



**VISION SKY**

# Historique SV

Création en 2004.

Instruments du début



# Évolution 2004 à 2012 Instruments de type dobson



# Le showRoom



# Atelier mécanique et optique 2012



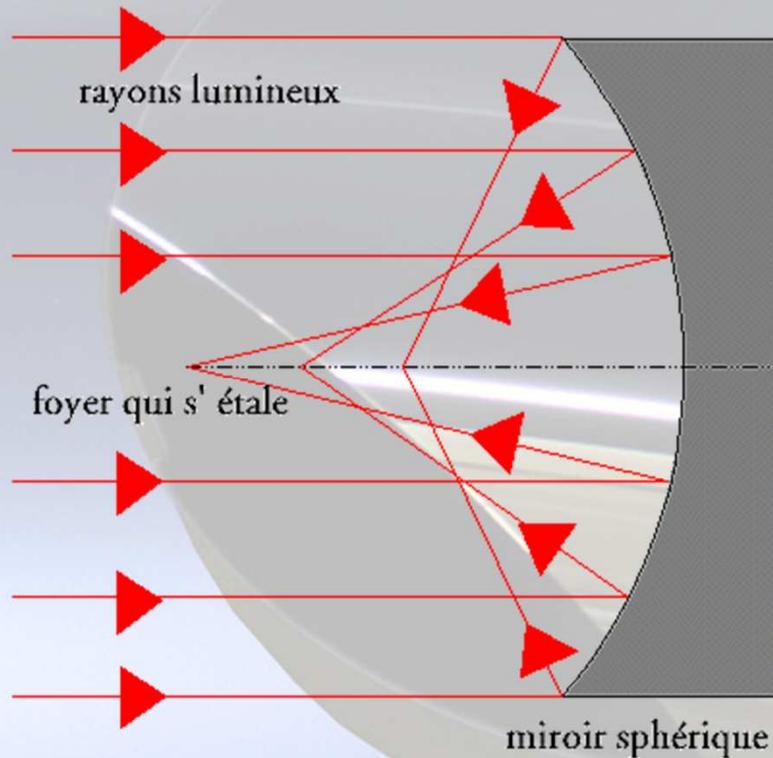
# Atelier mecanique et optique 2019





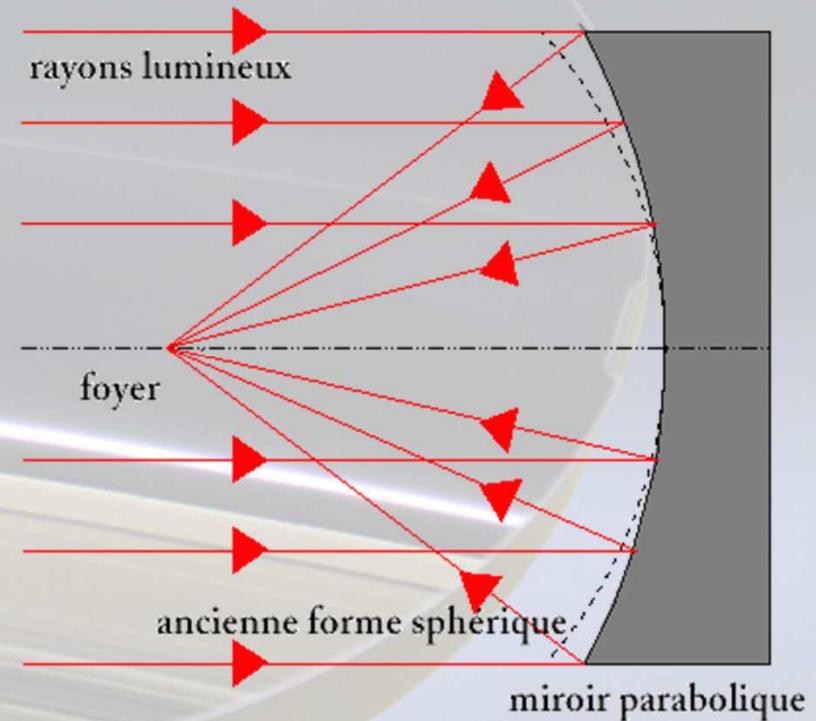
## 1\_Aberration de sphéricité

Cas d' un miroir sphérique

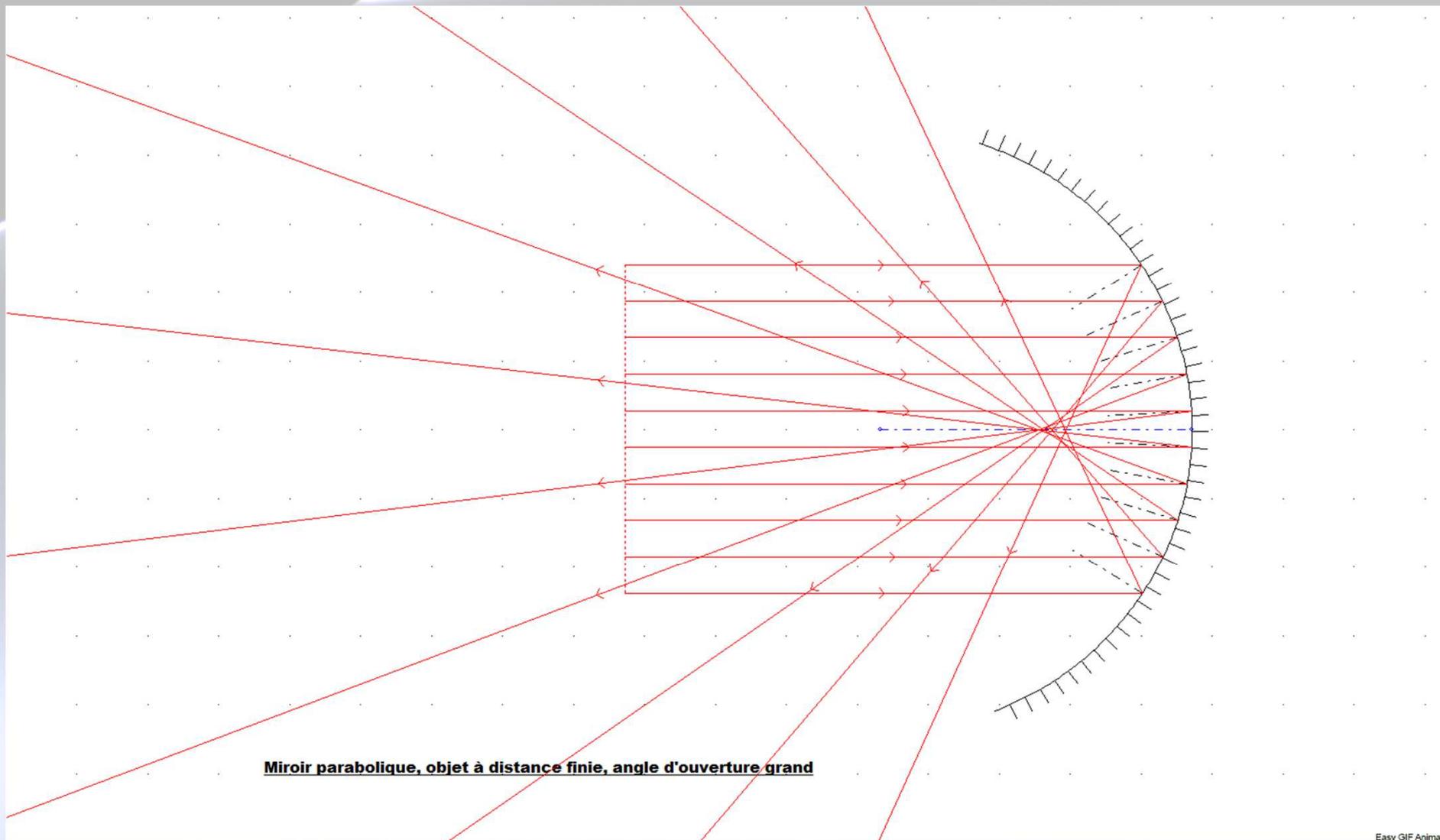


Foyer qui s' étale le long de l' axe optique  
Mise au point impossible

Cas d' un miroir parabolique

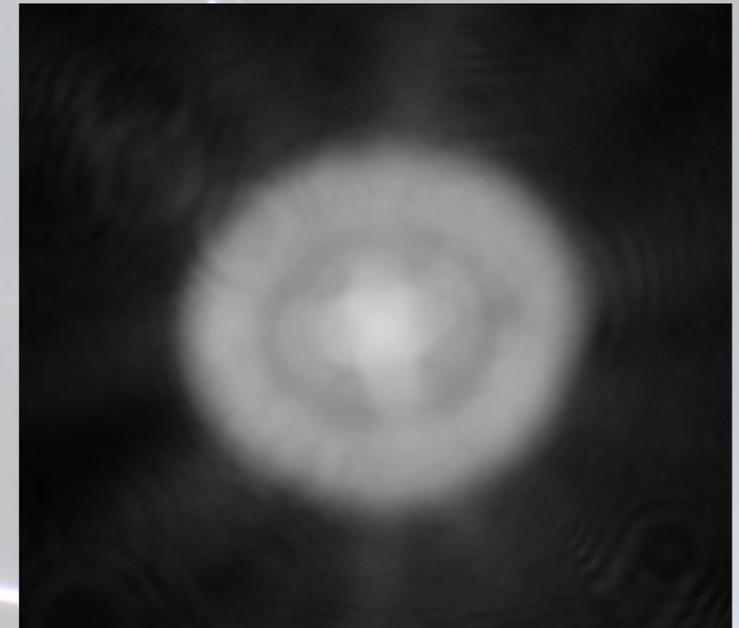
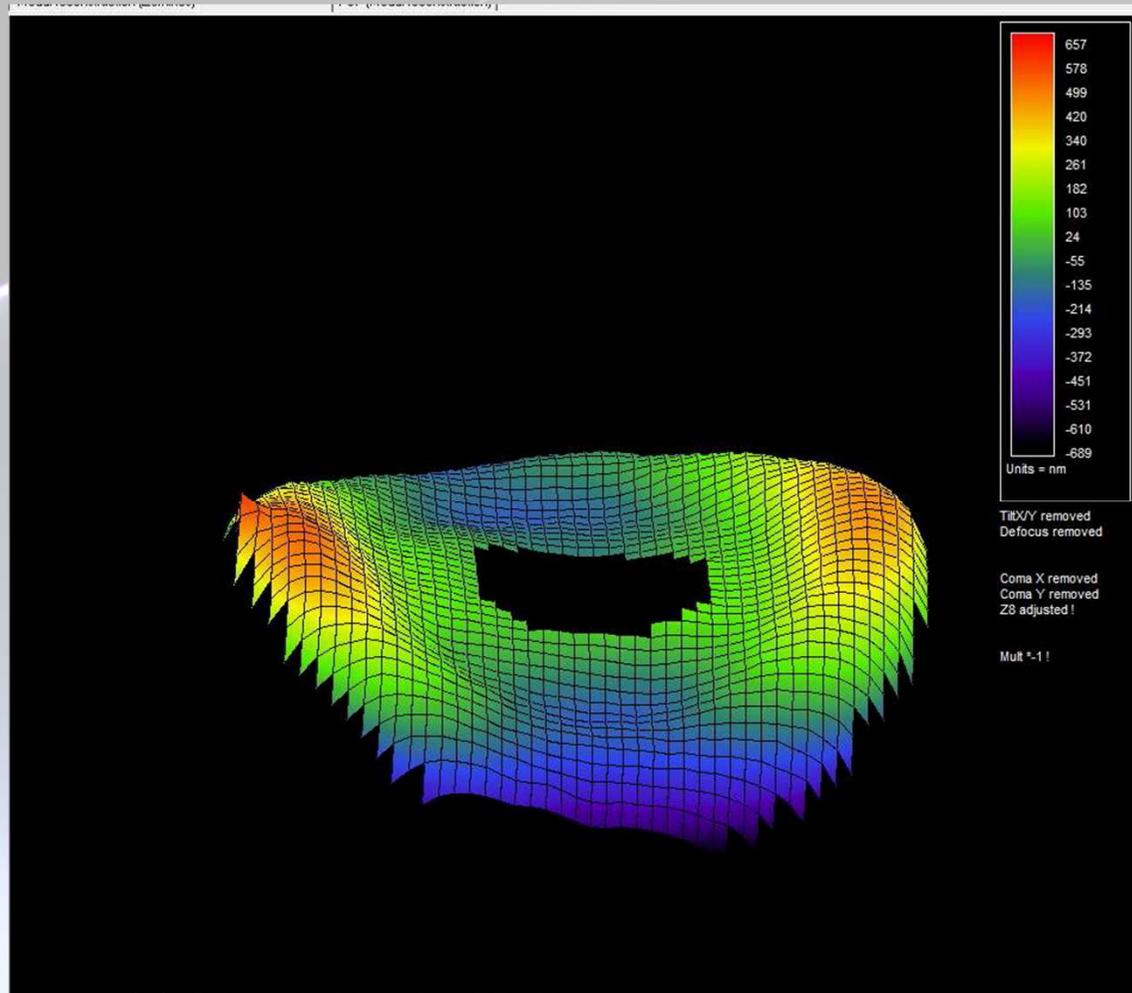


Le miroir a subit une asphérisation, d' autant  
Plus importante que l' ouverture du miroir est  
importante



Easy GIF Animator

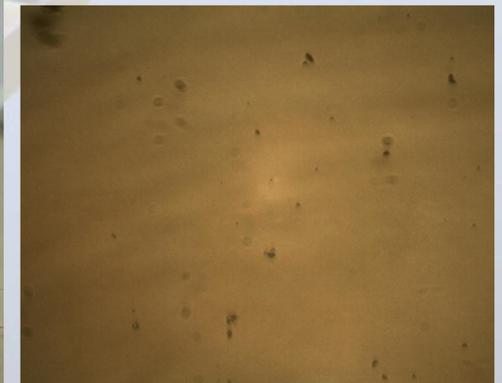
# 2\_Astigmatisme



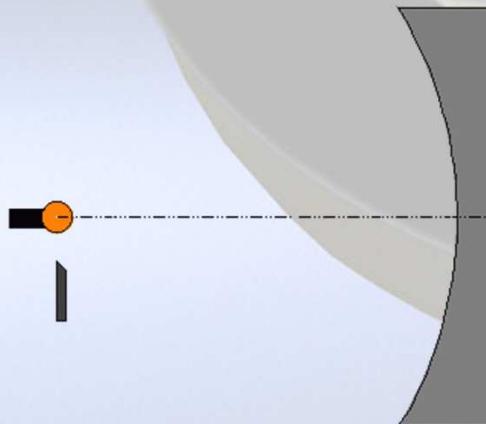
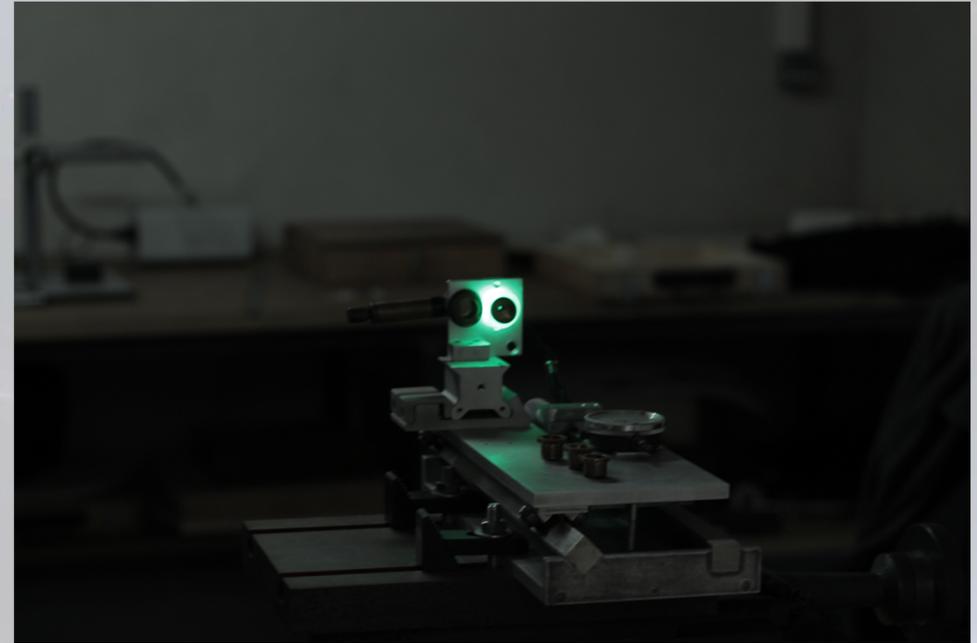
L'astigmatisme peut être une cause de problème, sur l'image ci-dessus, c'est un astigmatisme courant, le miroir est en forme de selle de cheval, et présente deux rayons de courbure différents, l'image en haut à droite, représente le même miroir, avec une étoile artificielle.

# Microscope

Le microscope permet d'aller plus loin que la loupe binoculaire, et permet de savoir si le polissage à été complet, En repérant les derniers petit accidents de surface

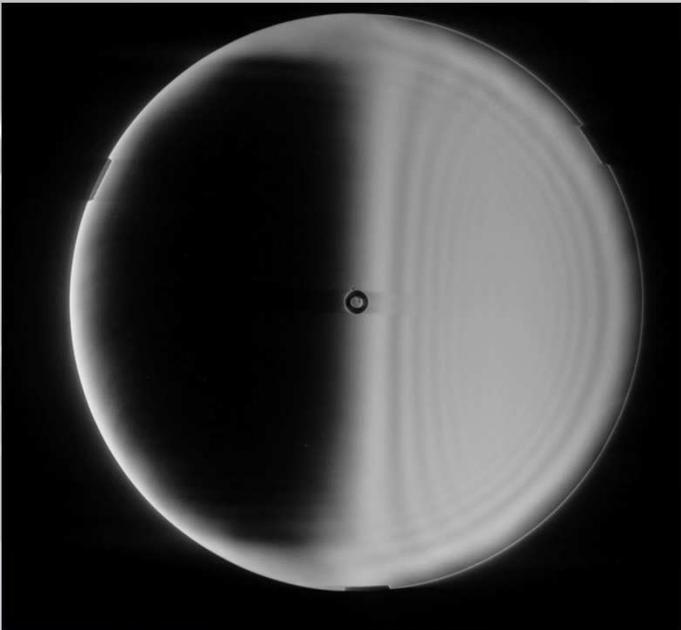
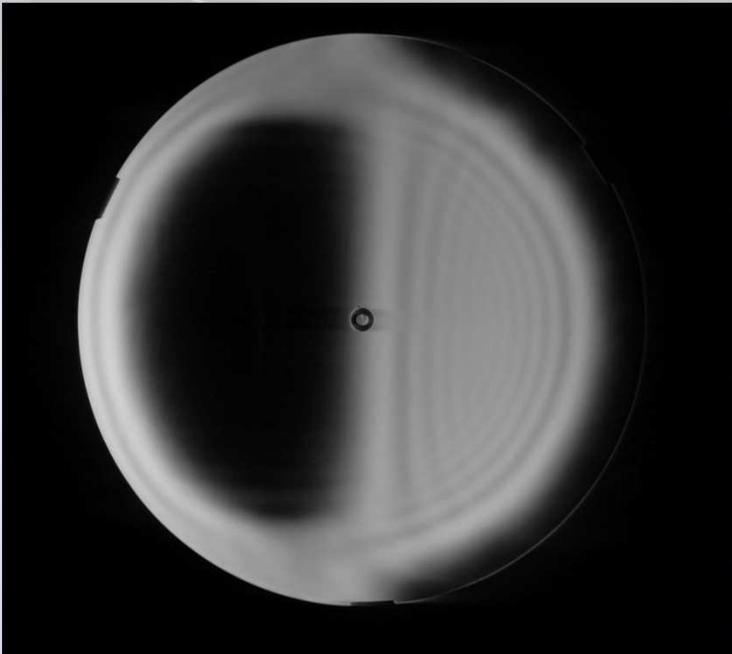
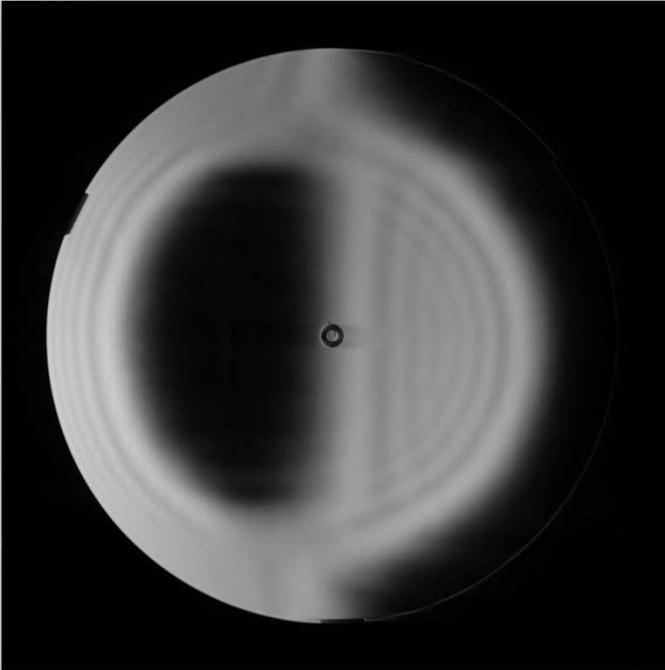
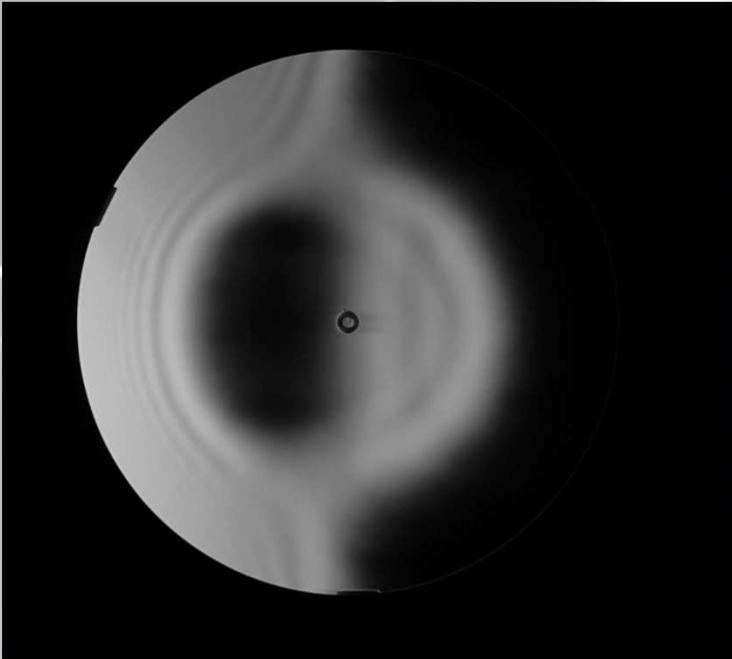


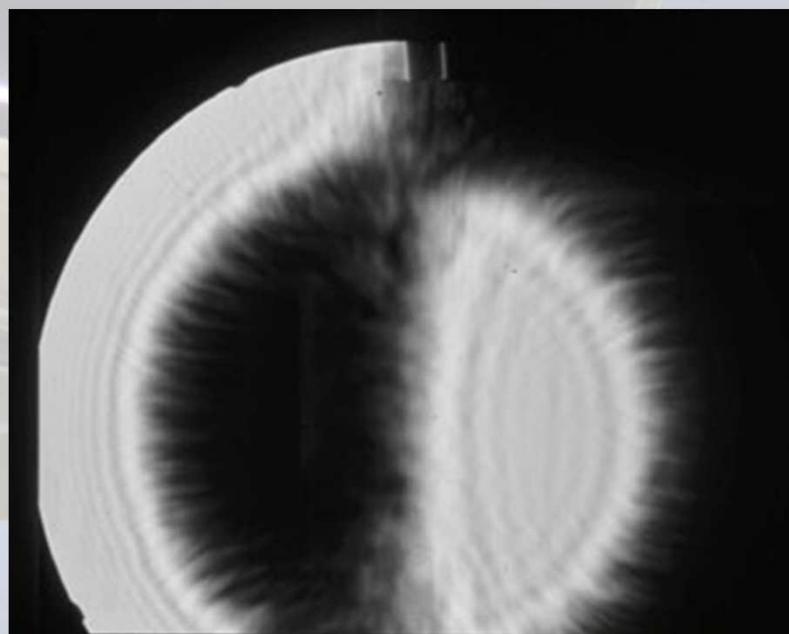
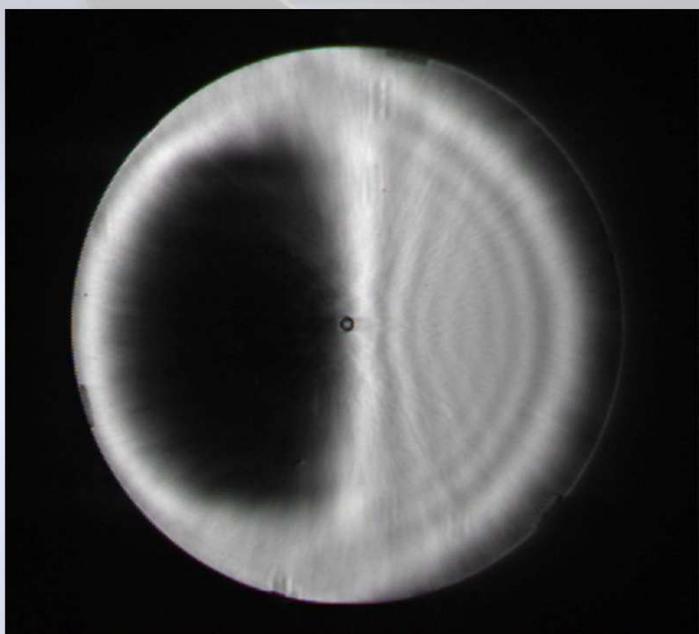
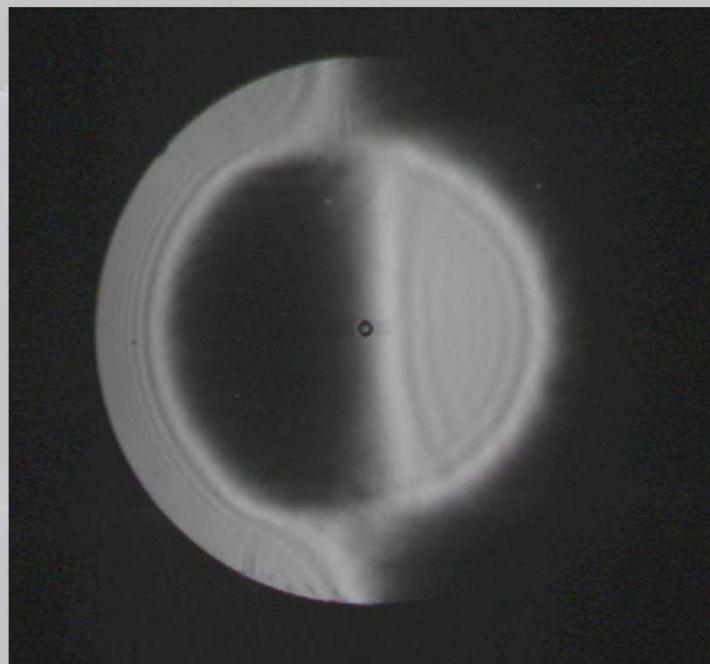
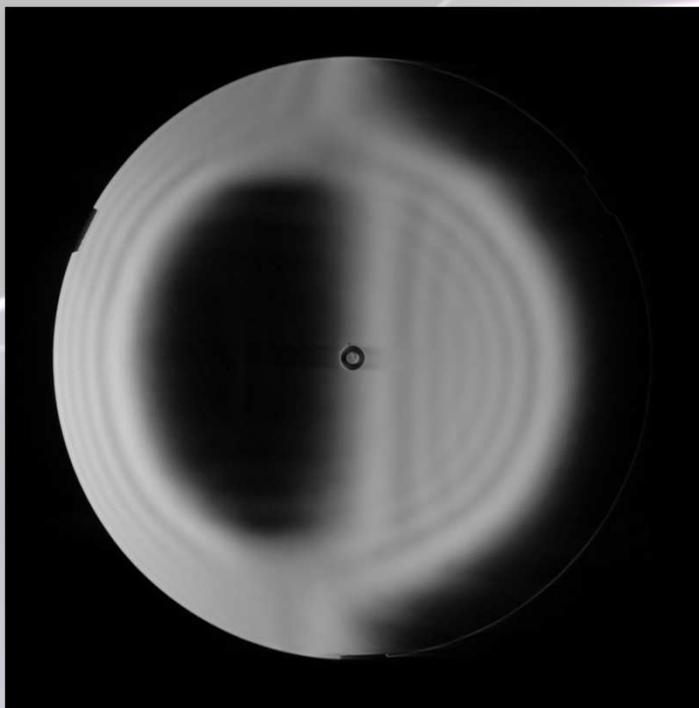
# Appareil de Foucault



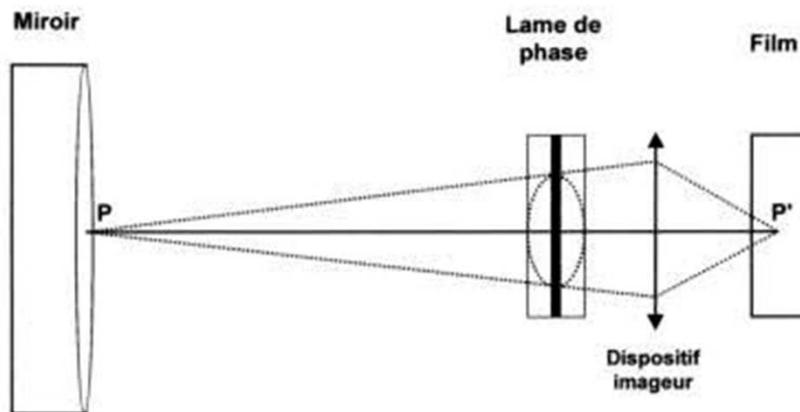
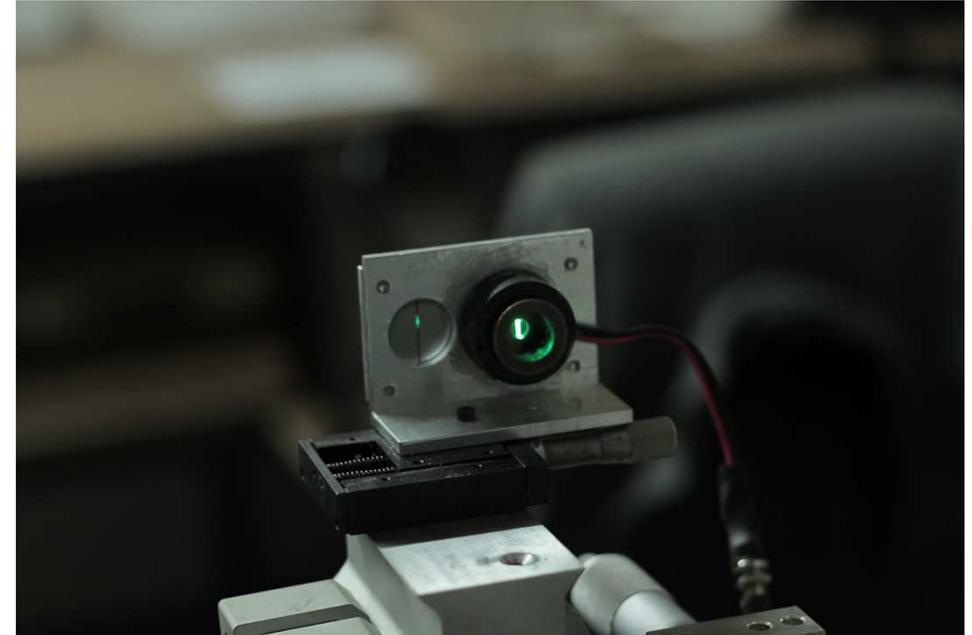
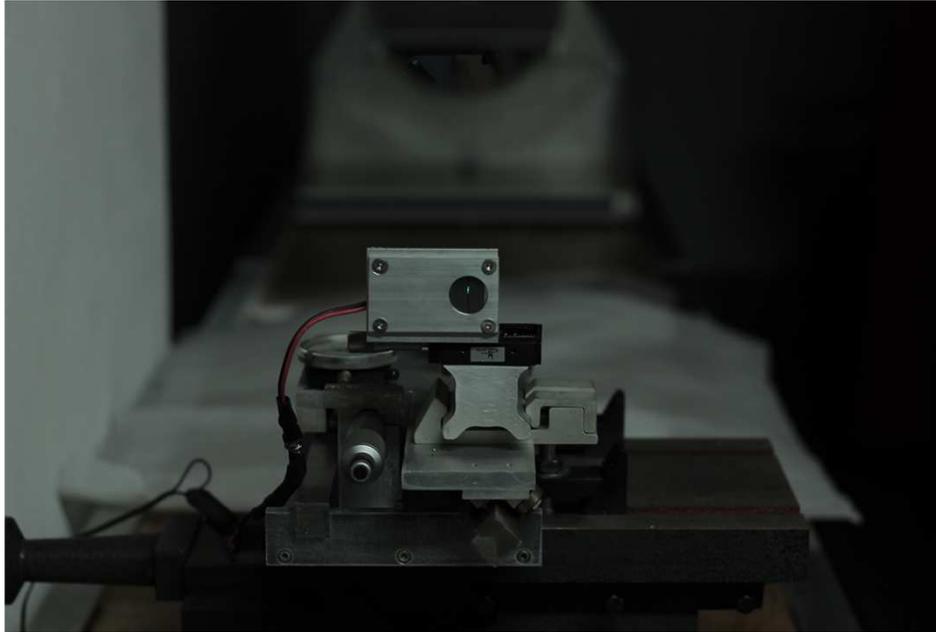
Le traditionnel appareil de Foucault, toujours présent, facile à mettre en œuvre, Donne de visu l' aspect de notre miroir, d' un simple coup d' œil de nombreuses Choses sont visible: la forme d' ensemble, les problème de bord et le Mamellonnage, il permet aussi de mesurer l' aberration longitudinale de notre miroir

Ce que l' on voit au foucault





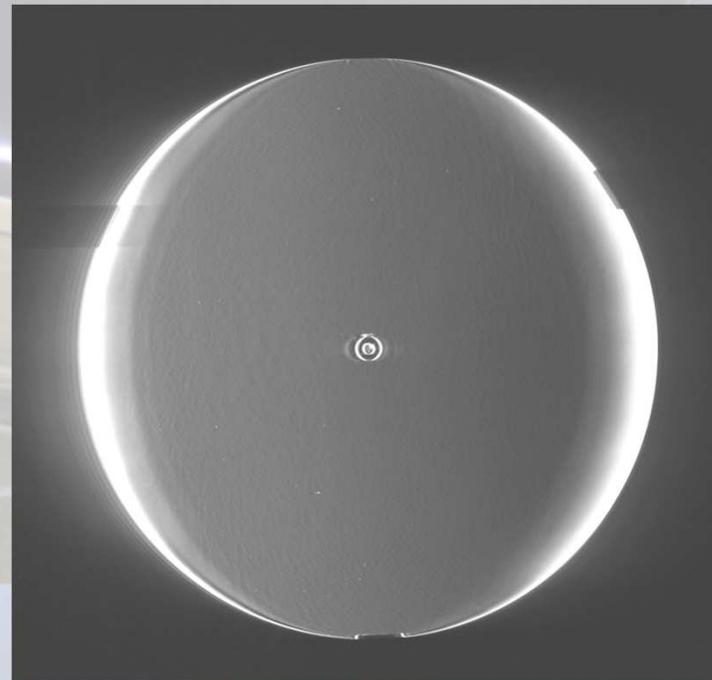
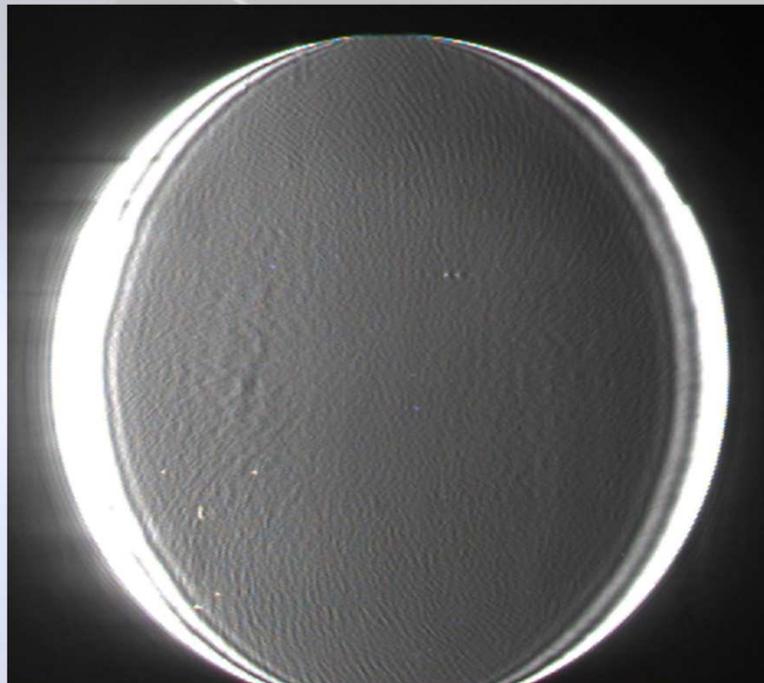
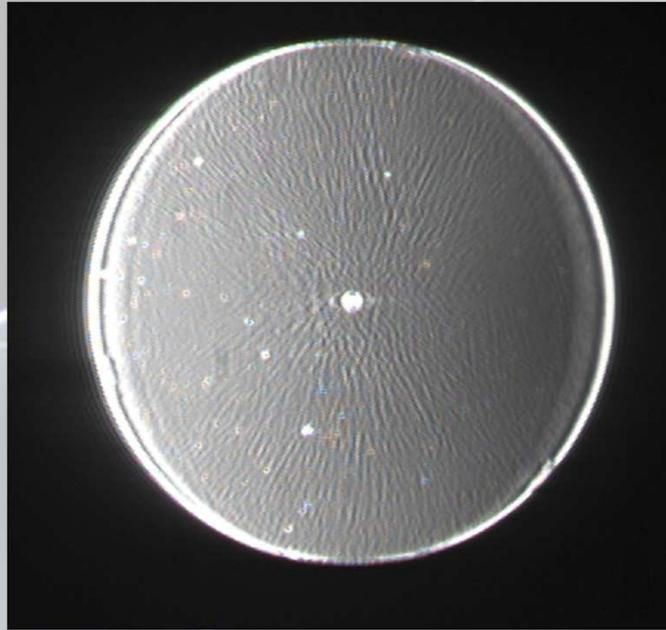
# Contraste de phase



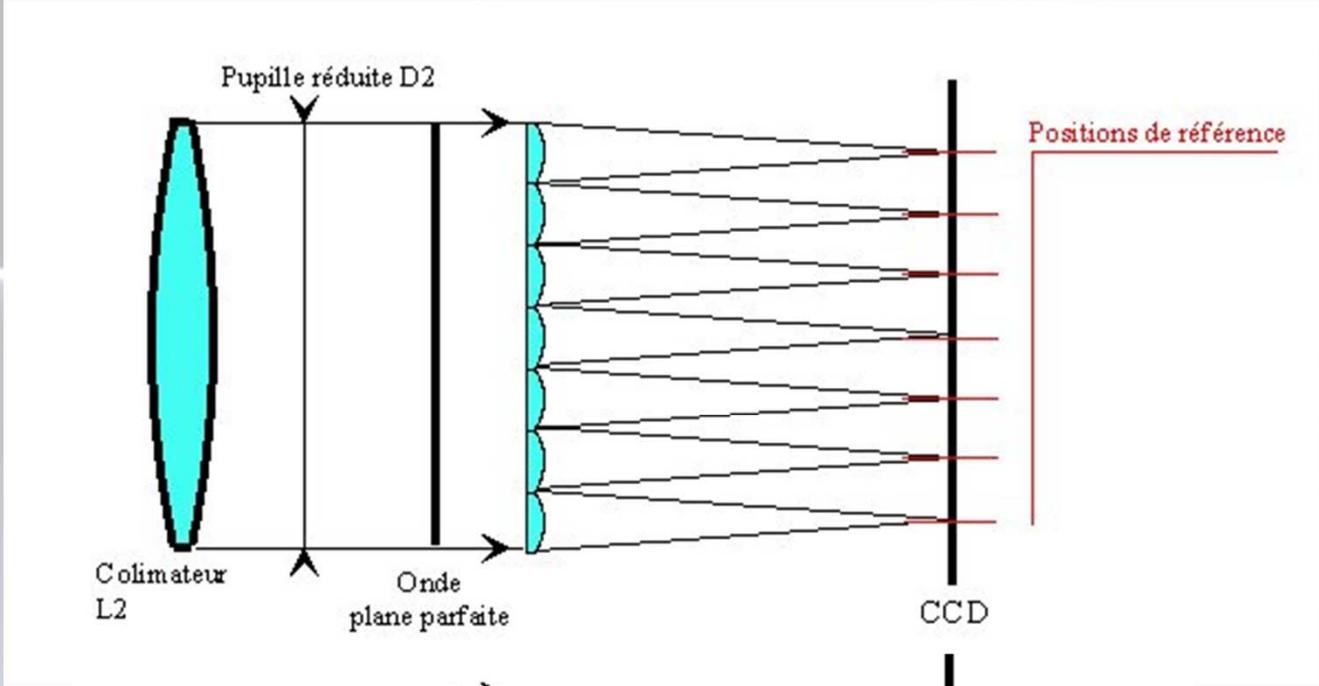
Considérons un point P du miroir (**figure 1**) . L'onde lumineuse issu de celui-ci peut être décomposée en deux : une composante due à la réflexion du miroir (trait gras), une autre due à la diffusion par diffraction sur les défauts du type micromamelonnage (en pointillés). La diffusion s'effectue dans un angle solide relativement important (cône en pointillé) alors que la réflexion s'effectue selon la loi de Descartes. La composante de réflexion a une intensité bien plus importante que celle de la diffusion et est déphasée par rapport à cette dernière de  $\lambda/4$ .

La lame de phase a deux effets sur la composante de réflexion : elle atténue considérablement son intensité de manière à la ramener dans l'ordre de grandeur de l'intensité de la diffusion (quelques millièmes de la composante réfléchie), et elle la déphase de  $\lambda/4$ .

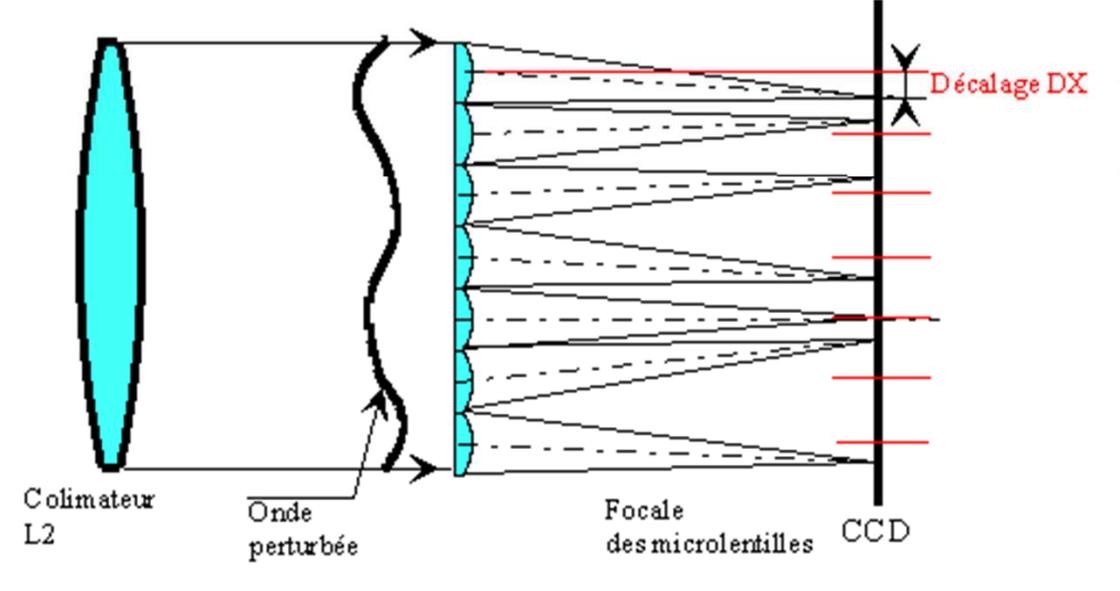
# Ce que l'on voit au contraste de phase



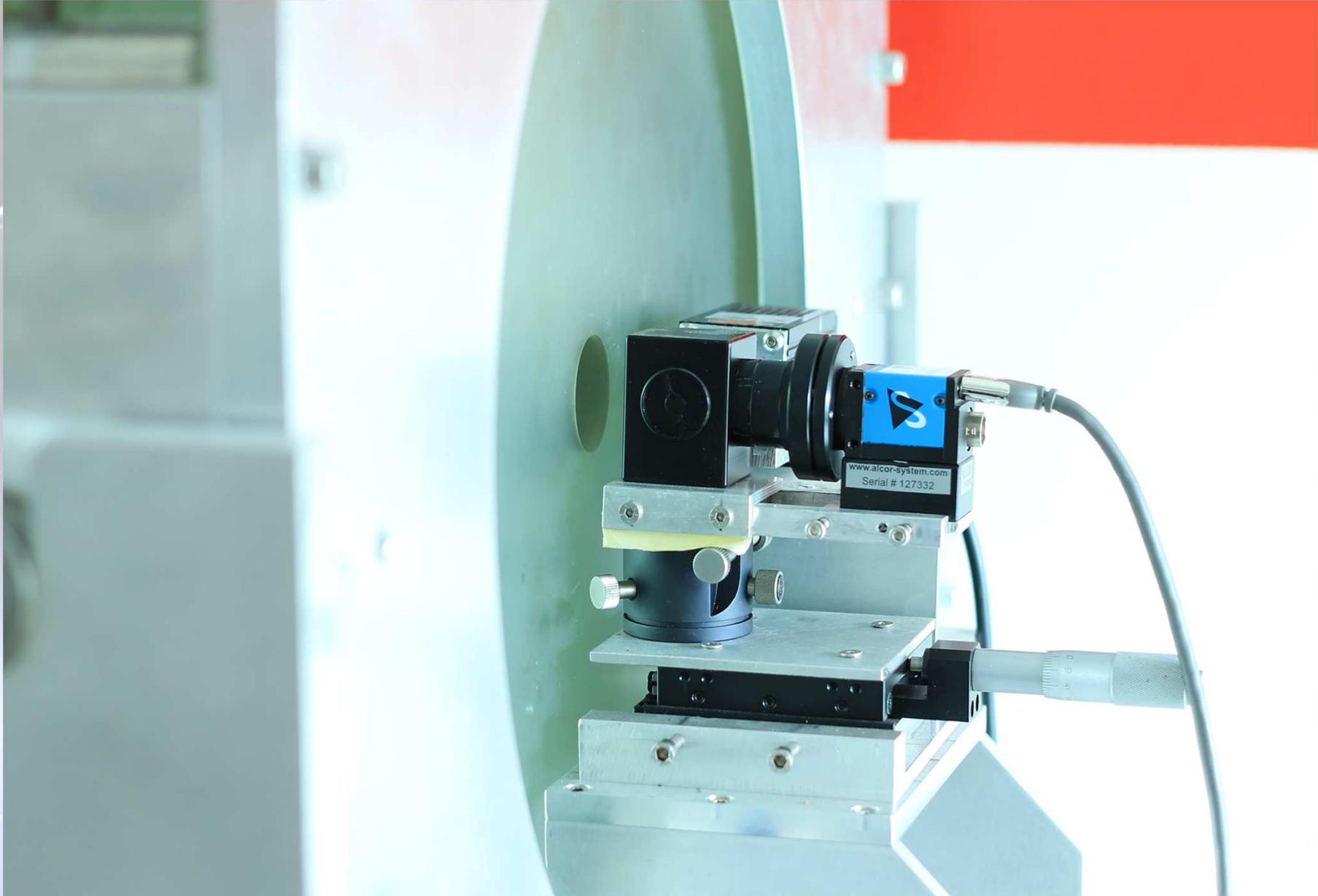
# Principe du shack hartmann

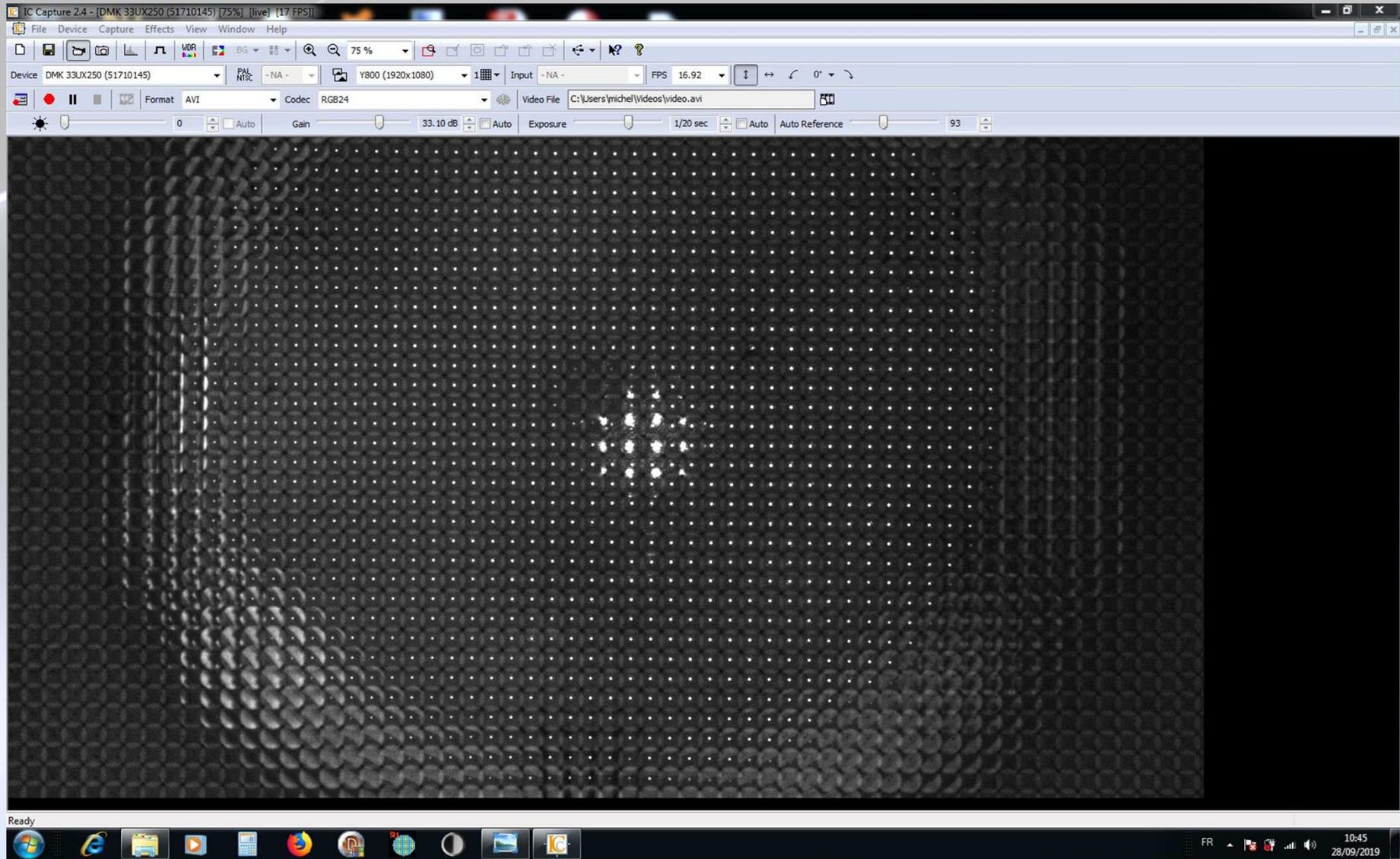


Cas d'un miroir parfait



Cas d'un miroir ayant des défauts





Shack Hartmann Analyser -> Version 2.3.1 build 205, compiled on 23/10/2018 [0.0070 sec 1 exposure(s)]

File Measurements Setup/Camera Generate report Tools Misc.

Capture Analysis properties Display Image acquisition

Reference grid : grille-21-09-2019.dat [27/09/2019]

Pupil parameters

- Center X (pixels) 1052
- Center Y (pixels) 874
- Radius (pixels) 654
- Radius Obsc. 149

Central obscuration : 22.8%

BackGround Box definition

- X left (pixels) 84
- X Right (pixels) 99
- Y Bottom (pixels) 50
- Y Top (pixels) 184

Background box statistics

- Max (ADU) = 1.0
- Mean (ADU) = 0.1
- Noise (ADU) = 0.22

Camera control

- Loop
- No compt.

Acquire image <

Camera Settings

- Exp. (s) 0.007
- Gain 100 Min: 0 - Max: 480
- Cooling none  Enabled
- Temperature : -

- Stack 5 images
- Subtract dark frame Options...
- Correct for hot pixels

All image statistics

Close to saturation [0]

Pupill statistics

- Dynamic OK [0]
- X=2064 Y=4 V=0

XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
XXXXX	XXXXX	XXXXX	XXXXX	XXXXX

28/09/2019 10:39:54.408 [IA5C] : Reading process starting  
 28/09/2019 10:39:54.418 [IA5C] : Image read, type=6  
 28/09/2019 10:39:54.482 [IA5C] : Image display cuts 0 / 6  
 28/09/2019 10:39:54.848 [IA5C] : Min=0.0 Max=1.0 Mean=0.1 Noise=0.221  
 28/09/2019 10:39:54.850 [IA5C] : All wavefront Analysis disabled...  
 28/09/2019 10:39:55.011 [Main] : Image grabed, high cut=6.00 Low cut=0.00 Max=234 at X=1106 Y=759 Min=0 at X=1 Y=1

FR 10:40 28/09/2019

Shack Hartmann Analyser -> Version 2.3.1 build 205, compiled on 23/10/2018 [0.0070 sec 20 exposure(s)]

File Measurements Setup/Camera Generate report Tools Misc.

Capture Analysis properties Display Image acquisition Spots position Modal reconstruction (Zernikes) Zonal reconstruction

Reference grid : grille-21-09-2019.dat (27/09/2019)

**Perform analysis**

Spot detection setup

- Use background box + SNR  
Signal to noise : 6
- Use fixed threshold  
Threshold (ADU) : 100

Centroids

- Barycentric (0.80% brightest pixels)
- Enhanced (slower)

Cancel removed spots

Computations...

- No wavefront computations
- Wavefront comp. (Zonal)
- Wavefront comp. (Modal)
- Wavefront comp. (Modal+Zonal)

Zonal reconstructor algorithm

- 1 : Jacobi (slowest)
- 2 : Gauss-Siedel
- 3 : Succ. Over Relaxation (SOR)
- 4 : jacobi + SDR (fastest)

PSF Modal computation

- Do not compute PSF & MTF
- Do compute PSF & MTF

No X and Y tilt (Z1+; Z2)  
 No Defocus (Z3)  
 No Coma X (Z6)  
 No Coma Y (Z7)  
 No Astig +45° (Z4)  
 No Astig -45° (Z5)  
 No Spheric. 3rd (Z8)  
 No Trefoil X (Z9)  
 No Trefoil Y (Z10)

Dis. All Enable All Enable Prac.

Spots intensity map

- No Intensity map
- Intensity map

Save results to files

- Save result files as text and images capture
- Save image as FITS file

Go to result folder

2853  
Ø 4.51 mm  
Z3 = -367.5 nm, R = 34000.0 mm

```

28/09/2019 10:48:26.500 [Main] : WaveFront map subtraction (Zernike #19) : 24.3 nm
28/09/2019 10:48:26.502 [Main] : WaveFront map subtraction (Zernike #20) : 54.2 nm
28/09/2019 10:48:26.503 [Main] : WaveFront map subtraction (Zernike #21) : -32.2 nm
28/09/2019 10:48:26.505 [Main] : WaveFront map subtraction (Zernike #22) : -7.8 nm
28/09/2019 10:48:26.506 [Main] : WaveFront map subtraction (Zernike #23) : -12.2 nm
28/09/2019 10:48:29.957 [Main] : All computations completed
  
```

FR 10:49 28/09/2019

Shack Hartmann Analyser -> Version 2.3.1 build 205, compiled on 23/10/2018 [0.0070 sec 20 exposure(s)]

File Measurements Setup/Camera Generate report Tools Misc.

Capture Analysis properties Display

Perform analysis

- Spot detection setup
- Use background box + SNR  
Signal to noise :
  - Use fixed threshold  
Threshold (ADU) :

- Centroids
- Barycentric (0.80% brightest pixels)
  - Enhanced (slower)

Cancel removed spots

- Computations..
- No wavefront computations
  - Wavefront comp. (Zonal)
  - Wavefront comp. (Modal)
  - Wavefront comp. (Modal+Zonal)

- Zonal reconstructor algorithm
- 1 : Jacobi (slowest)
  - 2 : Gauss-Siedel
  - 3 : Succ. Over Relaxation (SOR)
  - 4 : jacobi + SOR (fastest)

- PSF Modal computation
- Do not compute PSF & MTF
  - Do compute PSF & MTF

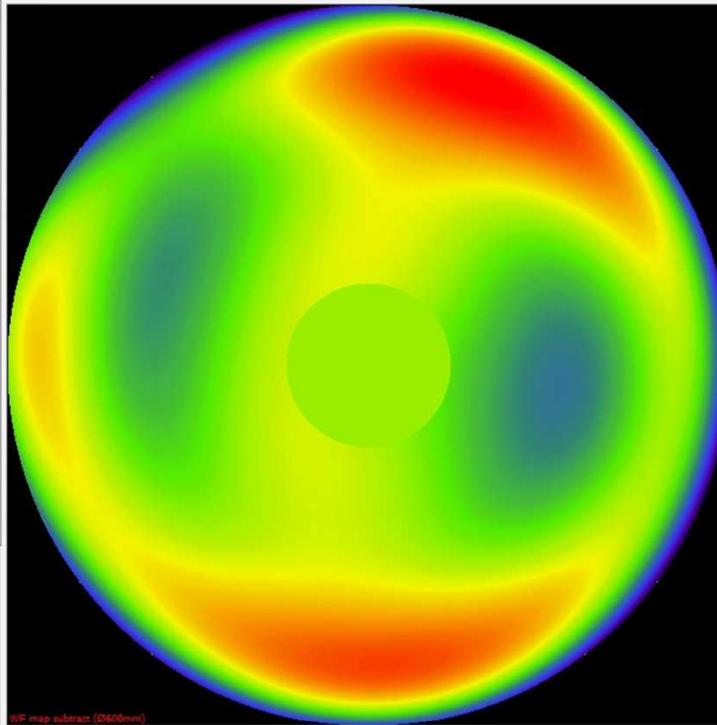
- No X and Y tilt (Z1+)
- No Defocus (Z3)
- No Coma X (Z6)
- No Coma Y (Z7)
- No Astig +45° (Z4)
- No Astig -45° (Z5)
- No Spheric. 3rd (Z8)
- No Trefoil X (Z9)
- No Trefoil Y (Z10)

Dis. All Enable All Enable Prac.

- Spots intensity map
- No Intensity map
  - Intensity map

- Save results to files
- Save result files as text and images capture
  - Save image as FITS file
- Go to result folder

Image acquisition	Spots position	Modal reconstruction (Zernikes)	Zonal reconstruction
Annular Zernike (0.2)	nm		
Z1 (Tilt X)	201.9 (set to zero)		
Z2 (Tilt Y)	-3568.8 (set to zero)		
Z3 (Defocus)	366.8 (set to zero)		
Z4 (Astigmatism +45°)	-58.1		
Z5 (Astigmatism -45°)	63.9		
Z6 (Coma X)	105.1 (set to zero)		
Z7 (Coma Y)	-36.6 (set to zero)		
Z8 (3rd spherical)	-61.4 [Z8 corrected]		
Z9 (Trefoil X)	69.0		
Z10 (Trefoil Y)	11.6		
Z11 (5th astigmatism +7.45°)	20.4		
Z12 (5th astigmatism 0-90°)	-89.6		
Z13 (Tetrafoil 1)	-21.8		
Z14 (Tetrafoil 2)	28.7		
Z15 (5th Trefoil x-axis)	2.6		
Z16 (5th Trefoil y-axis)	16.7		
Z17 (5th Coma x-axis)	-52.3		
Z18 (5th Coma y-axis)	-14.3		
Z19 (5th spherical)	-99.6		
Z25 (7th spherical)	-22.9		
Z36 (9th spherical)	7.4		
Z26 (Quadrafoil 1)	-3.9		
Z27 (Quadrafoil 2)	5.2		



All units in nm

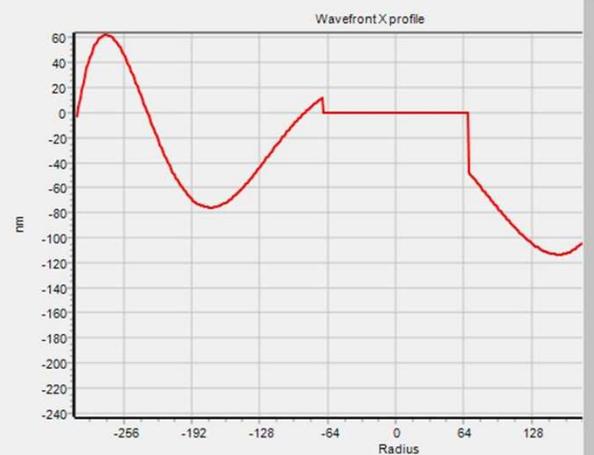
Min	-292.5	Rms	73.0
Max	183.3	Peak-P	475.8
Coma	124.1	Astig.	103.6

FIT error (as pixel per spot) **0.414** More

All units in Lambda / X

Peak to Peak	1.1
Rms	7.3

Compute



28/09/2019 10:48:26.700 (Main) : Wavefront map subtraction (Zernike #16) : 24.3 nm  
 28/09/2019 10:48:26.500 (Main) : Wavefront map subtraction (Zernike #19) : 24.3 nm  
 28/09/2019 10:48:26.502 (Main) : Wavefront map subtraction (Zernike #20) : 54.2 nm  
 28/09/2019 10:48:26.503 (Main) : Wavefront map subtraction (Zernike #21) : -32.2 nm  
 28/09/2019 10:48:26.505 (Main) : Wavefront map subtraction (Zernike #22) : -7.8 nm  
 28/09/2019 10:48:26.506 (Main) : Wavefront map subtraction (Zernike #23) : -12.2 nm  
 28/09/2019 10:48:29.957 (Main) : All computations completed

Shack Hartmann Analyser -> Version 2.3.1 build 205, compiled on 23/10/2018 [0.0010 sec 50 exposure(s)]

File Measurements Setup/Camera Generate report Tools Misc.

Capture Analysis properties Display Image acquisition Spots position Modal reconstruction [Zernikes] Zonal reconstruction PSF (From Modal reconstruction) MTF (From Modal reconstruction)

**Perform analysis**

Spot detection setup

Use background box + SNR  
Signal to noise : 6

Use fixed threshold  
Threshold (ADU) : 100

Centroids

Baycentric (1.0% brightest pixels)

Enhanced (slower)

Cancel removed spots

Computations...

No wavefront computations

Wavefront comp. (Zonal)

Wavefront comp. (Modal)

Wavefront comp. (Modal+Zonal)

Zonal reconstructor algorithm

1 : Jacobi (slowest)

2 : Gauss-Siedel

3 : Succ. Over Relaxation (SOR)

4 : jacobi + SOR (fastest)

PSF Modal computation

Do not compute PSF & MTF

Do compute PSF & MTF

No X and Y tilt (Z1+)

No Defocus (Z3)

No Coma X (Z6)

No Coma Y (Z7)

No Astig +45° (Z4)

No Astig -45° (Z5)

No Spheric. 3rd (Z8)

No Trefoil X (Z9)

No Trefoil Y (Z10)

Dis: All Enable All Enable Prac.

Spots intensity map

No Intensity map

Intensity map

Save results to files

Save result files as text and images capture

Save image as FITS file

Go to result folder

Annular Zernike (0.2)	nm
Z1 (Tilt X)	-3754.5 (set to zero)
Z2 (Tilt Y)	313.6 (set to zero)
Z3 (Defocus)	194.5 (set to zero)
Z4 (Astigmatism +45°)	33.6
Z5 (Astigmatism -45°)	-48.6
Z6 (Coma X)	68.0 (set to zero)
Z7 (Coma Y)	111.9 (set to zero)
Z8 (3rd spherical)	-19.9 [Z8 corrected]
Z9 (Trefoil X)	28.8
Z10 (Trefoil Y)	-9.6
Z11 (5th astigmatism +/-45°)	-11.9
Z12 (5th astigmatism 0-90°)	-21.3
Z13 (Tetrafoil 1)	-7.2
Z14 (Tetrafoil 2)	51.3
Z15 (5th Trefoil x-axis)	-9.8
Z16 (5th Trefoil y-axis)	3.6
Z17 (5th Coma x-axis)	-0.8
Z18 (5th Coma y-axis)	-5.1
Z19 (5th spherical)	-8.4
Z25 (7th spherical)	20.9
Z36 (9th spherical)	-21.1
Z26 (Quadrafoil 1)	-10.7
Z27 (Quadrafoil 2)	7.6

All units in nm

Min: -117.3 Rms: 35.1

Max: 112.5 Peak-P: 229.8

Coma: 137.5 Astig: 59.5

FIT error (as pixel per spot): 0.303 More

All units in Lambda / X

Peak to Peak: 2.3

Rms: 15.2

Wavefront curvature radius : -5609.694 mm (f=-0.46 μm r=2273.6 μm)

24/01/2019 09:37:53.216 [Main]: Wavefront map subtraction [Zernike #20]: -32.0 nm

24/01/2019 09:37:53.216 [Main]: Wavefront map subtraction [Zernike #21]: -5.3 nm

24/01/2019 09:37:53.217 [Main]: Wavefront map subtraction [Zernike #22]: -3.1 nm

24/01/2019 09:37:53.217 [Main]: Wavefront map subtraction [Zernike #23]: -4.9 nm

24/01/2019 09:37:56.492 [Main]: PSF start...

24/01/2019 09:38:00.142 [Main]: PSF computed -> OK!

24/01/2019 09:38:00.185 [Main]: All computations completed

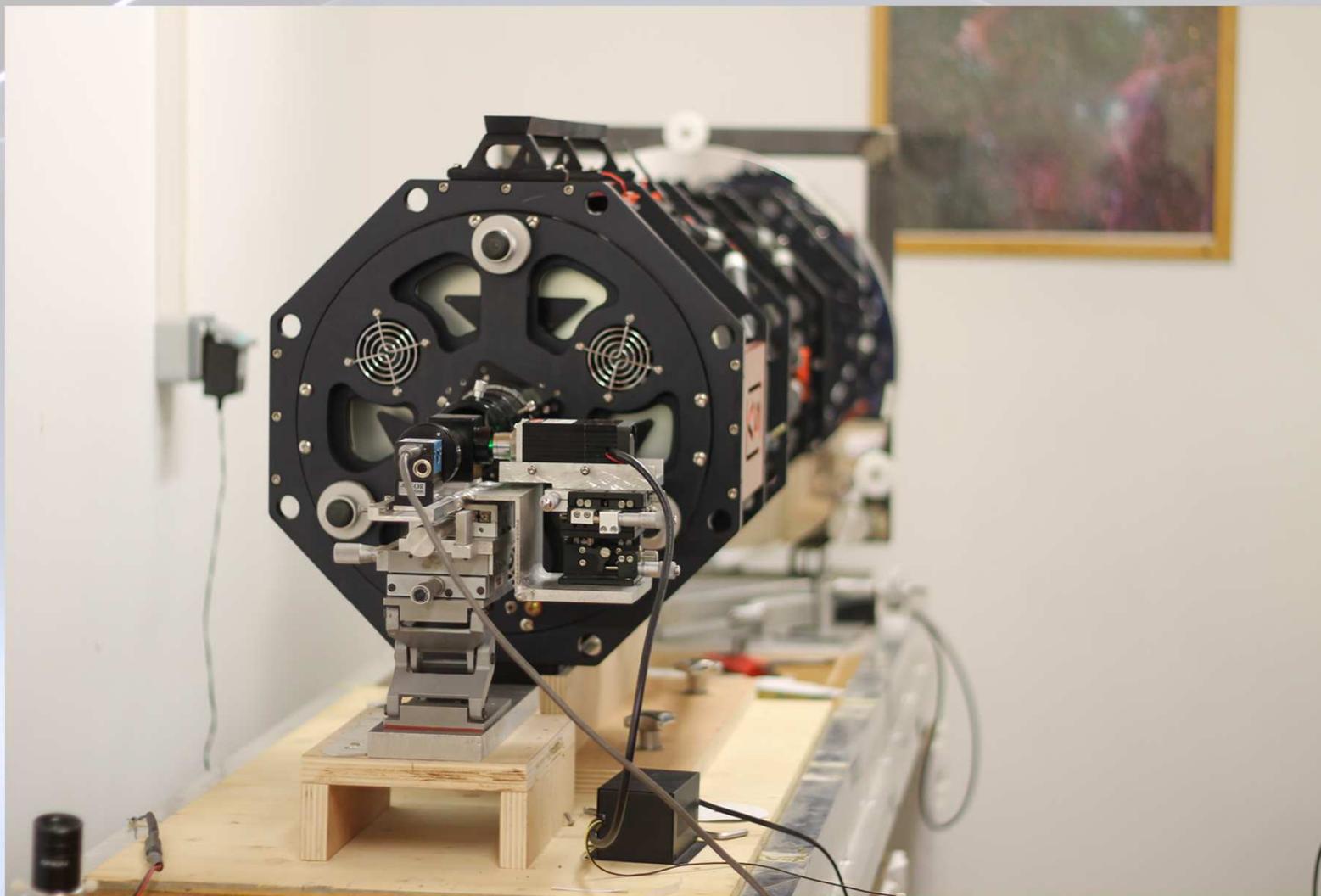
# Les instruments actuel SV

## Les dobsons

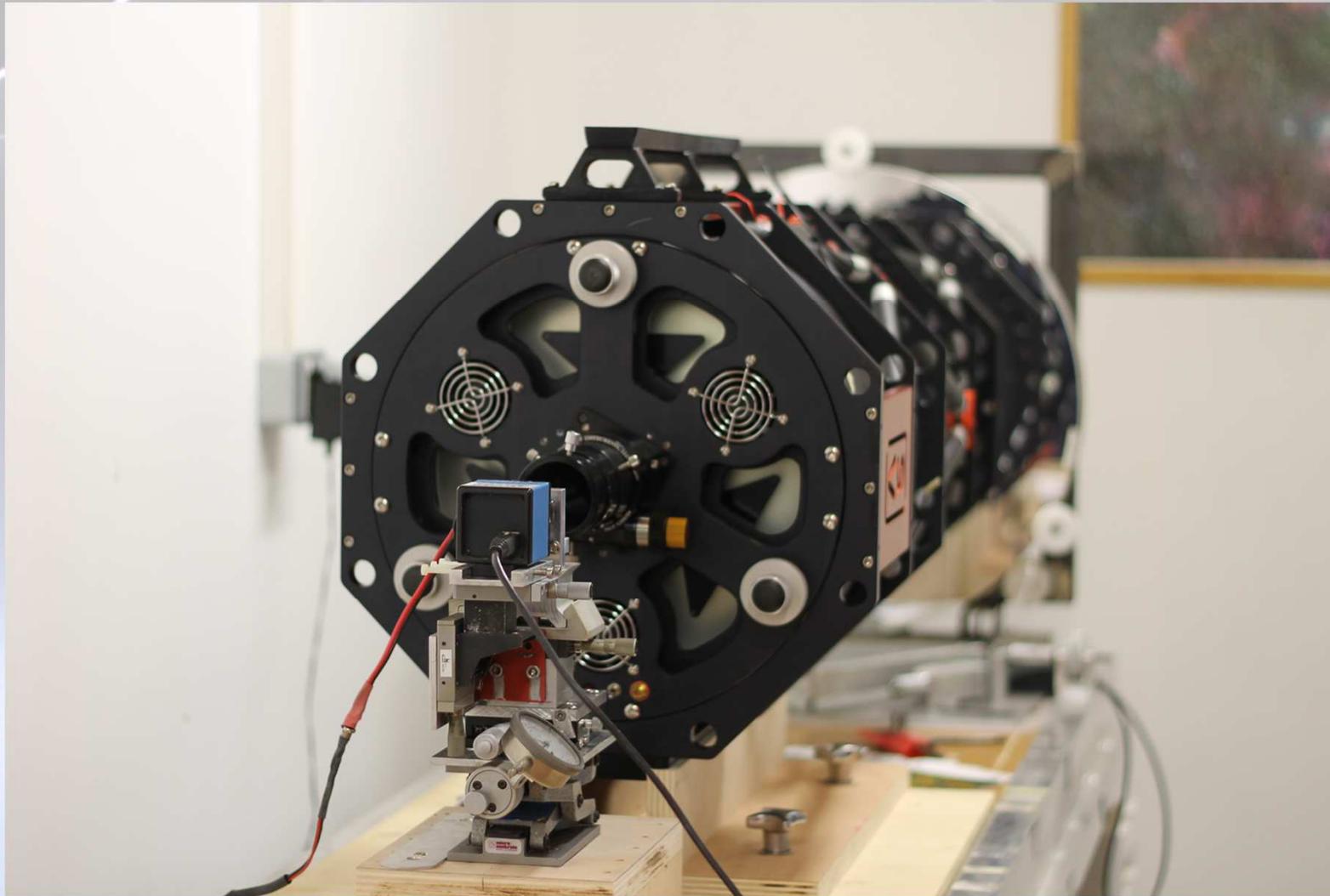


# Les astrographes newton, cassegrain, newton-cassegrain et ritchey-chretien

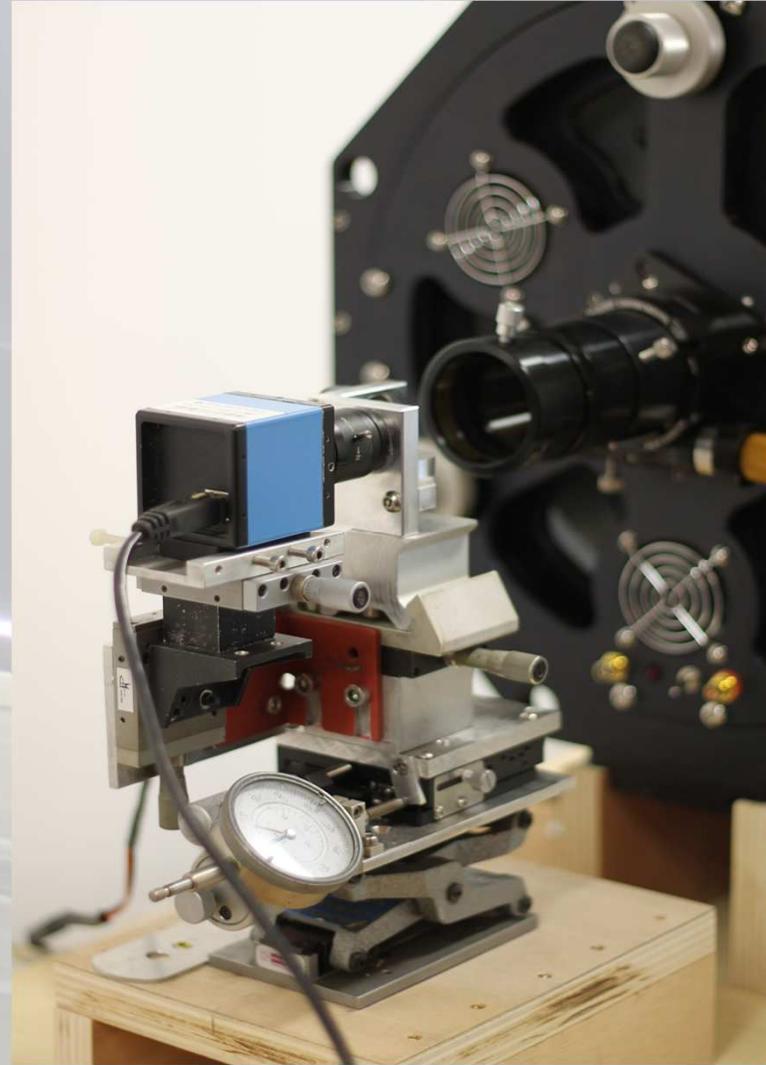
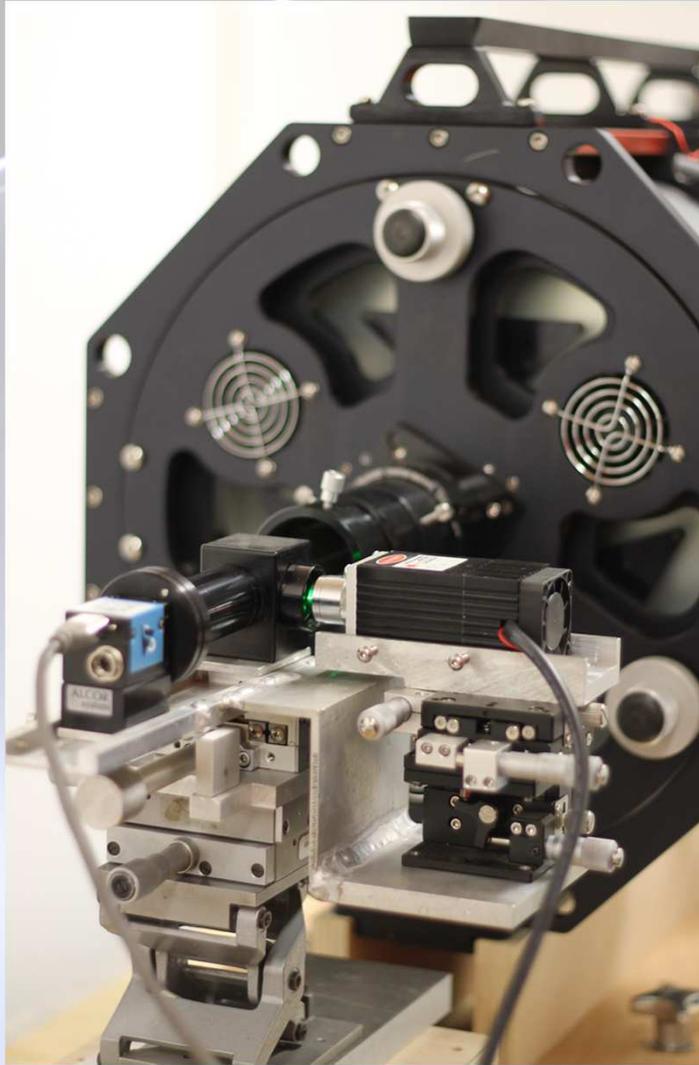




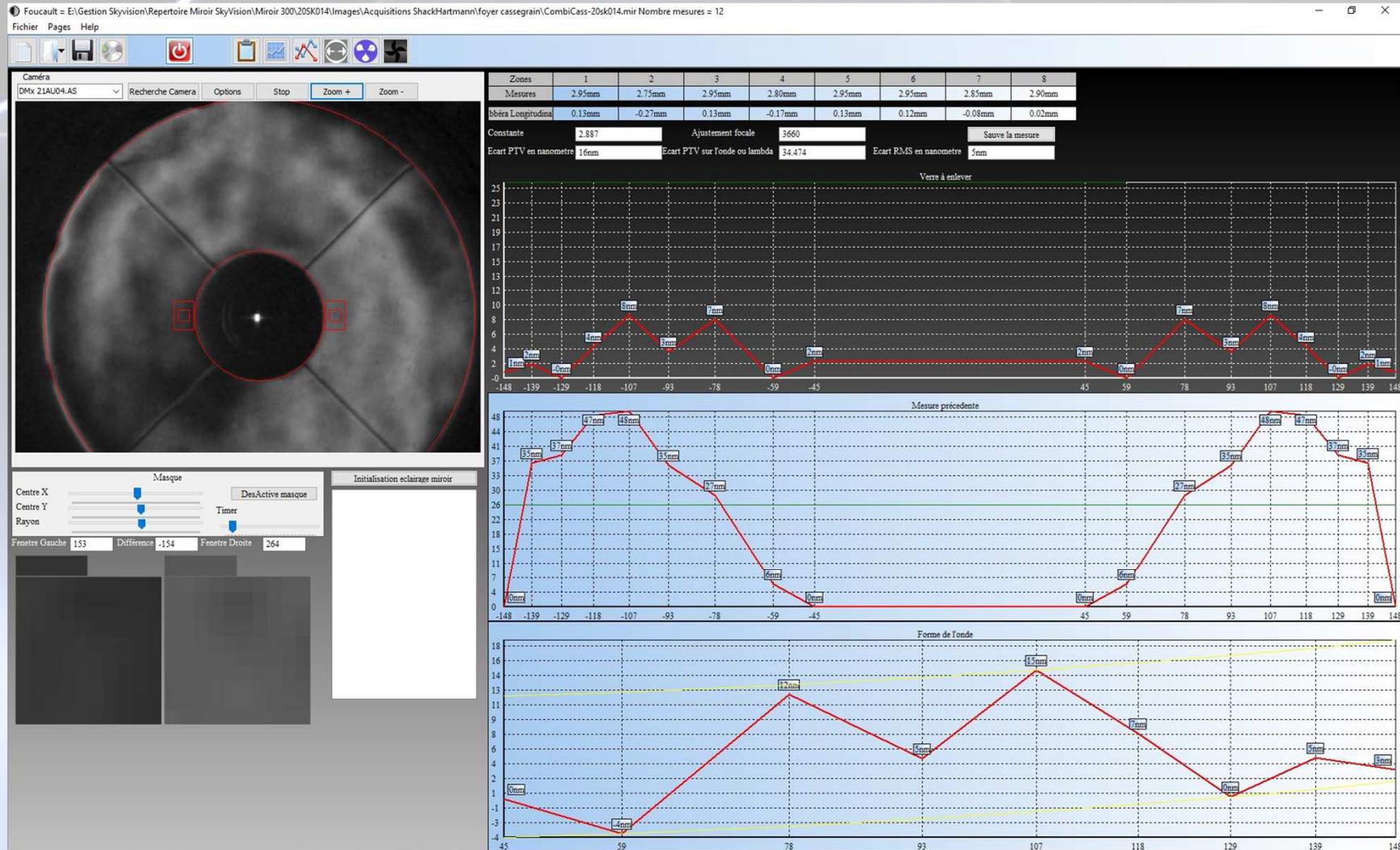
Contrôle au foyer cassegrain, focault camera, gamme NC 300



## Contrôle au SH et foucault camera



# Contrôle en cours de retouche, focault camera, gamme NC 300



## Mesure final SH, au foyer cassegrain, gamme NC 300

