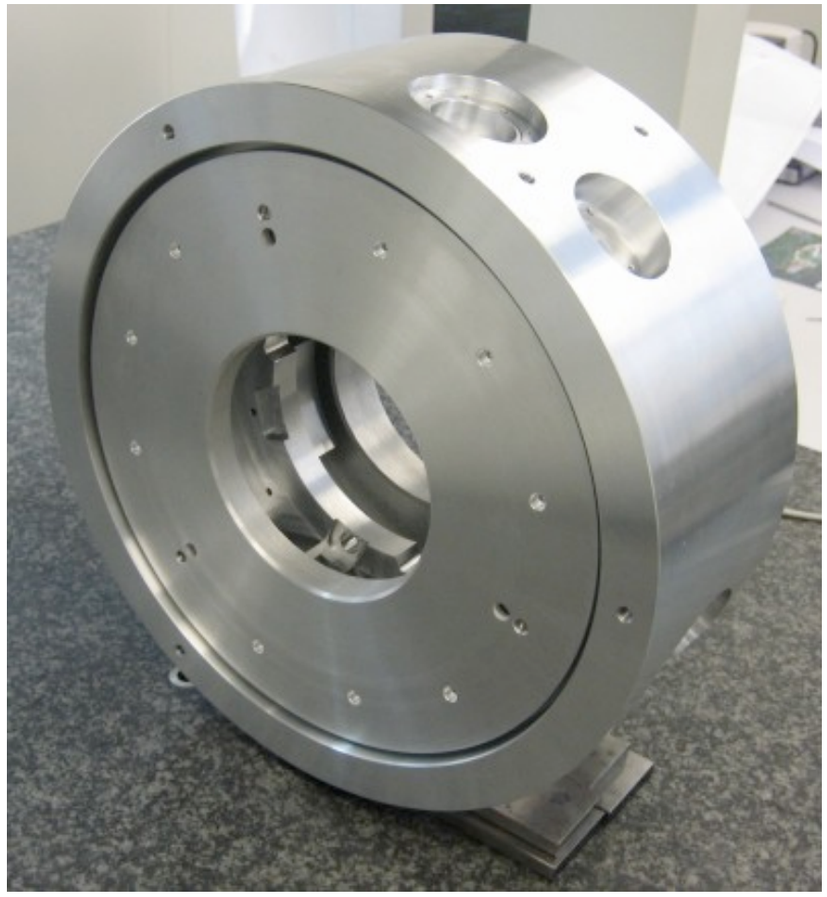
	TF focus	TF pupil	TF focus + PF pupil
FOV	12.5’ ⌀	22’ ⌀	12.5’ ⌀
Detector	EEV 4kx4k	EEV 4kx4k	EMCCD 1600x1600
Pixel size	12 µm	12 µm	16 µm
Scale	0.24”/px	0.24”/px	0.32”/px
Wavelength	370 - 900 nm		
TF lines	[OII] 372.7 nm H β 486.1 nm [OIII] 495.9 - 500.7 nm [NII] 654.8 - 658.4 nm H α 656.3 nm		

Fabry Perot mechanical characteristics 1



VISION OF EXCELLENCE





Fabry Perot mechanical characteristics 2

$$\mathcal{R} = p\,\mathcal{F}$$

$$p\,\lambda = 2\,n\,e$$

Fabry Perot mechanical characteristics 2

Interference order

spectral resolution

Finesse (coating)

$$\mathcal{R} = \mathrm{p}\,\mathcal{F}$$

$$\mathrm{p}\,\lambda = 2\,\mathrm{n}\,\mathrm{e}$$

Fabry Perot mechanical characteristics 2

Interference order

spectral resolution

Finesse (coating)

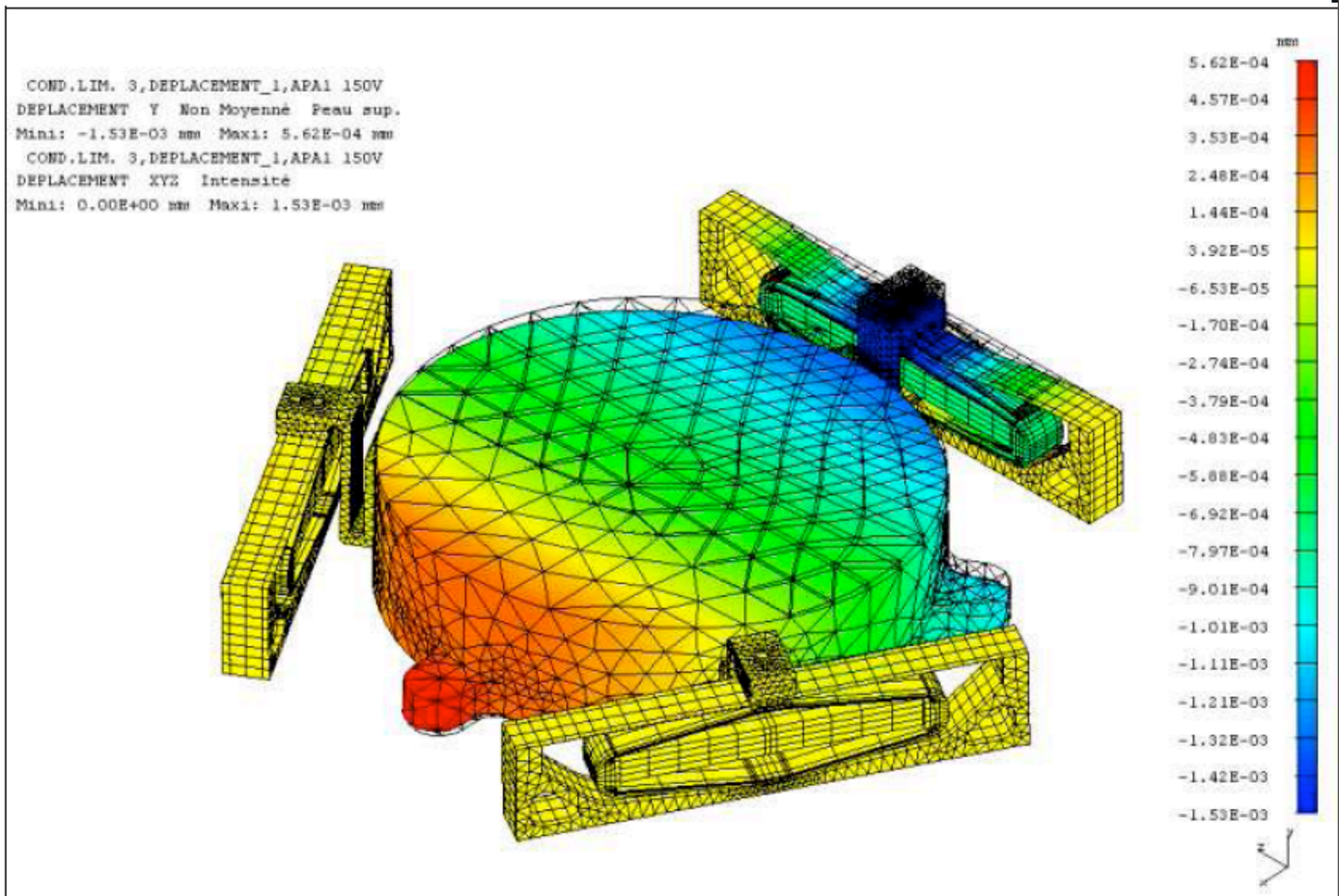
$$\mathcal{R} = \mathrm{p}\,\mathcal{F}$$

$$\mathrm{p}\,\lambda = 2\,\mathrm{n}\,\mathrm{e}$$

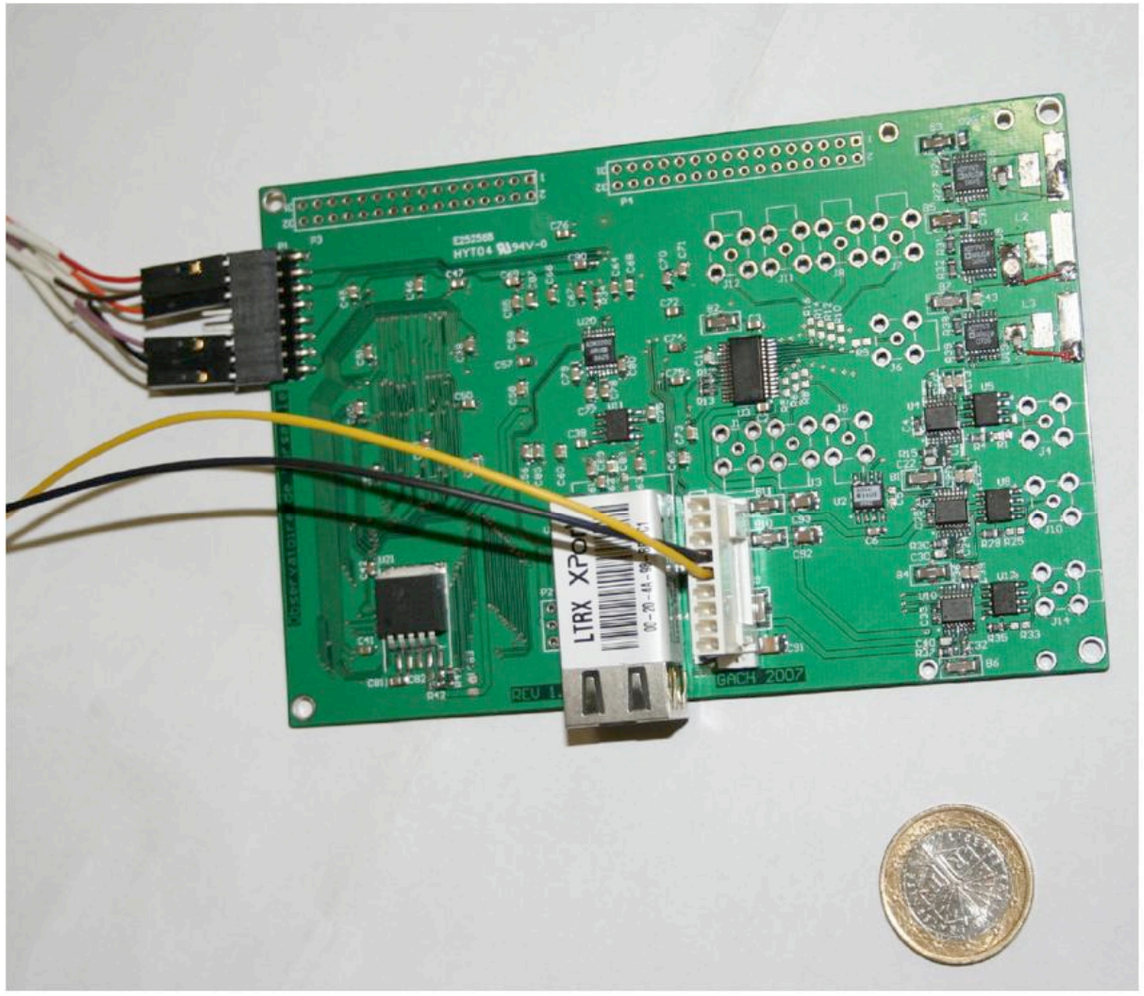
spacing

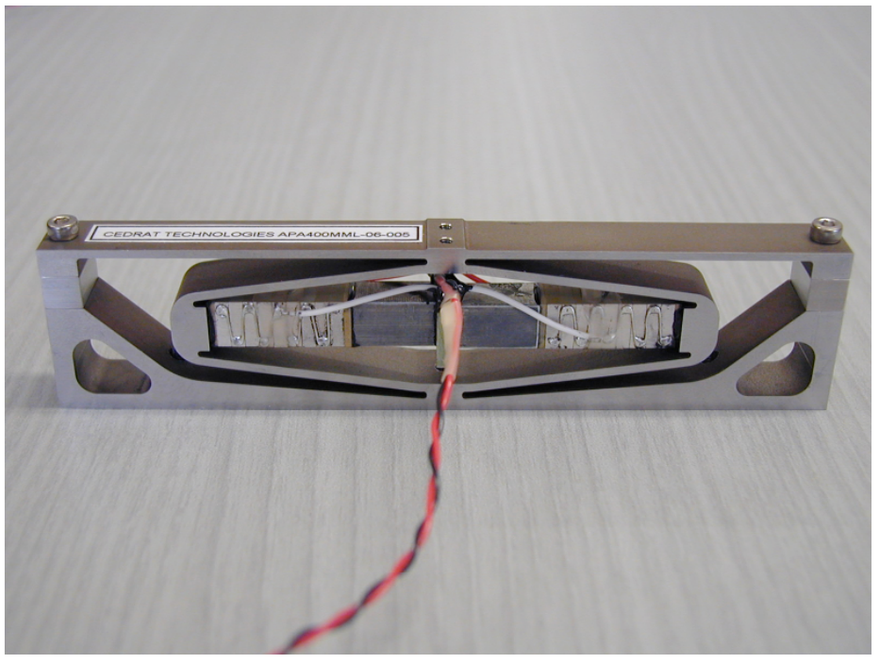
wavelength

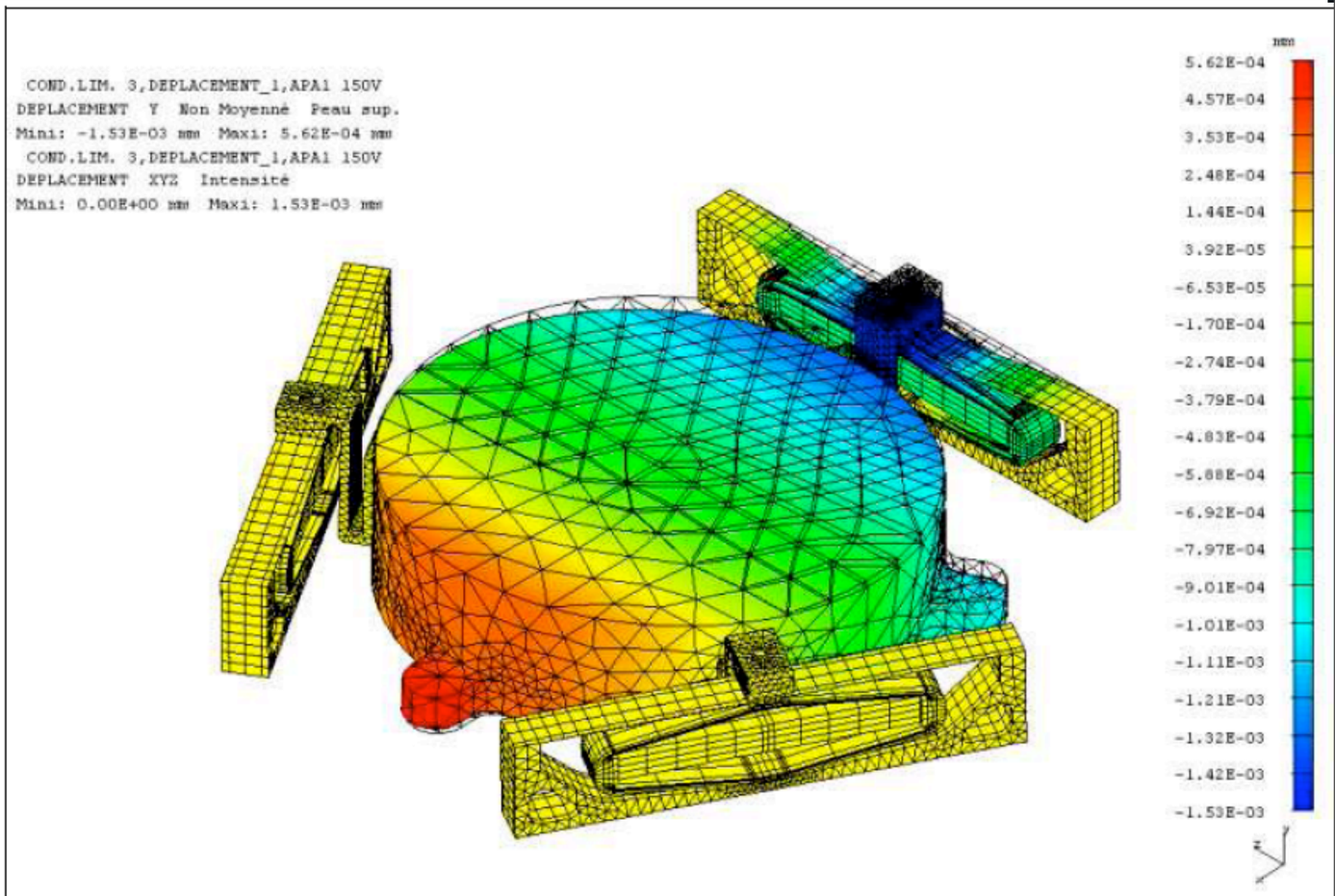
optical index (1)



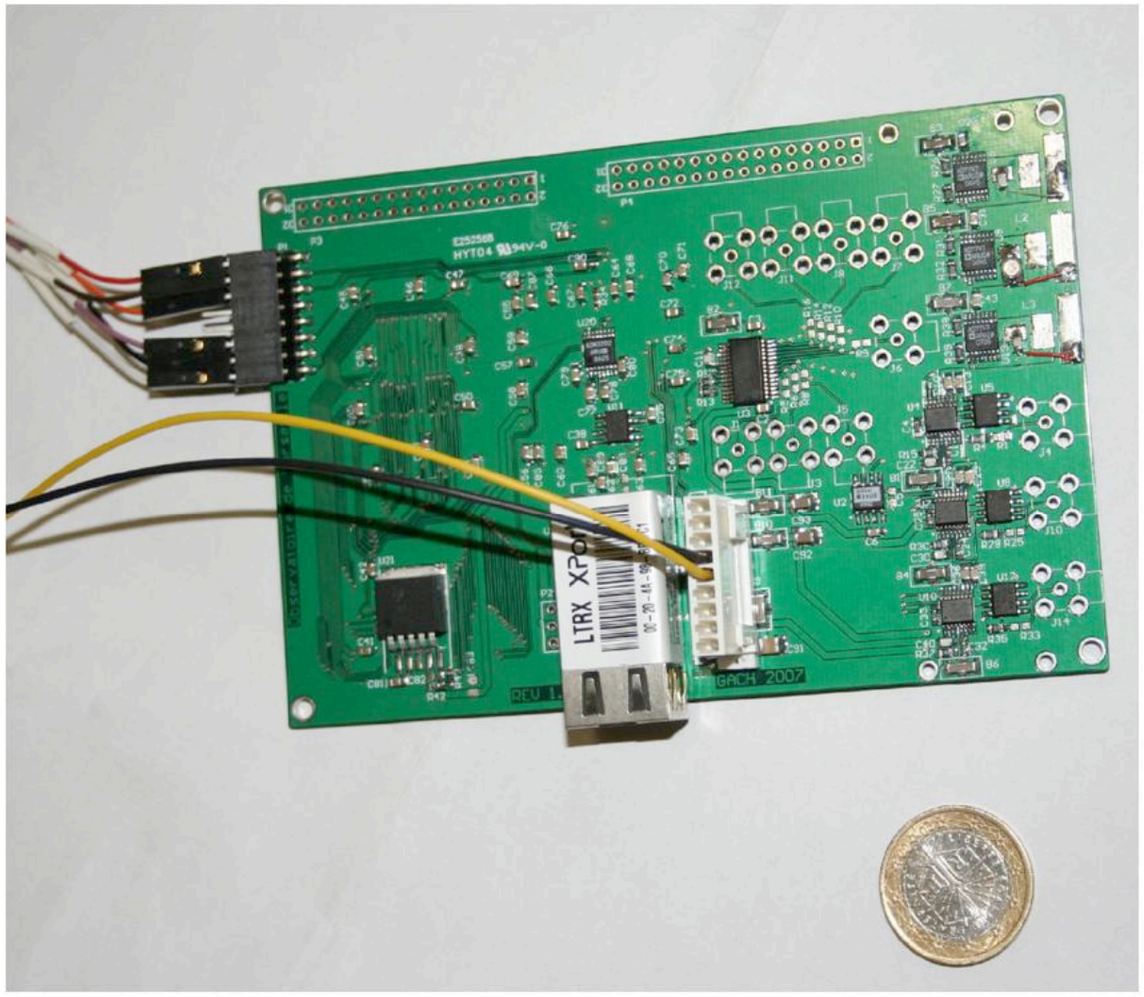
Déformée sous l'effet d'une de tension de 1V appliqué à un seul des APA (déplacement Y)

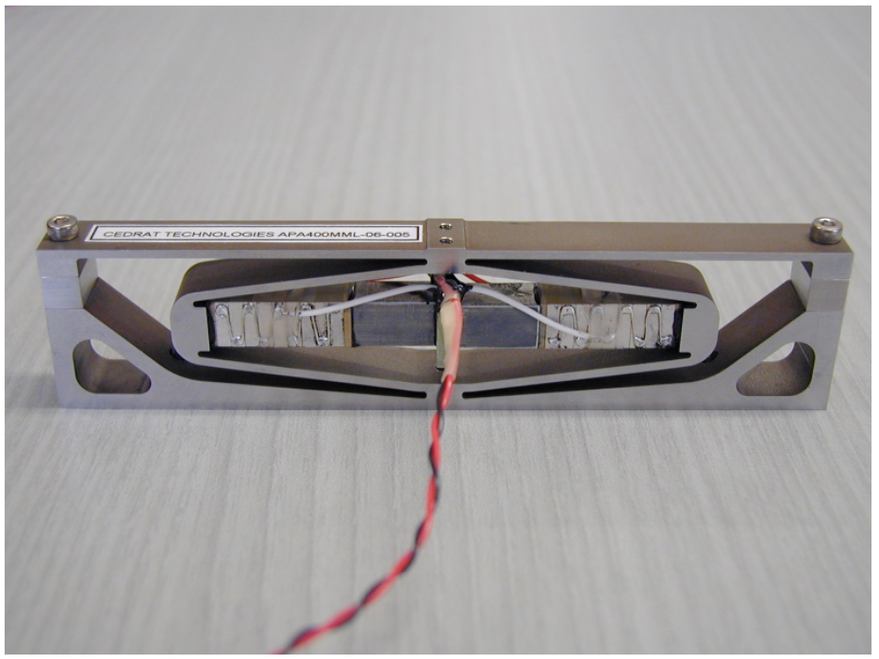


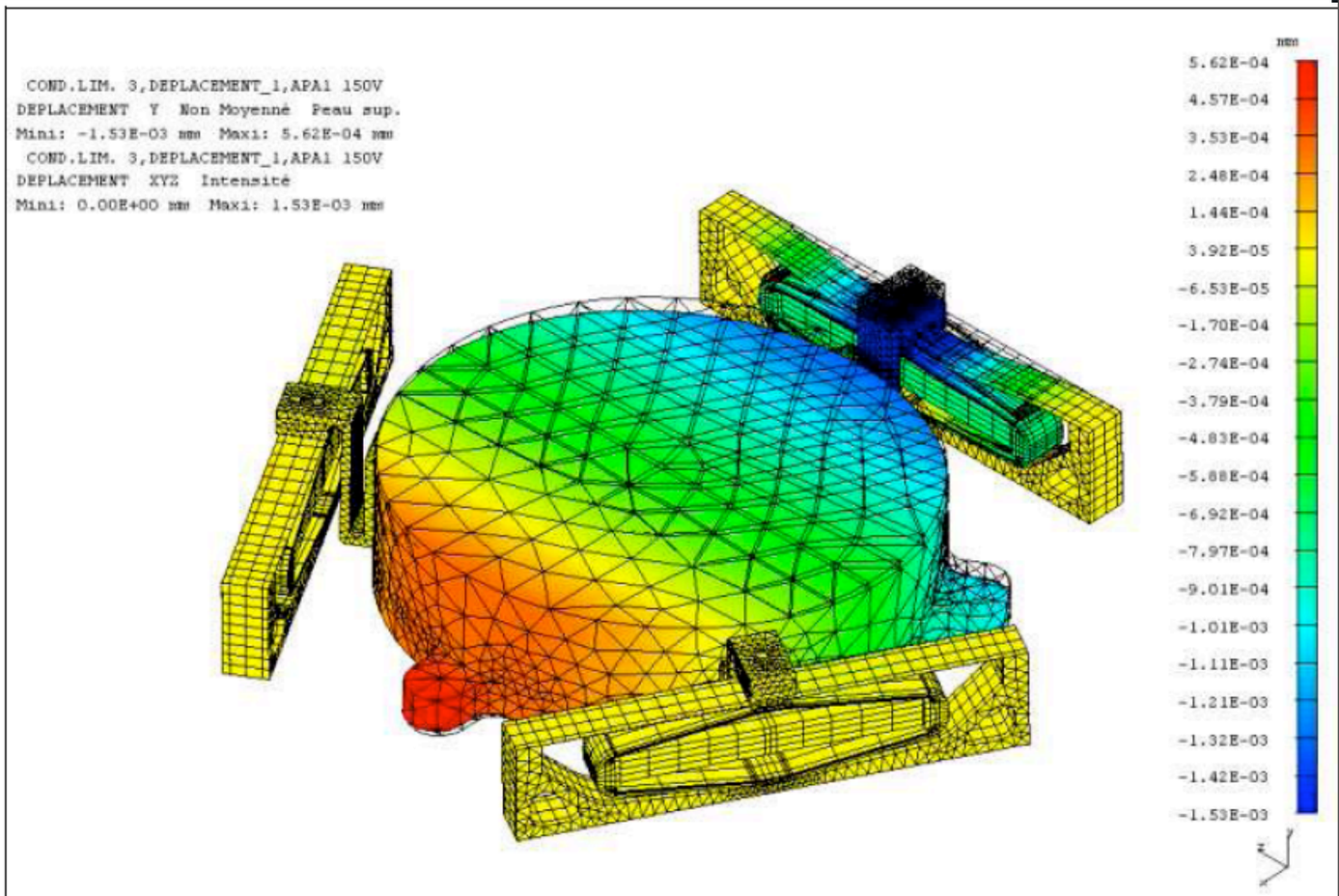




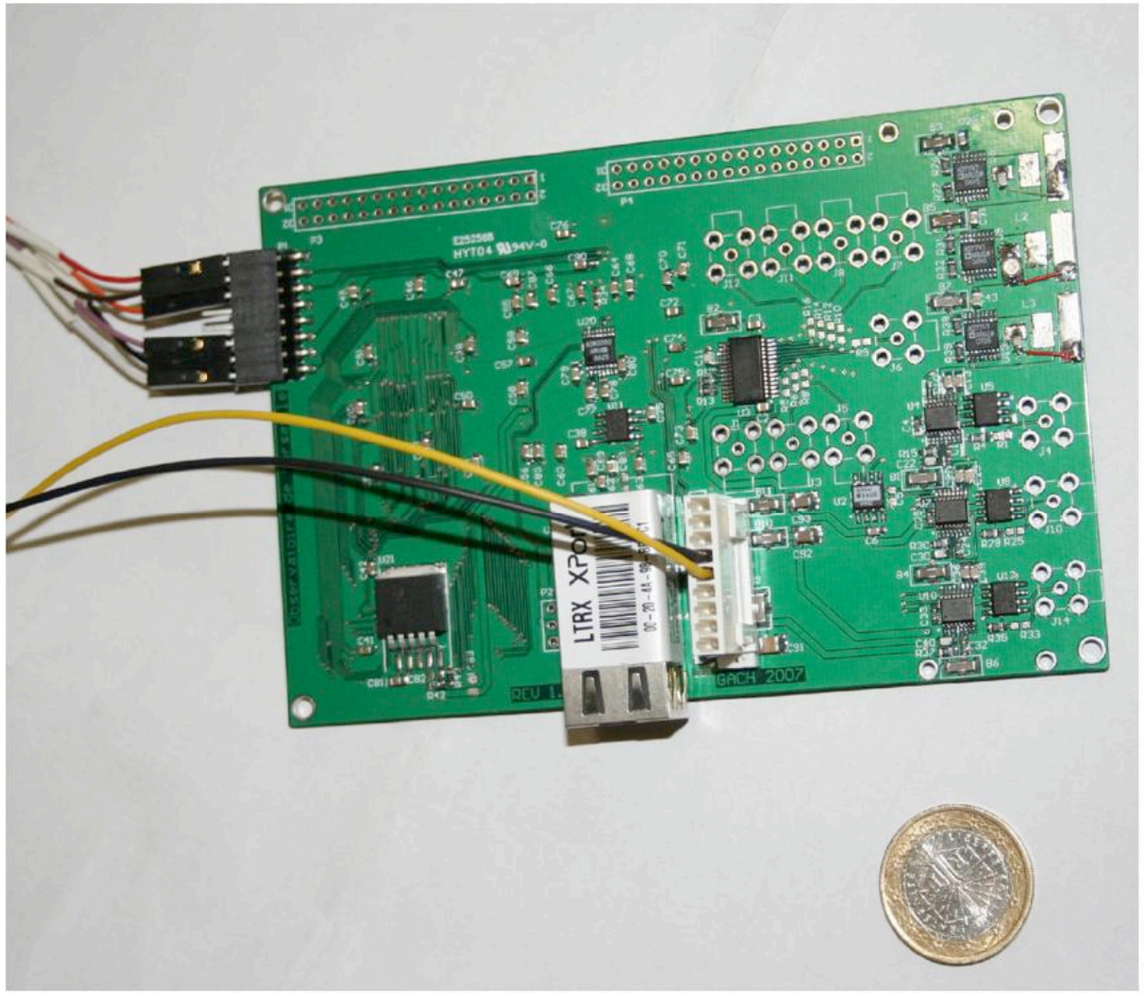
Déformée sous l'effet d'une de tension de 1V appliqué à un seul des APA (déplacement Y)

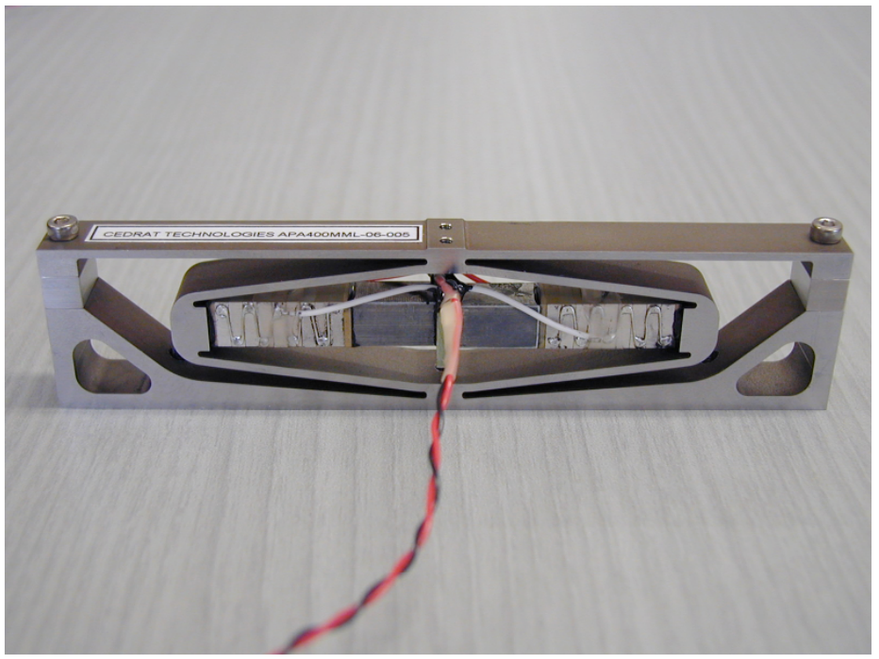






Déformée sous l'effet d'une de tension de 1V appliqué à un seul des APA (déplacement Y)



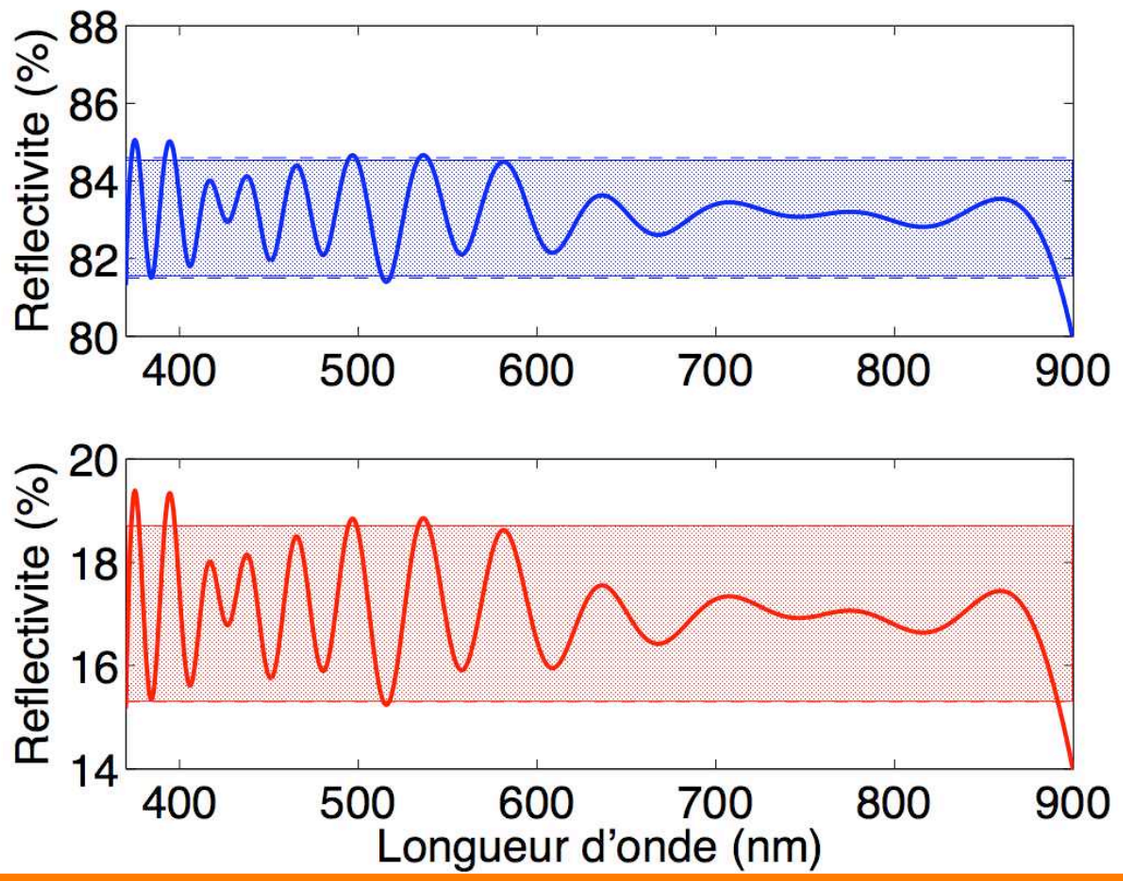


Fabry Perot optical characteristics

	HR FP	LR FP
Spectral resolution	10k to 40k	500 to 10k
Wavelength range	370-900 nm	
Order	220 to 835	30 to 630

Fabry Perot optical characteristics

Finesse LR vs λ



Finesse HR vs λ

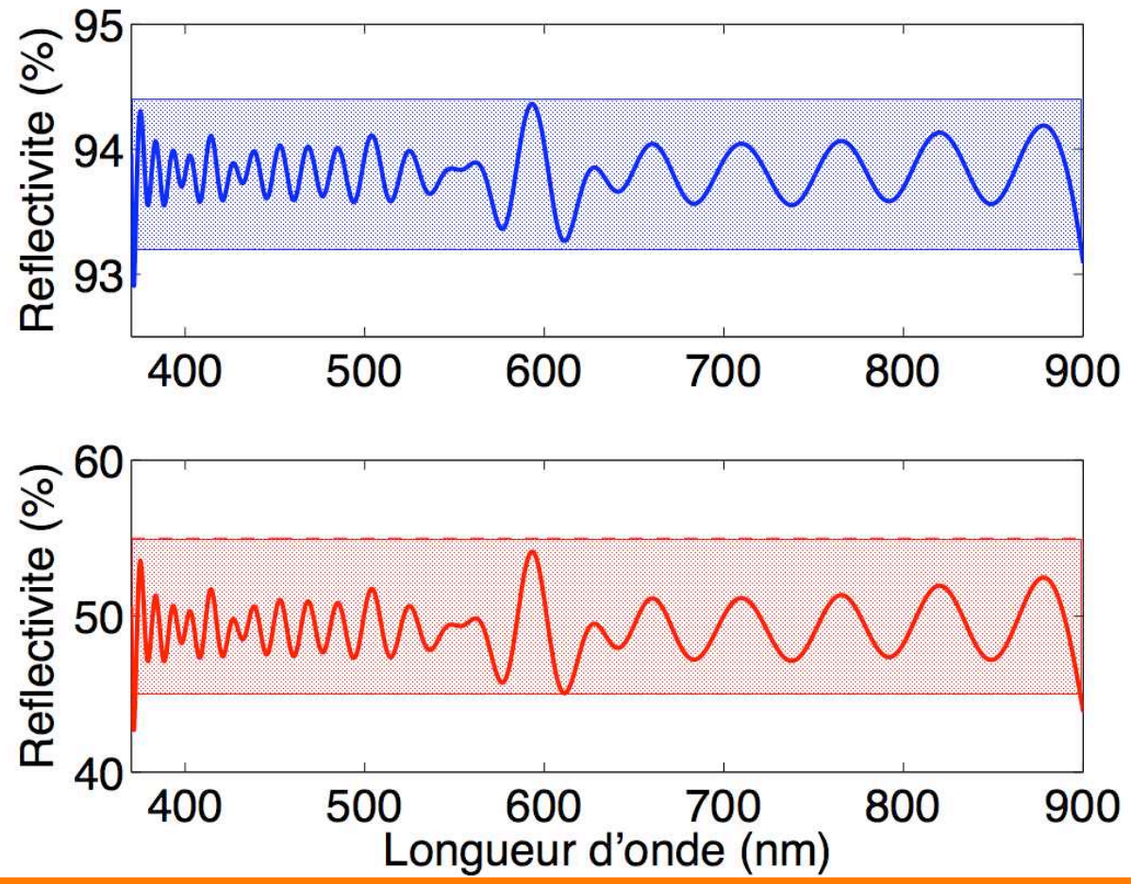
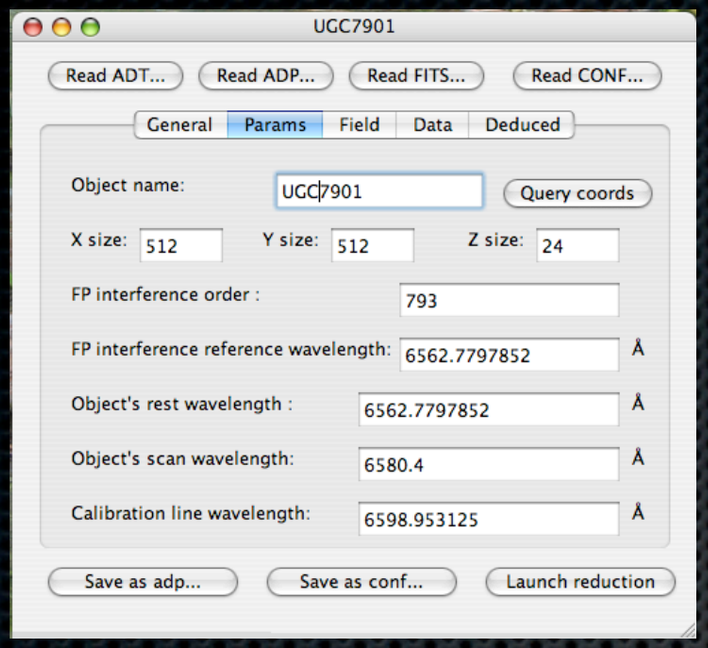


FIGURE 2 — RÉFLECTIVITÉ ET FINESSE DE LA SOLUTION B À 27 COUCHES

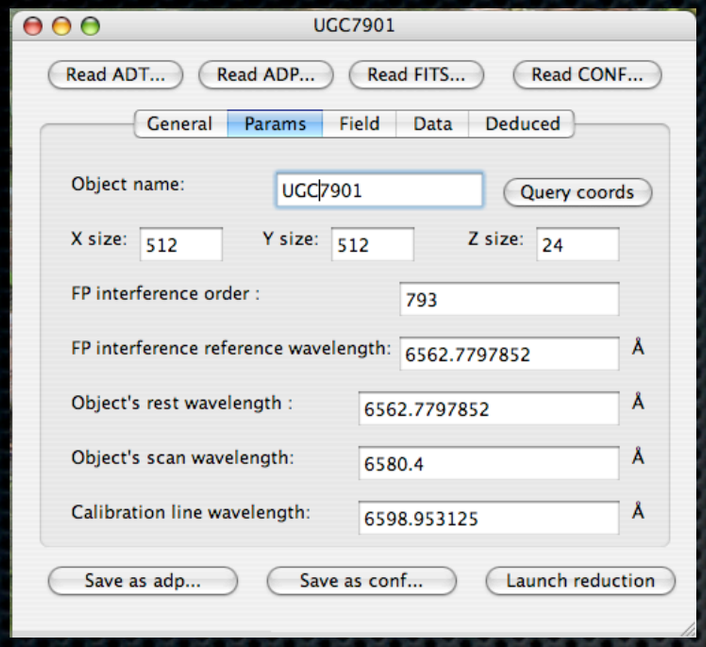
Order	220 to 835	30 to 630

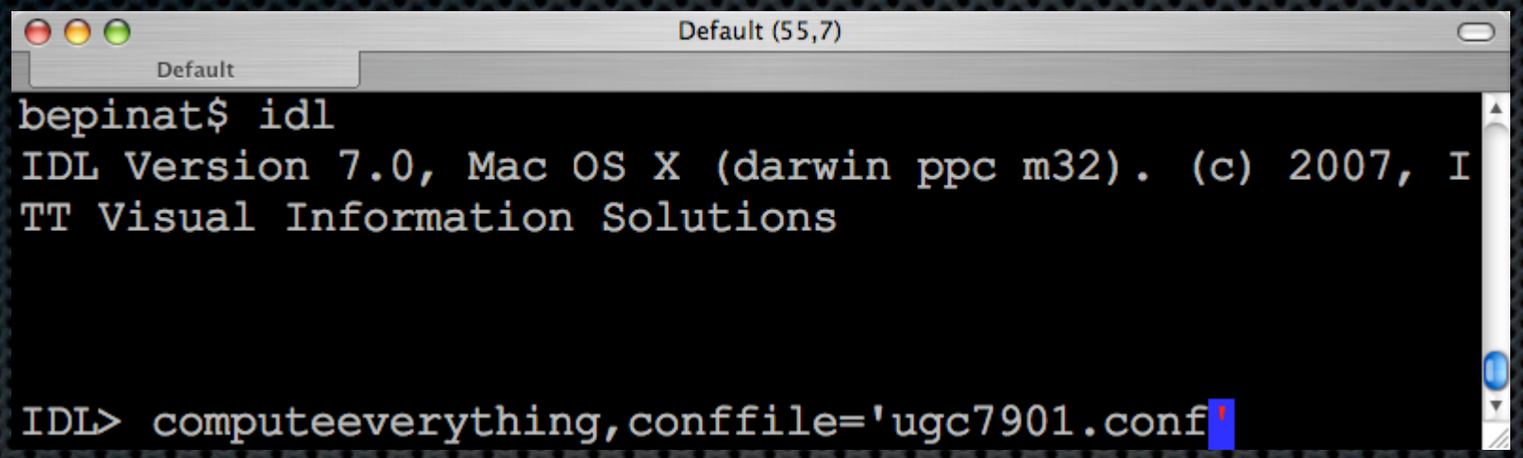
Reduction pipeline

Reduction pipeline

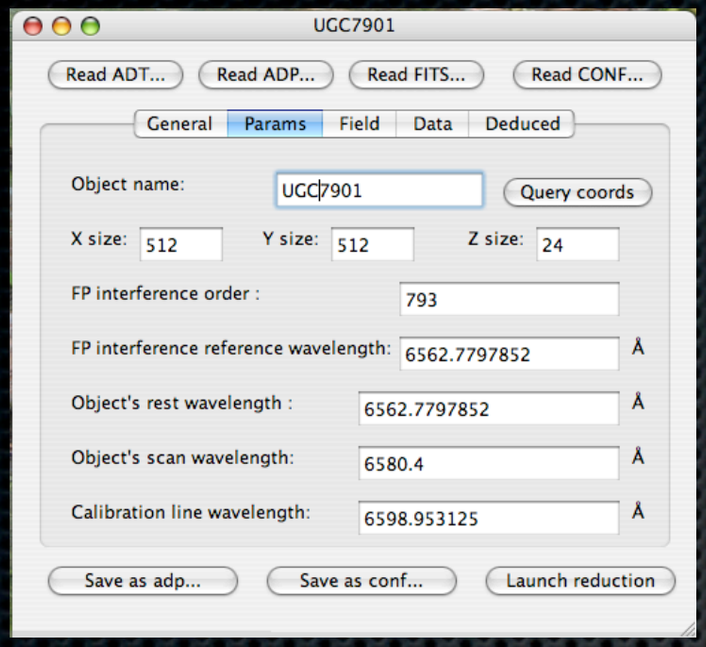


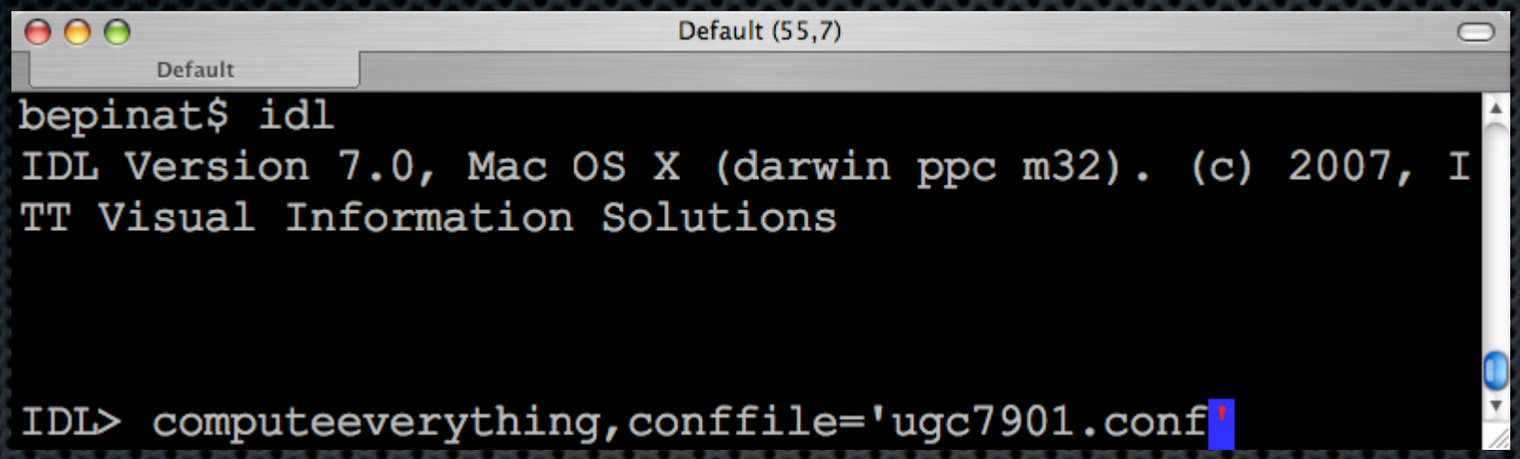
Reduction pipeline

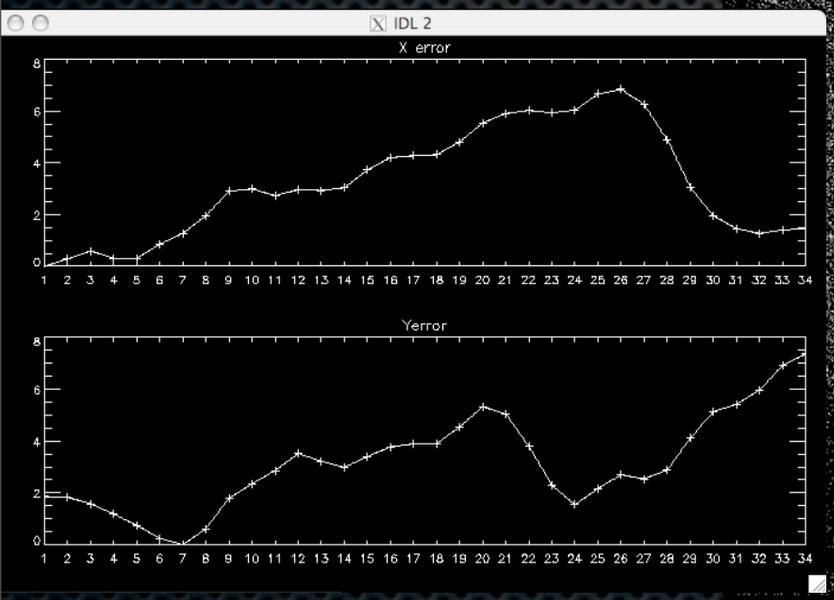


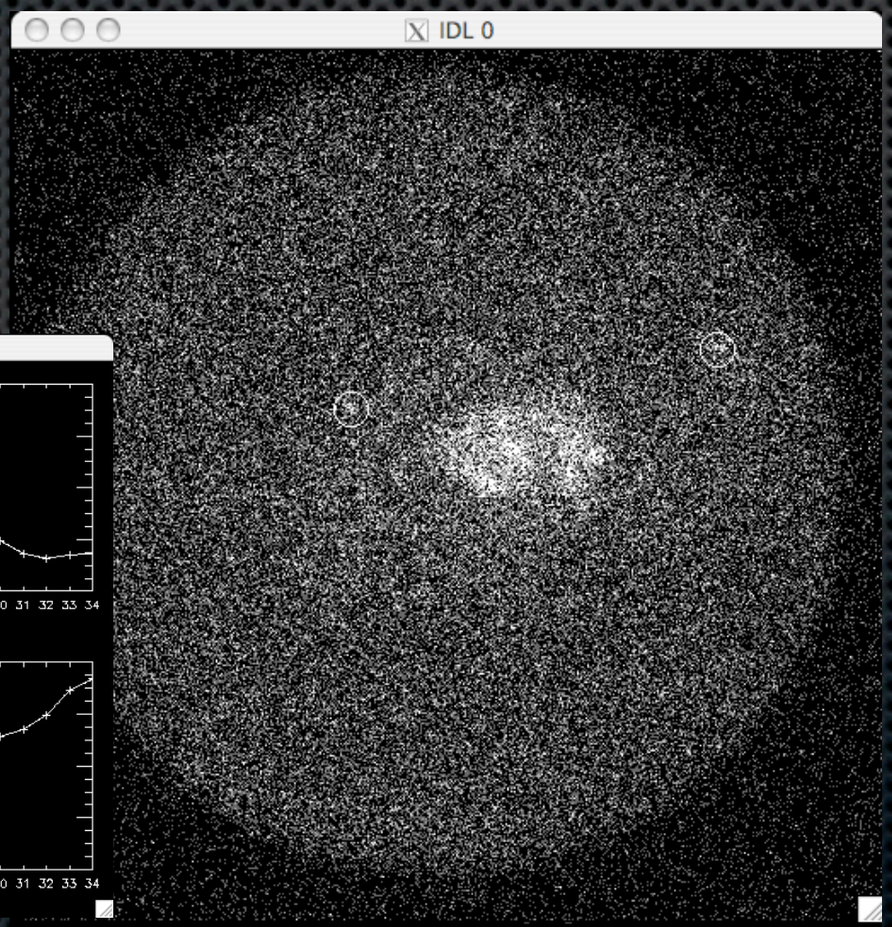


Reduction pipeline

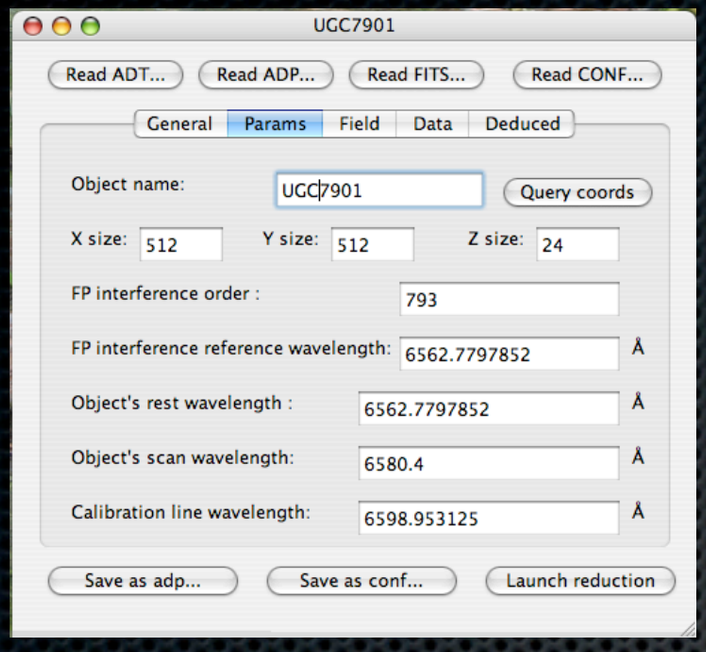


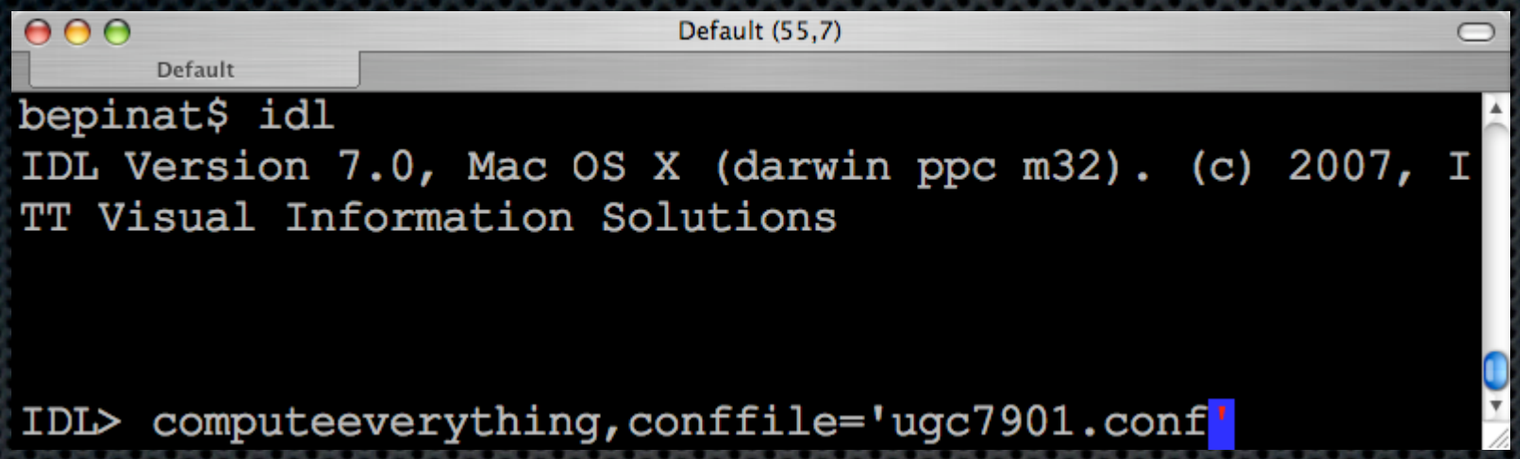


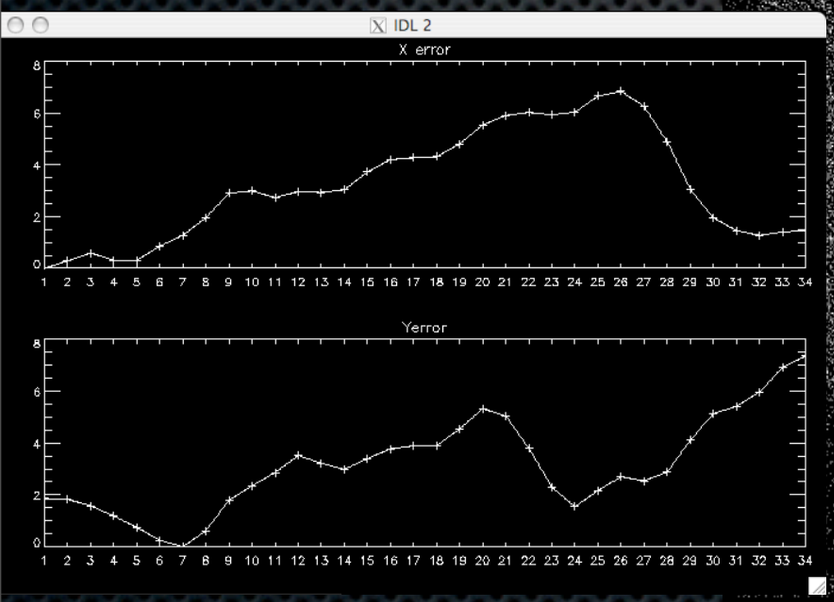


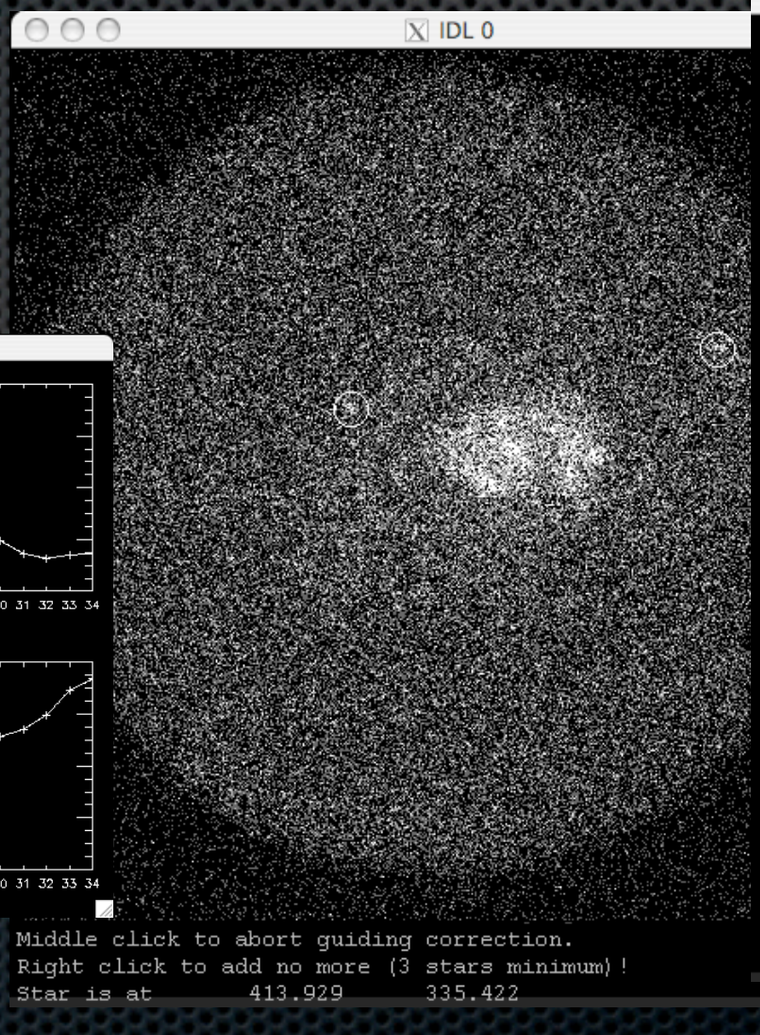


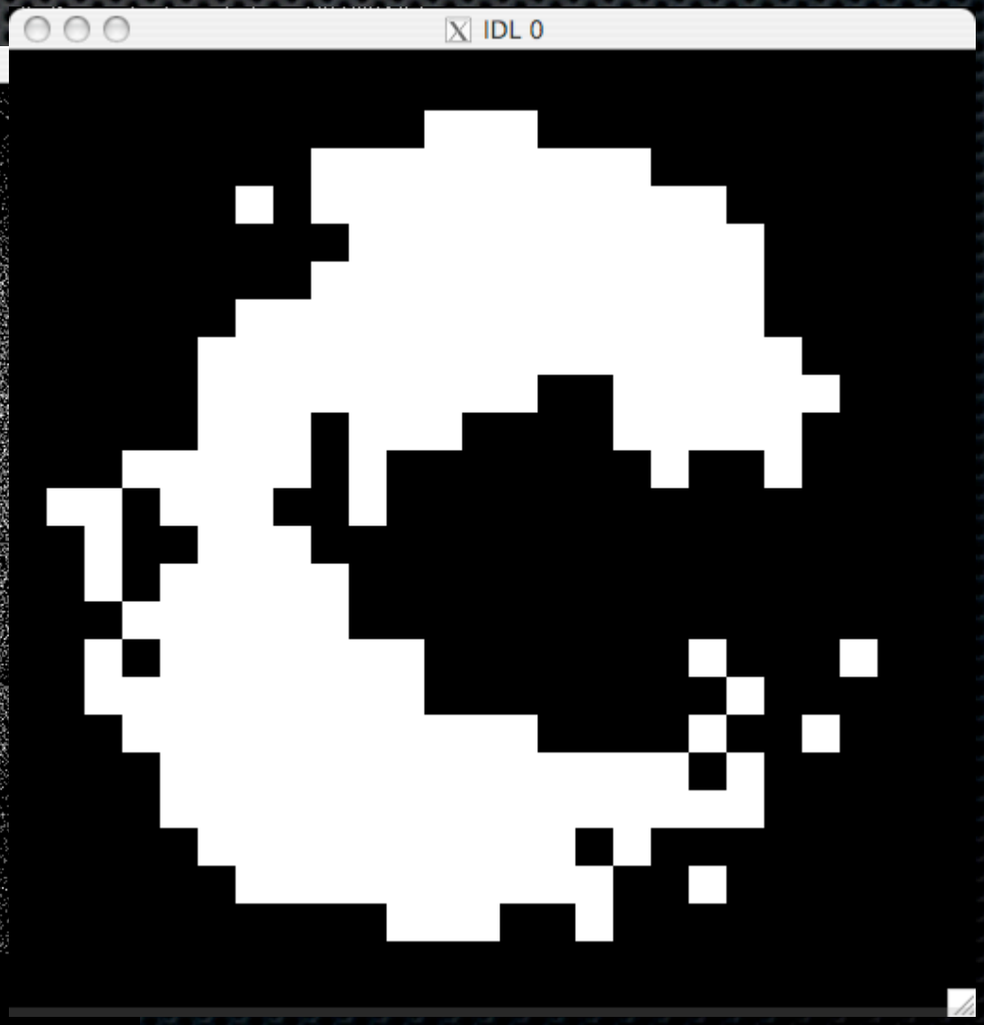
Reduction pipeline



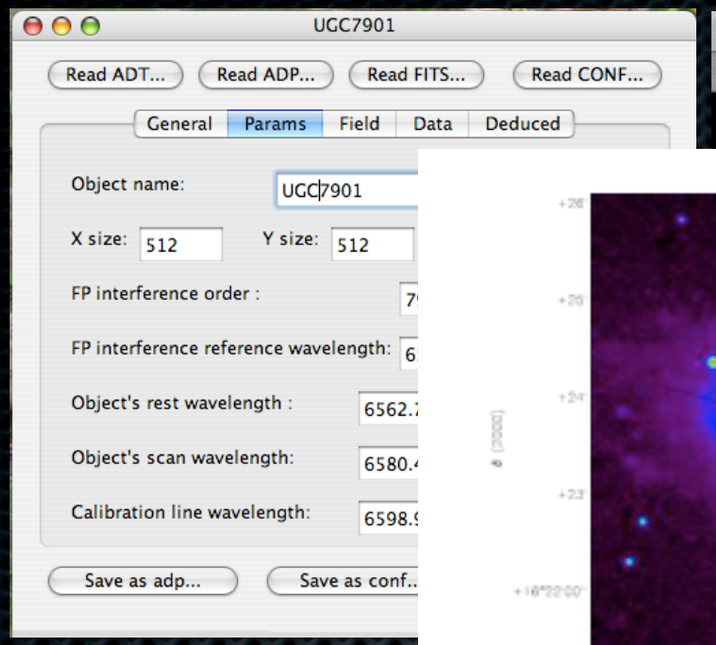


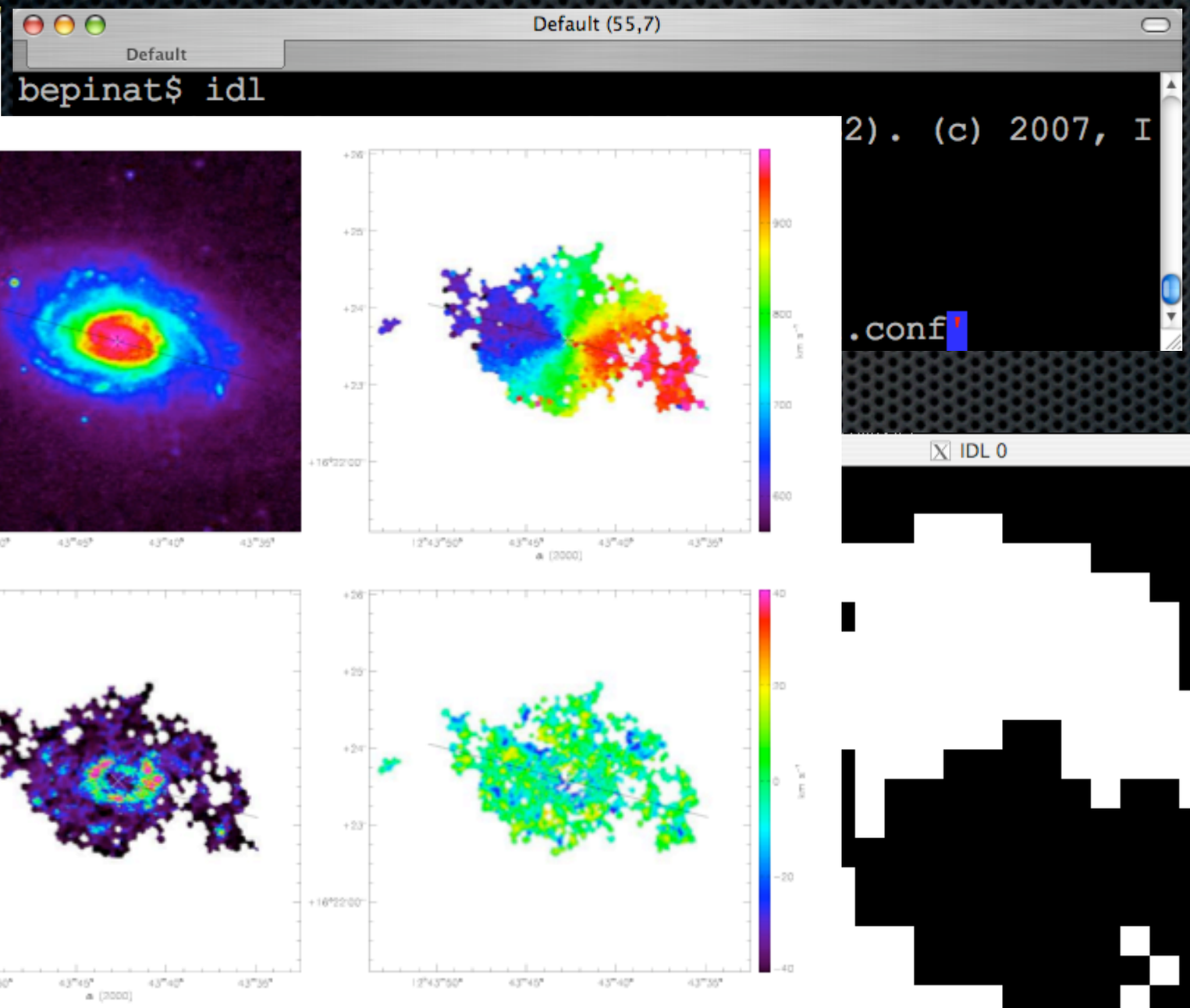


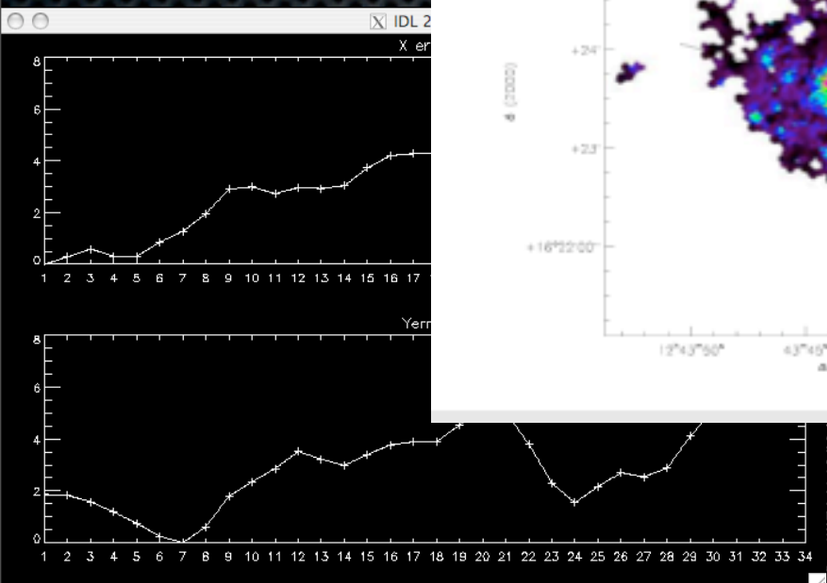




Reduction pipeline







WEB SITE 3D NTT

http://www.astro.umontreal.ca/3DNTT

Optics Meca Automat Filters L3CCD 4kx4k FP

Sep. 2008

Feb 2009

April 2009

Integration @ LAM

June 2009

Shipping

July 2009

Sep. 2009

First light