

# Fluorescence Detector (FD) System

## 30 Telescopes in 4 Buildings (eyes)

6 Telescopes at **Los Leones**

peripheral eye

6 Telescopes at **Coihueco**

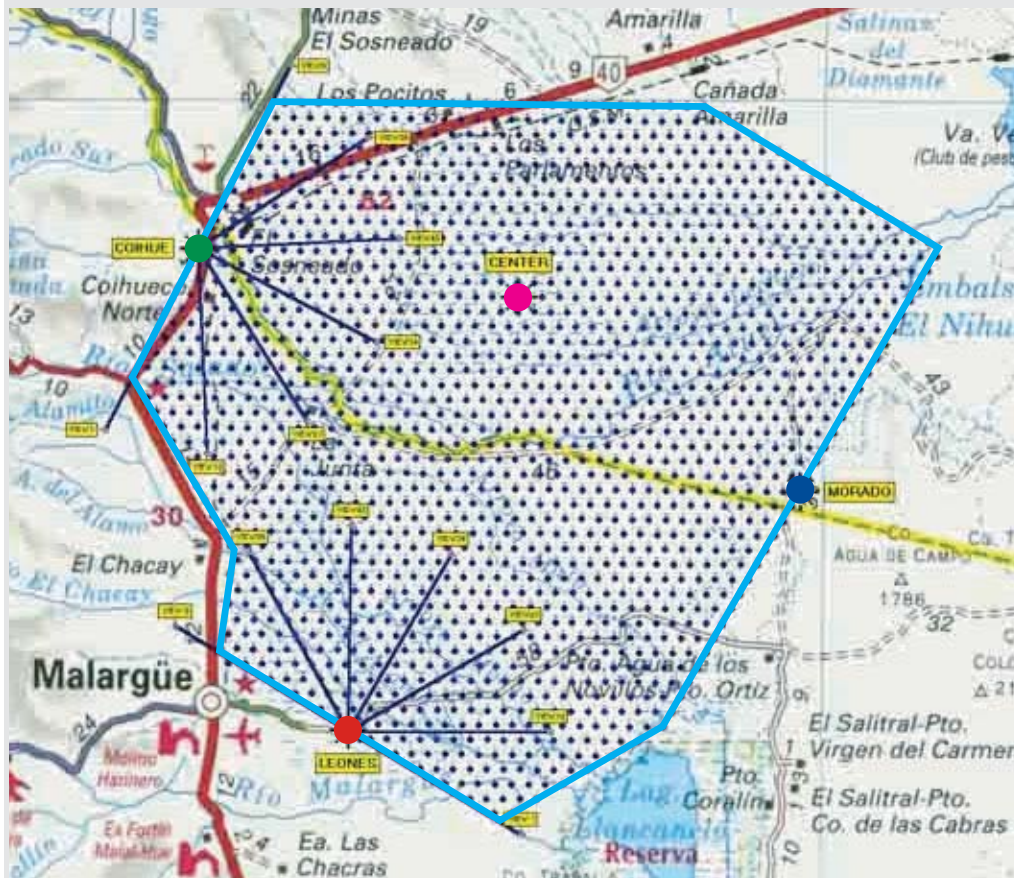
peripheral eye

6 Telescopes at **Los Morados**

peripheral eye

12 Telescopes at **Atuel**

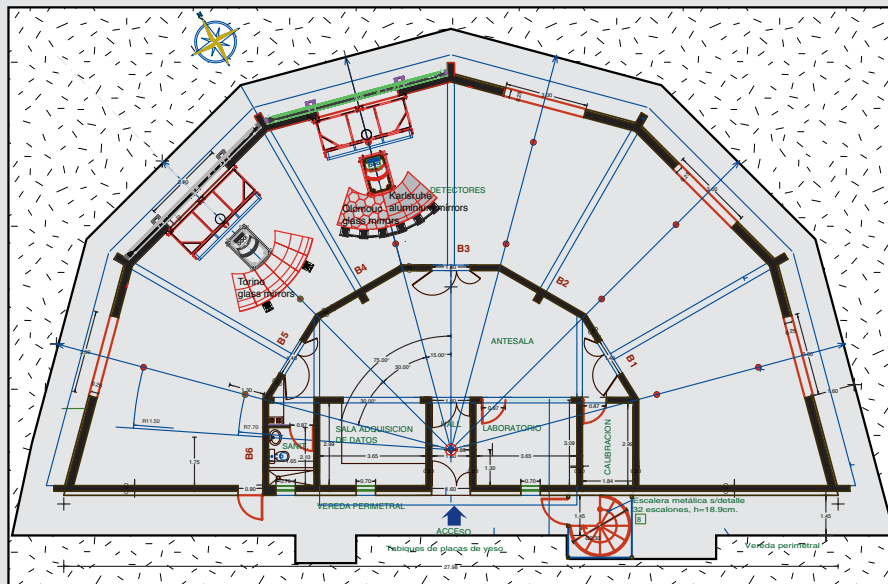
central eye



# Fluorescence Detector (FD) System

**Los Leones**

Installation January 2001



# Fluorescence Detector (FD) System

## Los Leones

aperture box

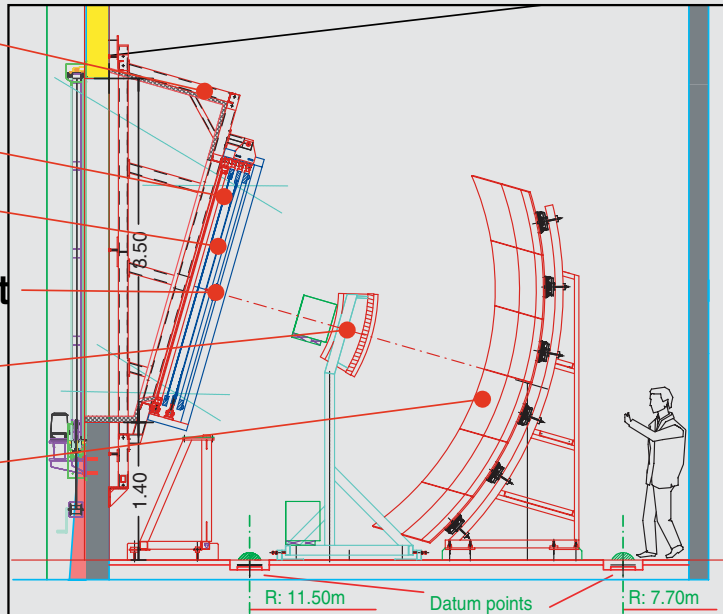
filter

corrector ring

reference point

camera

mirror system



aperture box

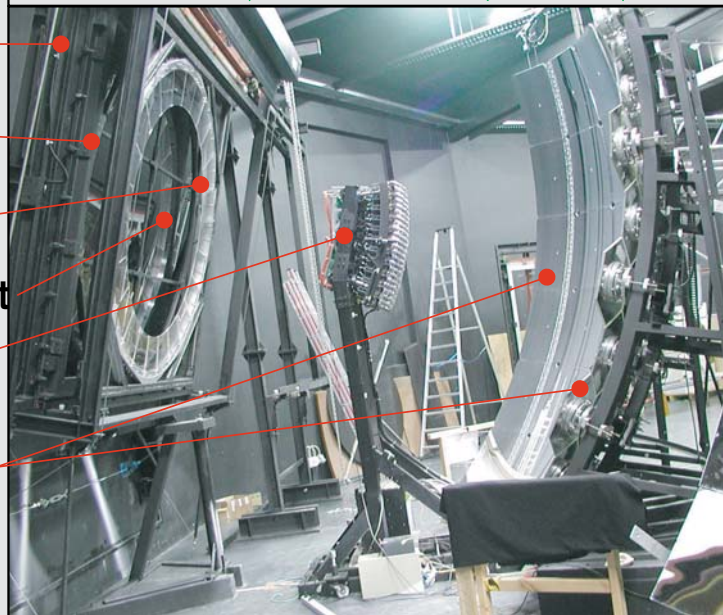
filter

corrector ring

reference point

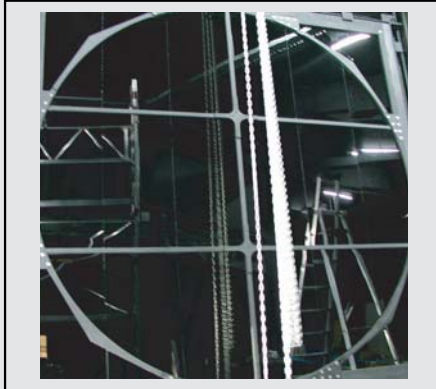
camera

mirror system





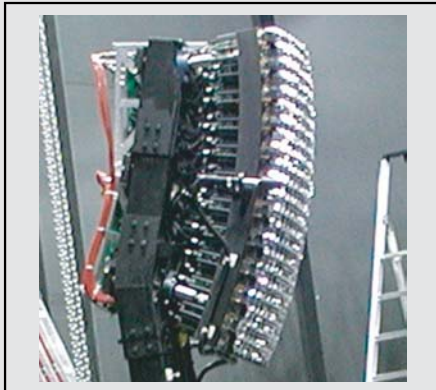
# Fluorescence Detector (FD) System



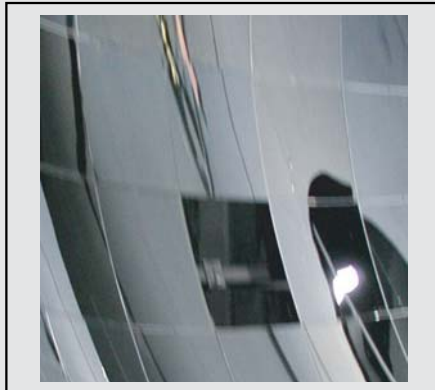
**Filter in bay 4**



**Corrector ring in bay 4**



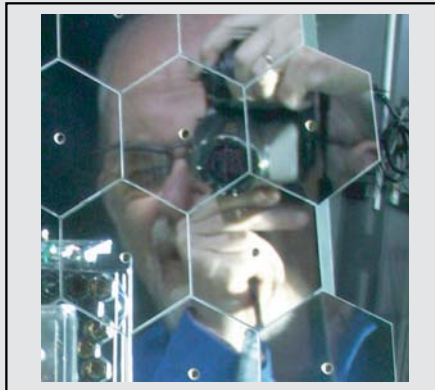
**Camera in bay 4**



**Torino mirrors in bay 5**



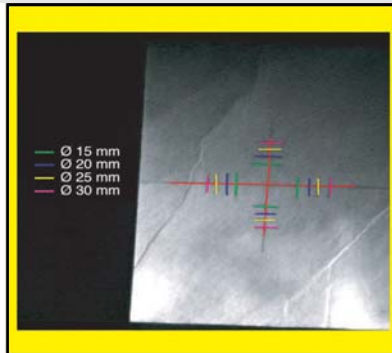
**Karlsruhe mirrors in bay 4**



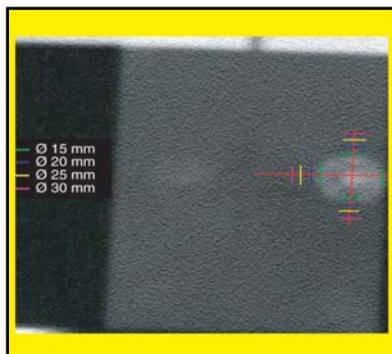
**Olomouc mirrors in bay 4**

# Fluorescence Detector (FD) System

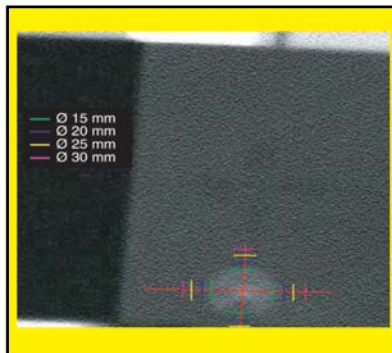
CCD star images, mirror bay 4, uv filter out  
**corrector ring out**      **corrector ring in**



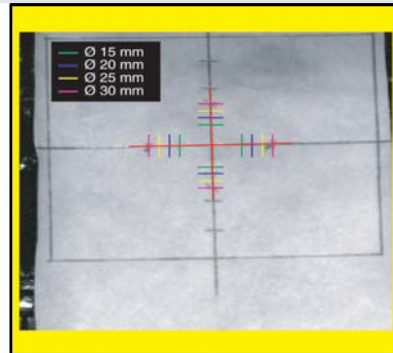
**scale**



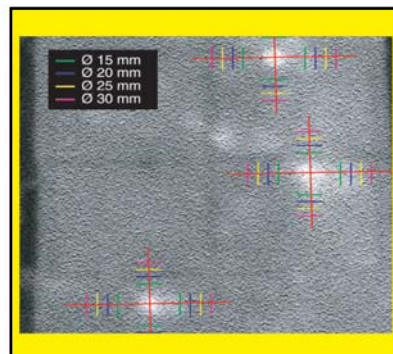
**star image (30 s)**



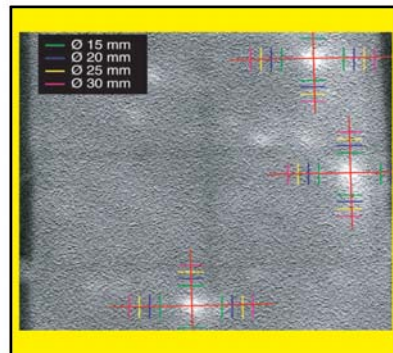
**star image (30 s)**



**scale**



**star image (30 s)**

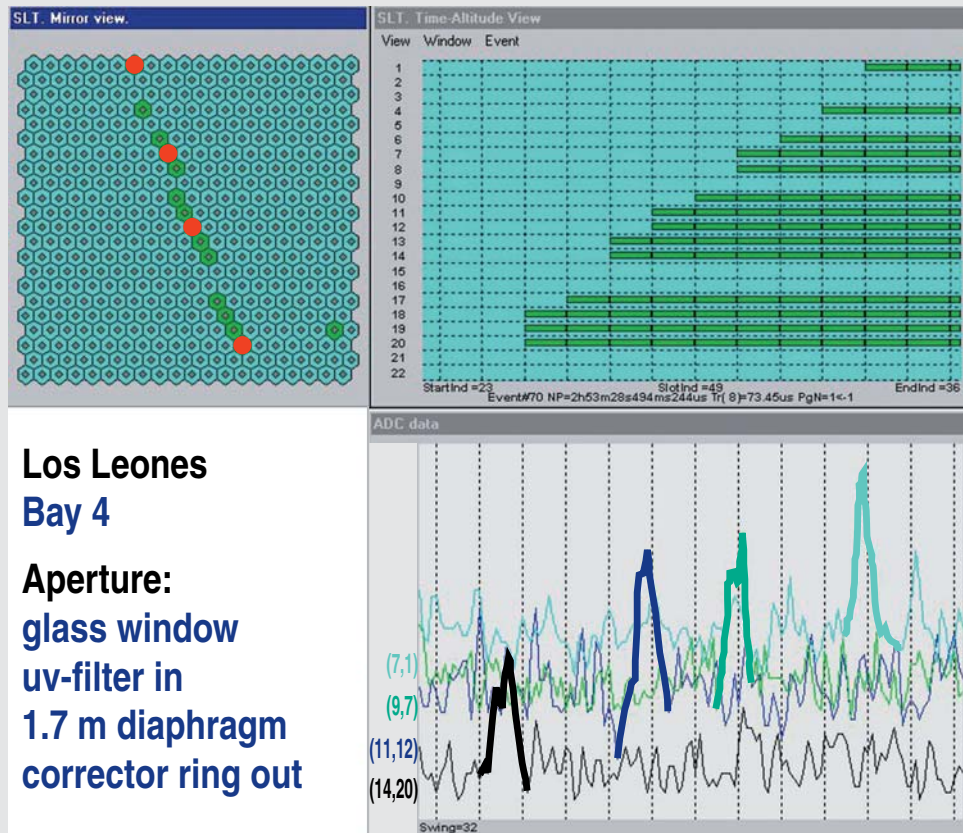


**star image (30 s)**

# Fluorescence Detector (FD) System

## Los Leones

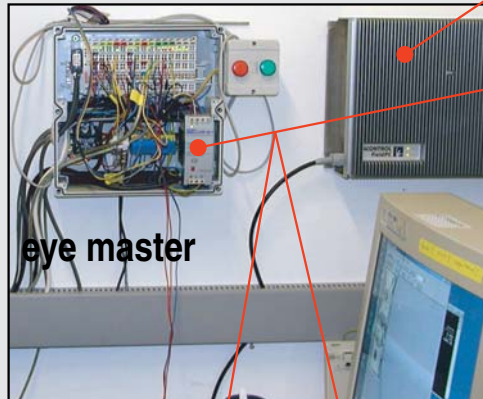
5 months from scratch: **1st shower event recorded 23<sup>rd</sup> May**





# Fluorescence Detector (FD) System

## Slow Control



## 4-Control

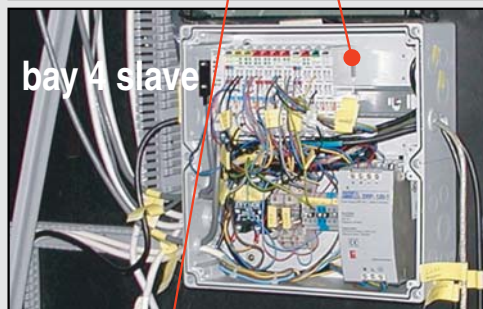
commercial system (NT-PC)

**PROFIBUS**

interlock, monitoring

sensors

light, wind,  
status of equipment



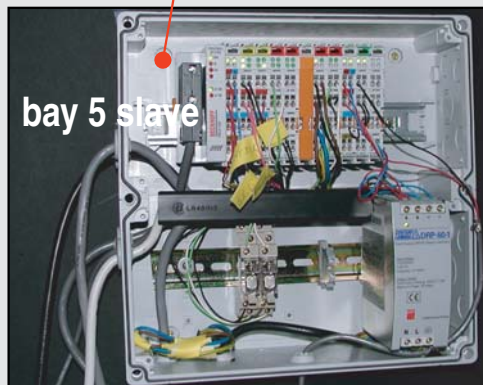
bay 4 slave

## interlock

shutter

emergency curtain

high voltage



bay 5 slave

## actions

status recording

alarm

veto

control of PCs at eye

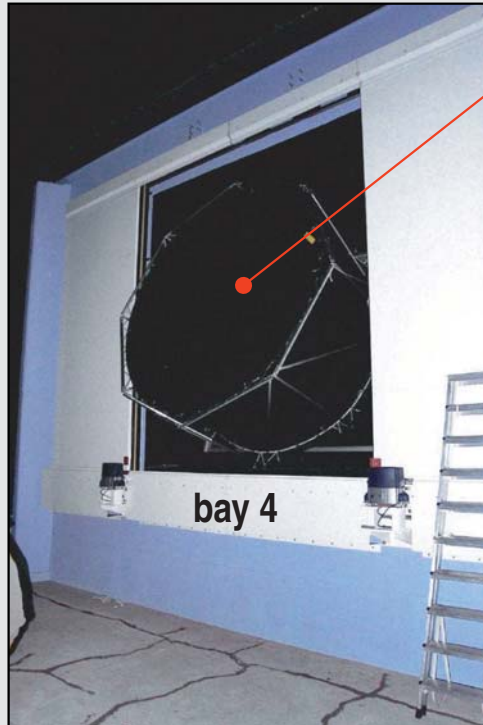
shutdown

**Slow Control can veto eye PC and human interaction**

# Fluorescence Detector (FD) System

## Calibration

### Absolute calibration:



end to end  
calibrated light source

### Alternative method:

piece by piece  
parameter of components  
ray tracing

Rayleigh scattering  
LASER shots

Cross check  
independent methods

### Relative calibration:

Fibre at centre of each mirror  
Fibres at side of cameras  
Fibres at aperture boxes

Currently in operation

light -> camera

light -> mirrors

light -> screen at shutter

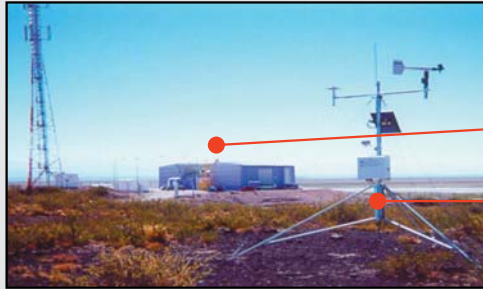
Fed by different light sources in calibration room

Calibrated light source and relative calibration at each eye



# Fluorescence Detector (FD) System

## Atmospheric Monitoring



horizontal extinction length  
stable HG light source  
stable CCD photometer

weather station  
Los Leones, Coihueco, Atuel



optical depth  
steerable LIDAR  
EAS-TOP steering system



clouds  
infrared imaging camera

star monitor  
CCD photometer

**Atmospheric monitoring at least at each eye,  
combination of different methods is essential.**

# Fluorescence Detector (FD) System

## Los Leones 2001

Installation January 2001

Commissioning of 1<sup>st</sup> telescope (bay 4) May 2001

1st shower event recorded 23<sup>rd</sup> May 2001

Commissioning of 2<sup>nd</sup> telescope (bay 5) October 2001

Commissioning of single telescope operation completed

Joint telescope operation in progress

Hybrid event recording (FD+SD ) from November 2001

Installation of cloud monitor & star monitor November 2001

## Los Leones 2002

Installation of LIDAR prototype January 2002

Calibration & atmospheric monitoring February 2002

End of prototype operation scheduled February 2002

Installation of new telescope systems February 2002

# Fluorescence Detector (FD) System

## Milestones for 2002

Los Leones	Stations	Completion
Dismantling of Prototypes	2	February 2002
Shutter installation	6	February 2002
Reference point	6	May 2002
aperture box	6	Bay 1-Bay 6
mirror support	6	
calibration equipment	6	
slow control	6	
Cleaning of building		May 2002
Mirror mounts,	3	June 2002  Bay 4-Bay 6
uv-filter, corrector ring,	3	
emergency curtain,	3	
mirrors,	3	
camera,	3	
electronics, hv,	3	
software, commissioning	3	
Regular Data Acquisition	July	December 2002
Calibration & atmospheric m	1	July 2002
Mirror mounts,	3	October 2002  Bay 1-Bay 3
uv-filter, corrector ring,	3	
emergency curtain,	3	
mirrors,	3	
camera,	3	
electronics, hv,	3	
software, commissioning	3	
Remote Control Operation		December 2002

# Fluorescence Detector (FD) System

## Milestones for 2002

<b>Coihueco</b>	<b>Station</b>	<b>Completion</b>
<b>Completion of building (shell)</b>	<b>1</b>	<b>March 2002</b>
Shutter installation	6	May 2002
Reference point	6	September 2002
aperture box	6	<b>Bay 1-Bay 6</b>
mirror support	6	
calibration equipment	6	
slow control	6	
<b>Cleaning of building</b>		<b>September 2002</b>
Mirror mounts,	3	October 2002
uv-filter, corrector ring,	3	
emergency curtain,	3	<b>Bay 1-Bay 3</b>
mirrors,	3	
camera,	3	
electronics, hv,	3	
software, commissioning	3	
<b>Regular Data Acquisition</b>	<b>October</b>	<b>- December 2002</b>
<b>Calibration &amp; atmospheric m</b>	<b>1</b>	<b>October 2002</b>
Mirror mounts,	3	November 2002
uv-filter, corrector ring,	3	
emergency curtain,	3	<b>Bay 4-Bay 6</b>
mirrors,	3	
camera,	3	
electronics, hv,	3	
software, commissioning	3	
<b>Remote 2 Eye Operation</b>		<b>December 2002</b>



# Fluorescence Detector (FD) System

## Milestones for 2003

Los Morados	Station	Completion	
Completion of building (shell)	1	January	2003
Shutter installation	6	March	2003
Reference point	6	June	2003
aperture box	6	Bay 1-Bay 6	
mirror support	6		
calibration equipment	6		
slow control	6		
Cleaning of building		July	2003
Mirror mounts,	3	August	2003
uv-filter, corrector ring,	3	Bay 1-Bay 3	
emergency curtain,	3		
mirrors,	3		
camera,	3		
electronics, hv,	3		
software, commissioning	3		
Regular Data Acquisition	August	-	December 2003
Calibration & atmospheric m	1	August	2003
Mirror mounts,	3	September	2003
uv-filter, corrector ring,	3	Bay 4-Bay 6	
emergency curtain,	3		
mirrors,	3		
camera,	3		
electronics, hv,	3		
software, commissioning	3		
Remote 3 Eye Operation		December	2003

# Fluorescence Detector (FD) System

## Milestones for 2004

Atuel	Station	Completion	
Completion of building (shell)	2	March	2004
Shutter installation	12	May	2004
Reference point	12	October	2004
aperture box	12	Bay 1-Bay 6	
mirror support	12		
calibration equipment	12		
slow control	12		
Cleaning of building		October	2004
Mirror mounts,	6	November	2004
uv-filter, corrector ring,	6	Bay 1-Bay 3	
emergency curtain,	6		
mirrors,	6		
camera,	6		
electronics, hv,	6		
software, commissioning	6		
Regular Data Acquisition	November - December	2004	
Calibration & atmospheric m	1	November	2004
Mirror mounts,	6	December	2004
uv-filter, corrector ring,	6	Bay 4-Bay 6	
emergency curtain,	6		
mirrors,	6		
camera,	6		
electronics, hv,	6		
software, commissioning	6		
Remote 4 Eye Operation		December	2004

# Fluorescence Detector (FD) System

## Funding for 2002

Item	Stations	Funding
building	1	85%
shutter	12	100%
reference point	12	100% ✓
aperture box	12	100%
mirror support	12	100% ✓
calibration equipment	12	100% (✓)
slow control	12	100% (✓)
cleaning of building		?
mirror mounts,	12	100% (✓)
uv-filter	12	100% (✓)
corrector ring,	12	100%
emergency curtain,	12	100%
mirrors,	12	100% (✓)
camera,	12	100% (✓)
electronics	12	100%
hv,	12	100%
software		100%
commissioning		?

# Fluorescence Detector (FD) System

## Funding for 2003

Item	Stations	Funding
building	1	?%
shutter	6	100%
reference point	6	100%
aperture box	6	100%
mirror support	6	100%
calibration equipment	6	100%
slow control	6	100%
cleaning of building		?
mirror mounts,	6	100%
uv-filter	6	100%
corrector ring,	6	100%
emergency curtain,	6	100%
mirrors,	6	100%
camera,	6	100%
electronics	6	100%
hv,	6	100%
software		100%
commissioning		?



# Fluorescence Detector (FD) System

## Funding for 2004

Item	Stations	Funding
building	2	?%
shutter	12	50%
reference point	12	100%
aperture box	12	50%
mirror support	12	100%
calibration equipment	12	100%
slow control	12	100%
cleaning of building		?
mirror mounts,	12	100%
uv-filter	12	100%
corrector ring,	12	50%
emergency curtain,	12	50%
mirrors,	12	100%
camera,	12	100%
electronics	12	100%
hv,	12	100%
software		100%
commissioning		?

Nr.	Vorgangsname	Dauer	Anfang	Ende
7	<b>2.1 Los Leones Building</b>	196t	Mon 07.01.02	Die 08.10.02
8	2.1.1 New Shutters at Los Keones	0t	Mon 07.01.02	Mon 07.01.02
9	2.1.2 Dismantling of Prototypes	0t	Mon 04.02.02	Mon 04.02.02
10	<b>2.1.3 Dismantling of Prototypes</b>	13,75t	Mon 04.02.02	Don 21.02.02
64	<b>2.1.5 Installation Los Leones</b>	87t	Mon 07.01.02	Mit 08.05.02
65	2.1.5.1 Shutters	34t	Mon 07.01.02	Fre 22.02.02
114	2.1.5.2 Reference Points	12t	Mon 04.02.02	Mit 20.02.02
121	2.1.5.3 Aperture Boxes	60t	Mit 06.02.02	Mit 01.05.02
128	2.1.5.4 Mirror Support Structu	18t	Mit 06.02.02	Mon 04.03.02
135	2.1.5.5 Calibration Equipment	53t	Mit 20.02.02	Mon 06.05.02
142	2.1.5.6 Slow Control	30t	Mon 04.02.02	Mon 18.03.02
149	<b>2.1.5.7 Industrial Cleening of</b>	5t	Mit 01.05.02	Mit 08.05.02
152	<b>2.1.8 B4-B6 Installation</b>	26t	Mit 08.05.02	Don 13.06.02
153	2.1.8.1 B4-B6 Mirror Mounts Ty	9t	Mit 08.05.02	Die 21.05.02
157	2.1.8.2 B4-B6 Filters	12t	Mon 13.05.02	Mit 29.05.02
161	2.1.8.3 B4-B5 Corrector Rings	10t	Fre 17.05.02	Fre 31.05.02
165	2.1.8.4 B4-B5 Emergency Curtai	6t	Mit 08.05.02	Don 16.05.02
169	2.1.8.5 B4-B6 Mirrors Type 1	8t	Mon 13.05.02	Don 23.05.02
173	2.1.8.6 B4-B6 Cameras	15t	Mit 15.05.02	Mit 05.06.02
177	2.1.8.7 B4-B6 Electronics & Mi	11t	Mit 22.05.02	Don 06.06.02
181	2.1.8.8 B4-B6 HV	11t	Mit 22.05.02	Don 06.06.02
185	2.1.8.9 B4-B6 Software Integra	12t	Don 23.05.02	Mon 10.06.02
189	2.1.8.10 B4-B6 Commissioning	13t	Mon 27.05.02	Don 13.06.02
193	<b>2.1.9 B1-B3 Installation</b>	26t	Mon 02.09.02	Die 08.10.02
194	2.1.9.1 B1-B3 Mirror Mounts Ty	9t	Mon 02.09.02	Fre 13.09.02
198	2.1.9.2 B1-B3 Filters	12t	Don 05.09.02	Mon 23.09.02
202	2.1.9.3 B1-B3 Corrector Rings	10t	Mit 11.09.02	Mit 25.09.02
206	2.1.9.4 B1-B3 Emergency Curtai	6t	Mon 02.09.02	Die 10.09.02
210	2.1.9.5 B1-B3 Mirrors Type 1	8t	Don 05.09.02	Die 17.09.02
214	2.1.9.6 B1-B3 Cameras	15t	Mon 09.09.02	Mon 30.09.02
218	2.1.9.7 B1-B3 Electronics & Mi	11t	Mon 16.09.02	Die 01.10.02
222	2.1.9.8 B1-B3 HV	11t	Mon 16.09.02	Die 01.10.02
226	2.1.9.9 B1-B3 Software Integra	12t	Die 17.09.02	Don 03.10.02
230	2.1.9.10 B1-B3 Commissioning	13t	Don 19.09.02	Die 08.10.02

Nr.	Vorgangsname	Dauer	Anfang	Ende
234	<b>2.2 Coihueco Building</b>	271t	Mon 05.11.01	Die 19.11.02
235	<b>2.2.1 Construction</b>	150t	Mon 05.11.01	Mon 03.06.02
236	2.2.1.1 Completion of Shell	100t	Mon 05.11.01	Mon 25.03.02
237	2.2.1.2 Completion of installa	50t	Mon 25.03.02	Mon 03.06.02
238	<b>2.2.3 Installation Coihueco</b>	115t	Mon 25.03.02	Mon 02.09.02
240	2.2.3.1 Shutters	42t	Mon 25.03.02	Mit 22.05.02
289	2.2.3.2 Reference Points	12t	Mon 03.06.02	Mit 19.06.02
296	2.2.3.3 Aperture Boxes	60t	Mit 05.06.02	Mit 28.08.02
303	2.2.3.4 Mirror Support Structu	18t	Mit 05.06.02	Mon 01.07.02
310	2.2.3.5 Calibration Equipment	53t	Mit 19.06.02	Mon 02.09.02
317	2.2.3.6 Slow Control	30t	Mon 03.06.02	Mon 15.07.02
324	<b>2.2.4 Industrial Cleening of Bay</b>	5t	Mit 28.08.02	Mit 04.09.02
325	<b>2.2.7 B1-B3 Installation</b>	28t	Mit 04.09.02	Mon 14.10.02
326	2.2.7.1 B1-B3 Mirror Mounts Ty	12t	Mit 04.09.02	Fre 20.09.02
332	2.2.7.2 B1-B3 Filters	12t	Die 10.09.02	Don 26.09.02
336	2.2.7.3 B1-B3 Corrector Rings	10t	Mon 16.09.02	Mon 30.09.02
340	2.2.7.4 B1-B3 Emergency Curtai	6t	Mit 04.09.02	Don 12.09.02
344	2.2.7.5 B1-B3 Mirrors Type 2	11t	Die 10.09.02	Mit 25.09.02
348	2.2.7.6 B1-B3 Cameras	15t	Fre 13.09.02	Fre 04.10.02
352	2.2.7.7 B1-B3 Electronics & Mi	11t	Fre 20.09.02	Mon 07.10.02
356	2.2.7.8 B1-B3 HV	11t	Fre 20.09.02	Mon 07.10.02
360	2.2.7.9 B1-B3 Software Integra	12t	Mon 23.09.02	Mit 09.10.02
364	2.2.7.10 B1-B3 Commissioning	13t	Mit 25.09.02	Mon 14.10.02
368	<b>2.2.8 B4-B6 Installation</b>	26t	Mon 14.10.02	Die 19.11.02
369	2.2.8.1 B4-B6 Mirror Mounts Ty	12t	Mon 14.10.02	Mit 30.10.02
373	2.2.8.2 B4-B6 Filters	12t	Fre 18.10.02	Die 05.11.02
377	2.2.8.3 B4-B5 Corrector Rings	10t	Don 24.10.02	Don 07.11.02
381	2.2.8.4 B4-B5 Emergency Curtai	2t	Mon 14.10.02	Mit 16.10.02
385	2.2.8.5 B4-B6 Mirrors Type 2	11t	Fre 18.10.02	Mon 04.11.02
389	2.2.8.6 B4-B6 Cameras	13t	Mit 23.10.02	Mon 11.11.02
393	2.2.8.7 B4-B6 Electronics & Mi	9t	Mit 30.10.02	Die 12.11.02
397	2.2.8.8 B4-B6 HV	9t	Mit 30.10.02	Die 12.11.02
401	2.2.8.9 B4-B6 Software Integra	10t	Don 31.10.02	Don 14.11.02
405	2.2.8.10 B4-B6 Commissioning	11t	Mon 04.11.02	Die 19.11.02

Nr.	Vorgangsname	Dauer	Anfang	Ende
409	<b>2.3 Los Morados Building</b>	269t	Mon 02.09.02	Fre 12.09.03
410	<b>2.3.1 Construction</b>	150t	Mon 02.09.02	Mon 31.03.03
411	2.3.1.1 Completion of Shell	100t	Mon 02.09.02	Mon 20.01.03
412	2.3.1.2 Completion of installa	50t	Mon 20.01.03	Mon 31.03.03
414	<b>2.3.3 Installation Los Morados</b>	115t	Mon 20.01.03	Mon 30.06.03
415	2.3.3.1 Shutters	42t	Mon 20.01.03	Mit 19.03.03
464	2.3.3.2 Reference Points	12t	Mon 31.03.03	Mit 16.04.03
471	2.3.3.3 Aperture Boxes	60t	Mit 02.04.03	Mit 25.06.03
478	2.3.3.4 Mirror Support Structu	18t	Mit 02.04.03	Mon 28.04.03
485	2.3.3.5 Calibration Equipment	53t	Mit 16.04.03	Mon 30.06.03
492	2.3.3.6 Slow Control	30t	Mon 31.03.03	Mon 12.05.03
499	<b>2.3.4 Industrial Cleening of Bay</b>	5t	Mit 25.06.03	Mit 02.07.03
502	<b>2.3.7 B1-B3 Installation</b>	26t	Mit 02.07.03	Don 07.08.03
503	2.3.7.1 B1-B3 Mirror Mounts Ty	9t	Mit 02.07.03	Die 15.07.03
507	2.3.7.2 B1-B3 Filters	12t	Mon 07.07.03	Mit 23.07.03
511	2.3.7.3 B1-B3 Corrector Rings	10t	Fre 11.07.03	Fre 25.07.03
515	2.3.7.4 B1-B3 Emergency Curtai	6t	Mit 02.07.03	Don 10.07.03
519	2.3.7.5 B1-B3 Mirrors type 1	8t	Mon 07.07.03	Don 17.07.03
523	2.3.7.6 B1-B3 Cameras	15t	Mit 09.07.03	Mit 30.07.03
527	2.3.7.7 B1-B3 Electronics & Mi	11t	Mit 16.07.03	Don 31.07.03
531	2.3.7.8 B1-B3 HV	11t	Mit 16.07.03	Don 31.07.03
535	2.3.7.9 B1-B3 Software Integra	12t	Don 17.07.03	Mon 04.08.03
539	2.3.7.10 B1-B3 Commissioning	13t	Mon 21.07.03	Don 07.08.03
543	<b>2.3.8 B4-B6 Installation</b>	26t	Don 07.08.03	Fre 12.09.03
544	2.3.8.1 B4-B6 Mirror Mounts Ty	9t	Don 07.08.03	Mit 20.08.03
548	2.3.8.2 B4-B6 Filters	12t	Die 12.08.03	Don 28.08.03
552	2.3.8.3 B4-B5 Corrector Rings	10t	Mon 18.08.03	Mon 01.09.03
556	2.3.8.4 B4-B5 Emergency Curtai	6t	Don 07.08.03	Fre 15.08.03
560	2.3.8.5 B4-B6 Mirrors Type 1	8t	Die 12.08.03	Fre 22.08.03
564	2.3.8.6 B4-B6 Cameras	15t	Don 14.08.03	Don 04.09.03
568	2.3.8.7 B4-B6 Electronics & Mi	11t	Don 21.08.03	Fre 05.09.03
572	2.3.8.8 B4-B6 HV	11t	Don 21.08.03	Fre 05.09.03
576	2.3.8.9 B4-B6 Software Integra	12t	Fre 22.08.03	Die 09.09.03
580	2.3.8.10 B4-B6 Commissioning	13t	Die 26.08.03	Fre 12.09.03



Nr.	Vorgangsname	Dauer	Anfang	Ende
584	<b>2.4 Atuel Building</b>	<b>348t</b>	<b>Mon 01.09.03</b>	<b>Don 30.12.04</b>
585	<b>2.4.1 Construction</b>	<b>225t</b>	<b>Mon 01.09.03</b>	<b>Mon 12.07.04</b>
586	2.4.1.1 Completion of Shell	150t	Mon 01.09.03	Mon 29.03.04
587	2.4.1.2 Completion of installa	75t	Mon 29.03.04	Mon 12.07.04
589	<b>2.4.3 Installation Atuel</b>	<b>140t</b>	<b>Mon 29.03.04</b>	<b>Mon 11.10.04</b>
590	<b>2.4.3.1 Shutters</b>	<b>42t</b>	<b>Mon 29.03.04</b>	<b>Mit 26.05.04</b>
639	<b>2.4.3.2 Reference Points</b>	<b>12t</b>	<b>Mon 12.07.04</b>	<b>Mit 28.07.04</b>
646	<b>2.4.3.3 Aperture Boxes</b>	<b>60t</b>	<b>Mit 14.07.04</b>	<b>Mit 06.10.04</b>
653	<b>2.4.3.4 Mirror Support Structu</b>	<b>18t</b>	<b>Mit 14.07.04</b>	<b>Mon 09.08.04</b>
660	<b>2.4.3.5 Calibration Equipment</b>	<b>53t</b>	<b>Mit 28.07.04</b>	<b>Mon 11.10.04</b>
667	<b>2.4.3.6 Slow Control</b>	<b>30t</b>	<b>Mon 12.07.04</b>	<b>Mon 23.08.04</b>
674	<b>2.4.4 Industrial Cleening of Bay</b>	<b>5t</b>	<b>Mit 06.10.04</b>	<b>Mit 13.10.04</b>
677	<b>2.4.7 B1-B3 Installation</b>	<b>26t</b>	<b>Mit 13.10.04</b>	<b>Don 18.11.04</b>
678	<b>2.4.7.1 B1-B3 Mirror Mounts Ty</b>	<b>9t</b>	<b>Mit 13.10.04</b>	<b>Die 26.10.04</b>
682	<b>2.4.7.2 B1-B3 Filters</b>	<b>12t</b>	<b>Mon 18.10.04</b>	<b>Mit 03.11.04</b>
686	<b>2.4.7.3 B1-B3 Corrector Rings</b>	<b>10t</b>	<b>Fre 22.10.04</b>	<b>Fre 05.11.04</b>
690	<b>2.4.7.4 B1-B3 Emergency Curtai</b>	<b>6t</b>	<b>Mit 13.10.04</b>	<b>Don 21.10.04</b>
694	<b>2.4.7.5 B1-B3 Mirrors Type 1</b>	<b>8t</b>	<b>Mon 18.10.04</b>	<b>Don 28.10.04</b>
698	<b>2.4.7.6 B1-B3 Cameras</b>	<b>15t</b>	<b>Mit 20.10.04</b>	<b>Mit 10.11.04</b>
702	<b>2.4.7.7 B1-B3 Electronics &amp; Mi</b>	<b>11t</b>	<b>Mit 27.10.04</b>	<b>Don 11.11.04</b>
706	<b>2.4.7.8 B1-B3 HV</b>	<b>11t</b>	<b>Mit 27.10.04</b>	<b>Don 11.11.04</b>
710	<b>2.4.7.9 B1-B3 Software Integra</b>	<b>12t</b>	<b>Don 28.10.04</b>	<b>Mon 15.11.04</b>
714	<b>2.4.7.10 B1-B3 Commissioning</b>	<b>13t</b>	<b>Mon 01.11.04</b>	<b>Don 18.11.04</b>
718	<b>2.4.8 B4-B6 Installation</b>	<b>26t</b>	<b>Don 18.11.04</b>	<b>Fre 24.12.04</b>
719	<b>2.4.8.1 B4-B6 Mirror Mounts Ty</b>	<b>9t</b>	<b>Don 18.11.04</b>	<b>Mit 01.12.04</b>
723	<b>2.4.8.2 B4-B6 Filters</b>	<b>12t</b>	<b>Die 23.11.04</b>	<b>Don 09.12.04</b>
727	<b>2.4.8.3 B4-B5 Corrector Rings</b>	<b>10t</b>	<b>Mon 29.11.04</b>	<b>Mon 13.12.04</b>
731	<b>2.4.8.4 B4-B5 Emergency Curtai</b>	<b>6t</b>	<b>Don 18.11.04</b>	<b>Fre 26.11.04</b>
735	<b>2.4.8.5 B4-B6 Mirrors Type 1</b>	<b>8t</b>	<b>Die 23.11.04</b>	<b>Fre 03.12.04</b>
739	<b>2.4.8.6 B4-B6 Cameras</b>	<b>15t</b>	<b>Don 25.11.04</b>	<b>Don 16.12.04</b>
743	<b>2.4.8.7 B4-B6 Electronics &amp; Mi</b>	<b>11t</b>	<b>Don 02.12.04</b>	<b>Fre 17.12.04</b>
747	<b>2.4.8.8 B4-B6 HV</b>	<b>11t</b>	<b>Don 02.12.04</b>	<b>Fre 17.12.04</b>
751	<b>2.4.8.9 B4-B6 Software Integra</b>	<b>12t</b>	<b>Fre 03.12.04</b>	<b>Die 21.12.04</b>
755	<b>2.4.8.10 B4-B6 Commissioning</b>	<b>13t</b>	<b>Die 07.12.04</b>	<b>Fre 24.12.04</b>
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Nr.	Vorgangsname	Dauer	Anfang	Ende
760	<b>2.4.10 Installation Atuel</b>	140t	Mon 29.03.04	Mon 11.10.04
845	<b>2.4.11 Industrial Cleening of Bay</b>	5t	Mit 06.10.04	Mit 13.10.04
848	<b>2.4.14 B1-B3 Installation</b>	28t	Mit 13.10.04	Mon 22.11.04
849	2.4.14.1 B1-B3 Mirror Mounts T	12t	Mit 13.10.04	Fre 29.10.04
853	2.4.14.2 B1-B3 Filters	12t	Die 19.10.04	Don 04.11.04
857	2.4.14.3 B1-B3 Corrector Rings	10t	Mon 25.10.04	Mon 08.11.04
861	2.4.14.4 B1-B3 Emergency Curta	6t	Mit 13.10.04	Don 21.10.04
865	2.4.14.5 B1-B3 Mirrors Type 2	11t	Die 19.10.04	Mit 03.11.04
869	2.4.14.6 B1-B3 Cameras	15t	Fre 22.10.04	Fre 12.11.04
873	2.4.14.7 B1-B3 Electronics & M	11t	Fre 29.10.04	Mon 15.11.04
877	2.4.14.8 B1-B3 HV	11t	Fre 29.10.04	Mon 15.11.04
881	2.4.14.9 B1-B3 Software Integr	12t	Mon 01.11.04	Mit 17.11.04
885	2.4.14.10 B1-B3 Commissioning	13t	Mit 03.11.04	Mon 22.11.04
889	<b>2.4.15 B4-B6 Installation</b>	28t	Mon 22.11.04	Don 30.12.04
890	2.4.15.1 B4-B6 Mirror Mounts T	12t	Mon 22.11.04	Mit 08.12.04
894	2.4.15.2 B4-B6 Filters	12t	Fre 26.11.04	Die 14.12.04
898	2.4.15.3 B4-B5 Corrector Rings	10t	Don 02.12.04	Don 16.12.04
902	2.4.15.4 B4-B5 Emergency Curta	6t	Mon 22.11.04	Die 30.11.04
906	2.4.15.5 B4-B6 Mirrors Type 2	11t	Fre 26.11.04	Mon 13.12.04
910	2.4.15.6 B4-B6 Cameras	15t	Mit 01.12.04	Mit 22.12.04
914	2.4.15.7 B4-B6 Electronics & M	11t	Mit 08.12.04	Don 23.12.04
918	2.4.15.8 B4-B6 HV	11t	Mit 08.12.04	Don 23.12.04
922	2.4.15.9 B4-B6 Software Integr	12t	Don 09.12.04	Mon 27.12.04
926	2.4.15.10 B4-B6 Commissioning	13t	Mon 13.12.04	Don 30.12.04