OmegaCAM: Key Features

Scope: Sole VST instrument

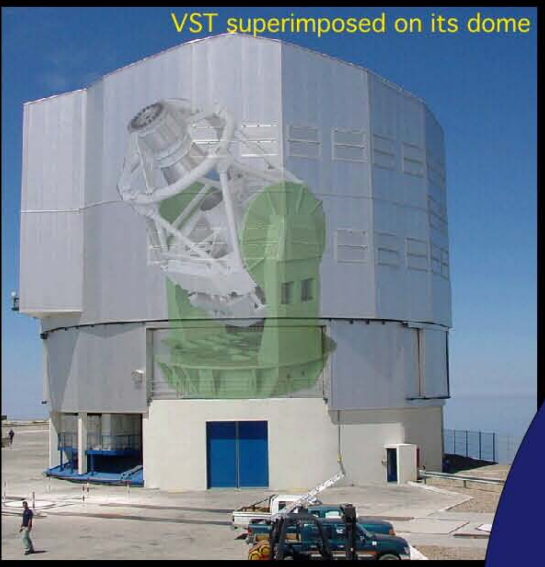
Top-level requirements: Cover VST FoV (1 deg x 1 deg)
Critically sample best seeing on Paranal, WFS for AO
Optimize for UV sensitivity
Conform to VLT technical standards

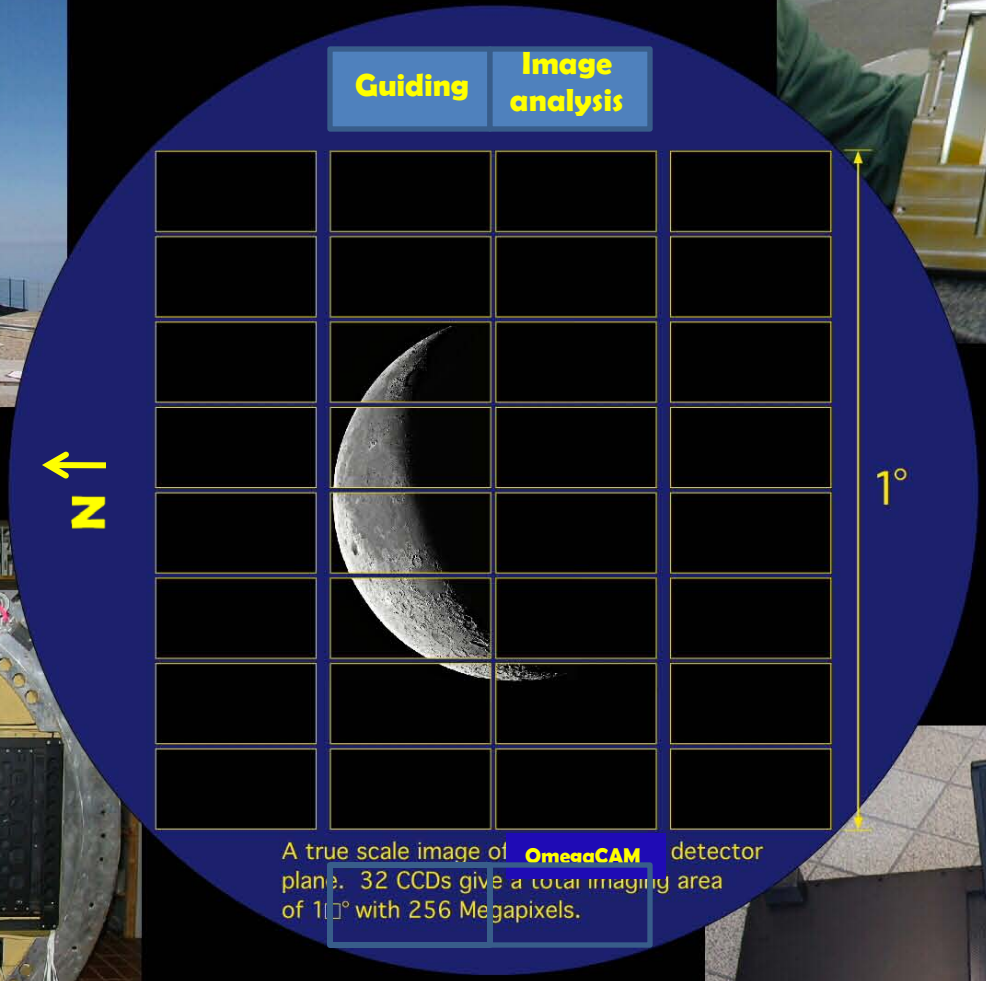
Filters: SDSS ugriz, Johnson B & V, Strömgren v, Hα (4 segments/λ_c),
segmented calibration filter, public private filters.
Up to 2 x 6 filters can be mounted.

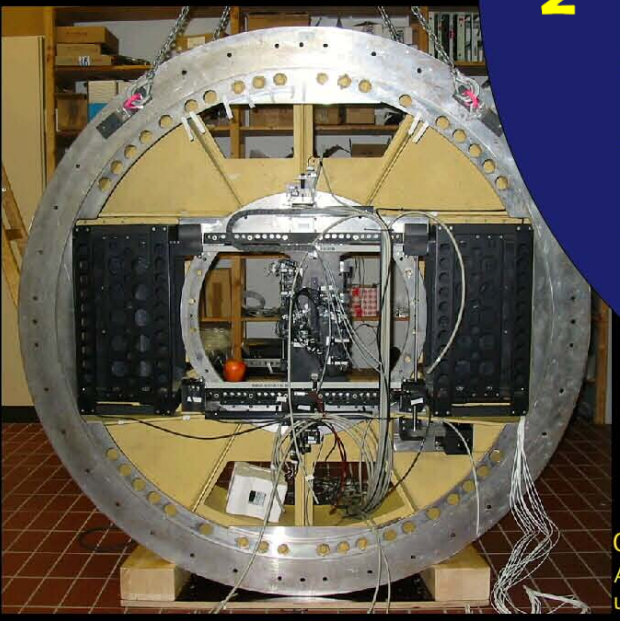
Detector system: 8 x 4 science mosaic of 2K x 4K e2v CCD44-82 devices
268 10^6 15μ x 15μ pixels (0.21 arcsec x 0.21 arcsec)
+ two 2K x 4K CCDs for autoguiding
+ two 2K x 4K CCDs for image analysis (AO)

Shutter: Dual blade, $t_{exp} \geq 0.1$ s

OmegaCAM







Camera mount in assembly.
An apple in the aperture is used for scale.

OmegaCAM: Time Table

Announcement of Opportunity	03/1998
Letter of Intent	06/1998
MoU	01/2000
Kick-off meeting	04/2000
Conceptual Design Review	07/2000
PDR	12/2000
Specifications, SoW	11/2001
FDR	09+11/2001
Agreement	03/2002
PAE	04/2004 (DFS) + 06/2004 + 09/2005 (detector)
Packed and stored in Garching	01/2006 + 10/2006 (detector)
Re-assembly on Paranal	10/2008
Faulty CCD replaced	12/2009
Last filters shipped to Paranal	02/2010

OmegaCAM: Key Players

PI:	**Konrad Kuijken, Leiden**
Co-I's:	**Ralf Bender, Munich**
	Enrico Cappellaro, Padua
Project manager:	**Bernard Muschielok, Munich**
ESO Instrument Responsible & Scientist:	**Dietrich Baade**
Detector system:	**Olaf Iwert, ESO**
Mechanics:	**Harald Nicklas, Göttingen**
Electronics:	**Achim Hess, Munich**
Control software:	**Andrea Baruffolo, Padua**
Data flow software:	**Edwin Valentijn, Groningen**
Shutter:	**Klaus Reif, Bonn**

OmegaCAM: Contractual Matters

Price:	**Fixed. Fully borne by OmegaCAM Consortium, incl. six person-years contributed to detector system**
ESO undertakings:	**Site, telescope, enclosure, infrastructure, operation**
Guaranteed Time:	**25% for 10 years (nominal)** **20% for 10 years + 25 VLT-UT nights (contract)** **?? (actual)**

OmegaCAM: Design Challenges

- **Space between instrument flange and vertex of dewar entrance window**
  - **89 mm filter and shutter**
  - **detector system deeply embedded in instrument (accessibility)**

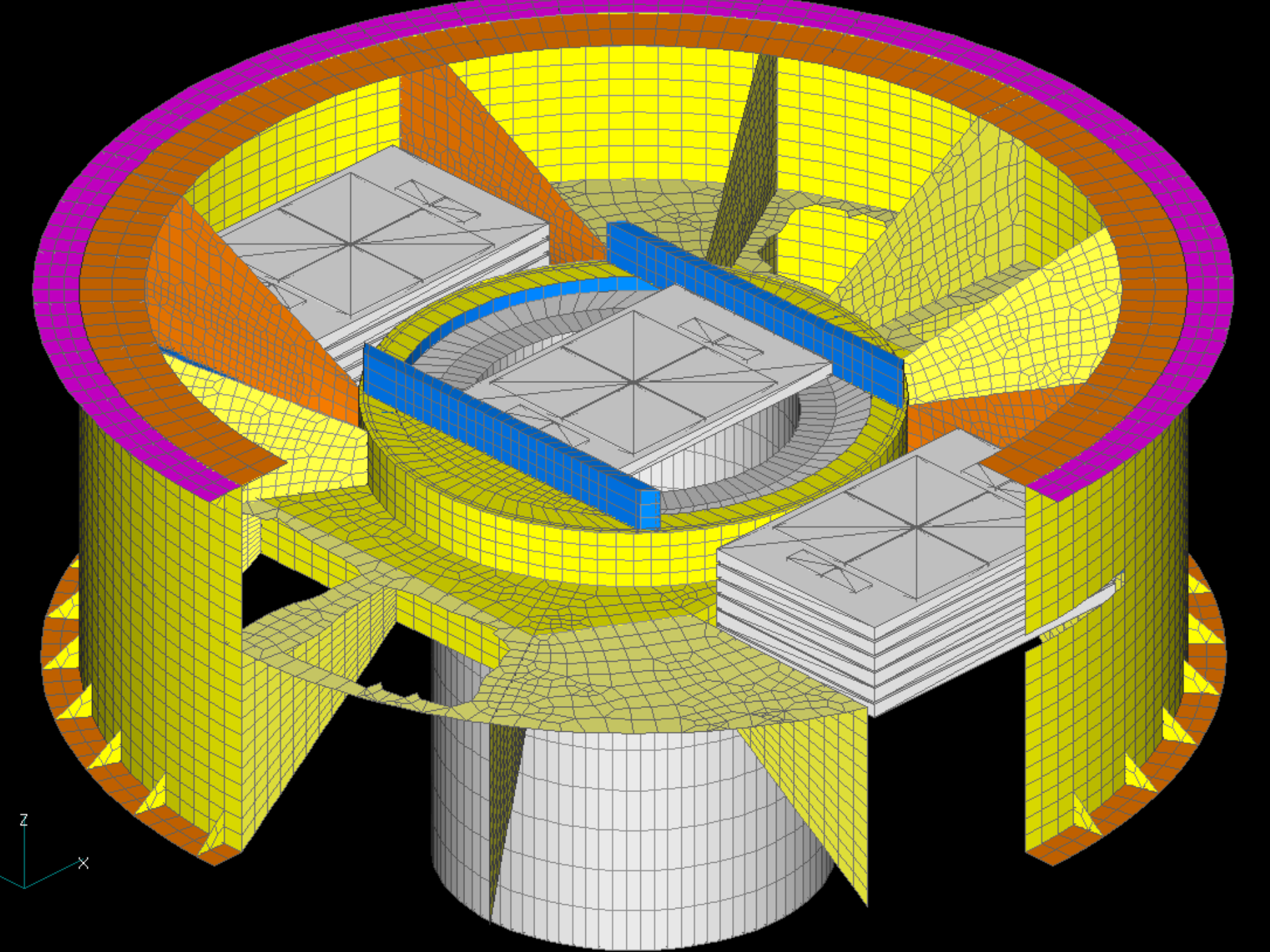
- **Mass limit**
  - **in Announcement of Opportunity: 220-250 kg**
  - **current allowances from VST: 687 kg (Cass. flange) + 300 kg (co-rotator)**
  - **measured: 765 kg + 318 kg**

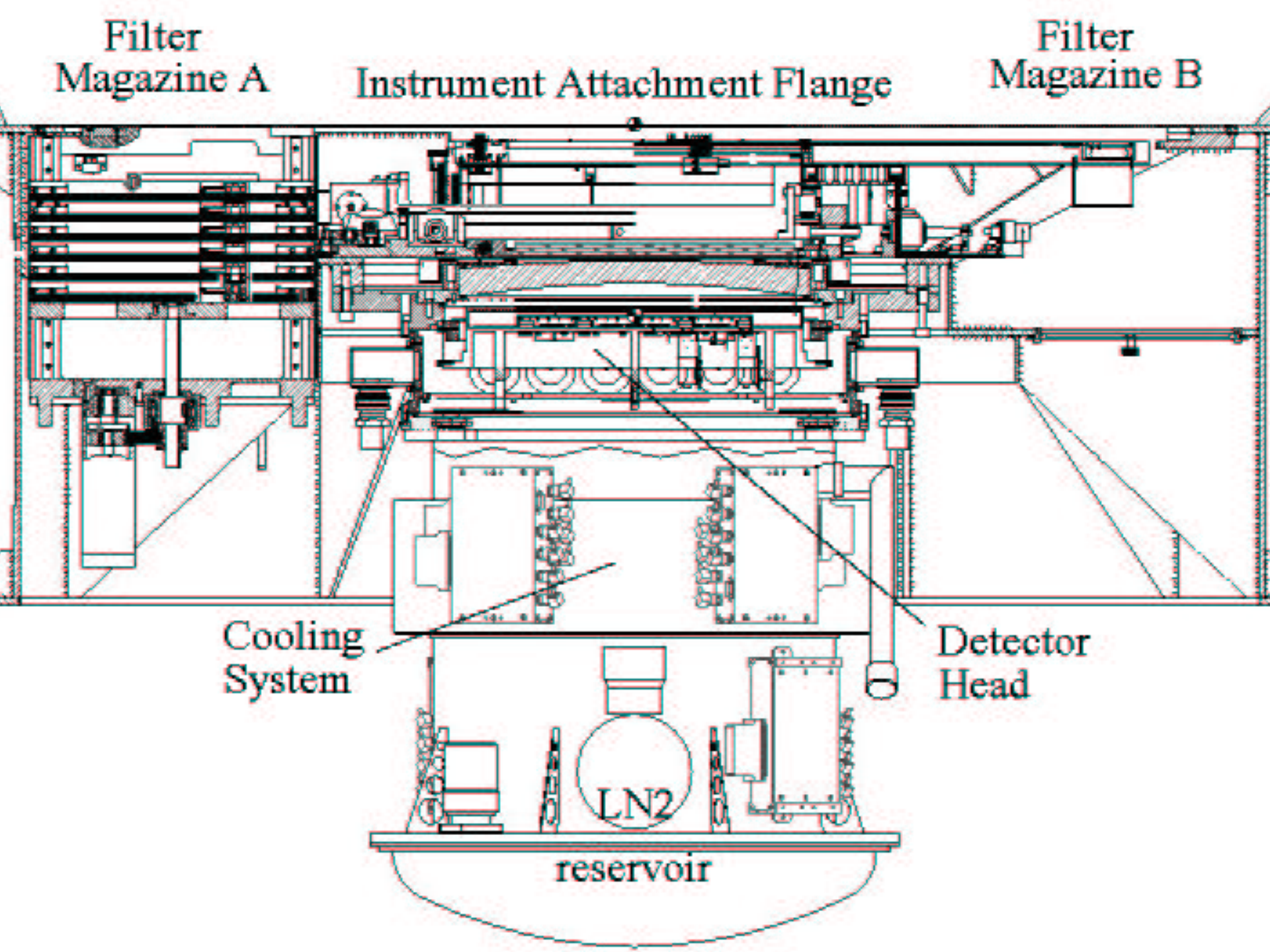
- **Distribution of items on co-rotator**

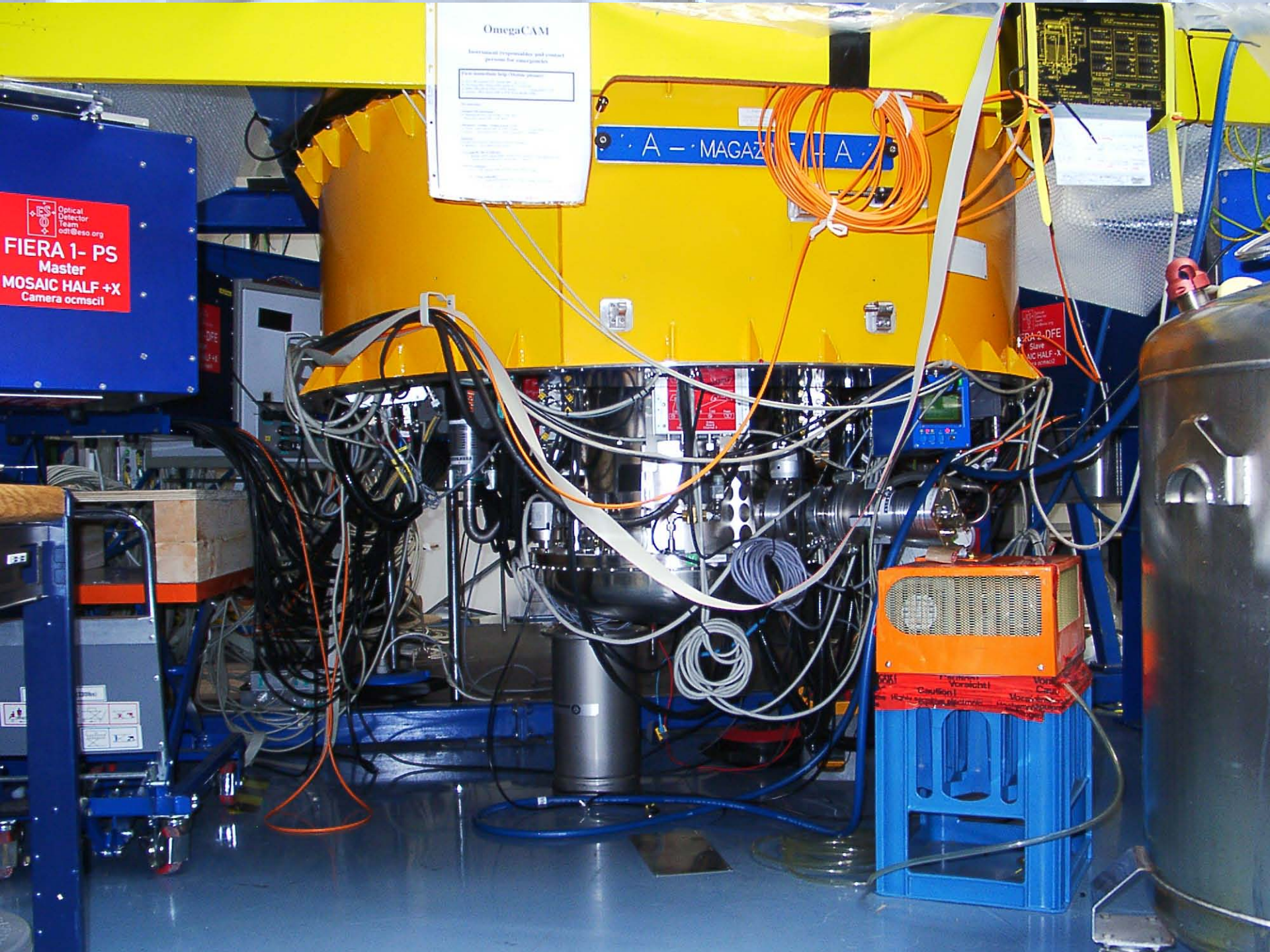
- **Large beam**
  - **Large shutter + large filters (274 mm x 274) mm + large mosaic**

- **Detector system**
  - **synchronization (<10 nsec) of 2 halves/controllers**
  - **parallel operation of science mosaic, guider CCDs, and IA CCDs**
  - **cooling**

- **Long March (長征)**
  - **people leaving & retiring**
  - **fading memory**


Z
X


Filter
Magazine A
Instrument Attachment Flange
Filter
Magazine B
Cooling
System
Detector
Head
LN2
reservoir


OmegaCAM
Optical Detector Team odt@eso.org
FIERA 1- PS
Master
MOSAIC HALF +X
Camera ocmscil
A – MAGAZ H A
FIERA-2-DFE
Slave
MC HALF -X
Caution!
Vorsicht!

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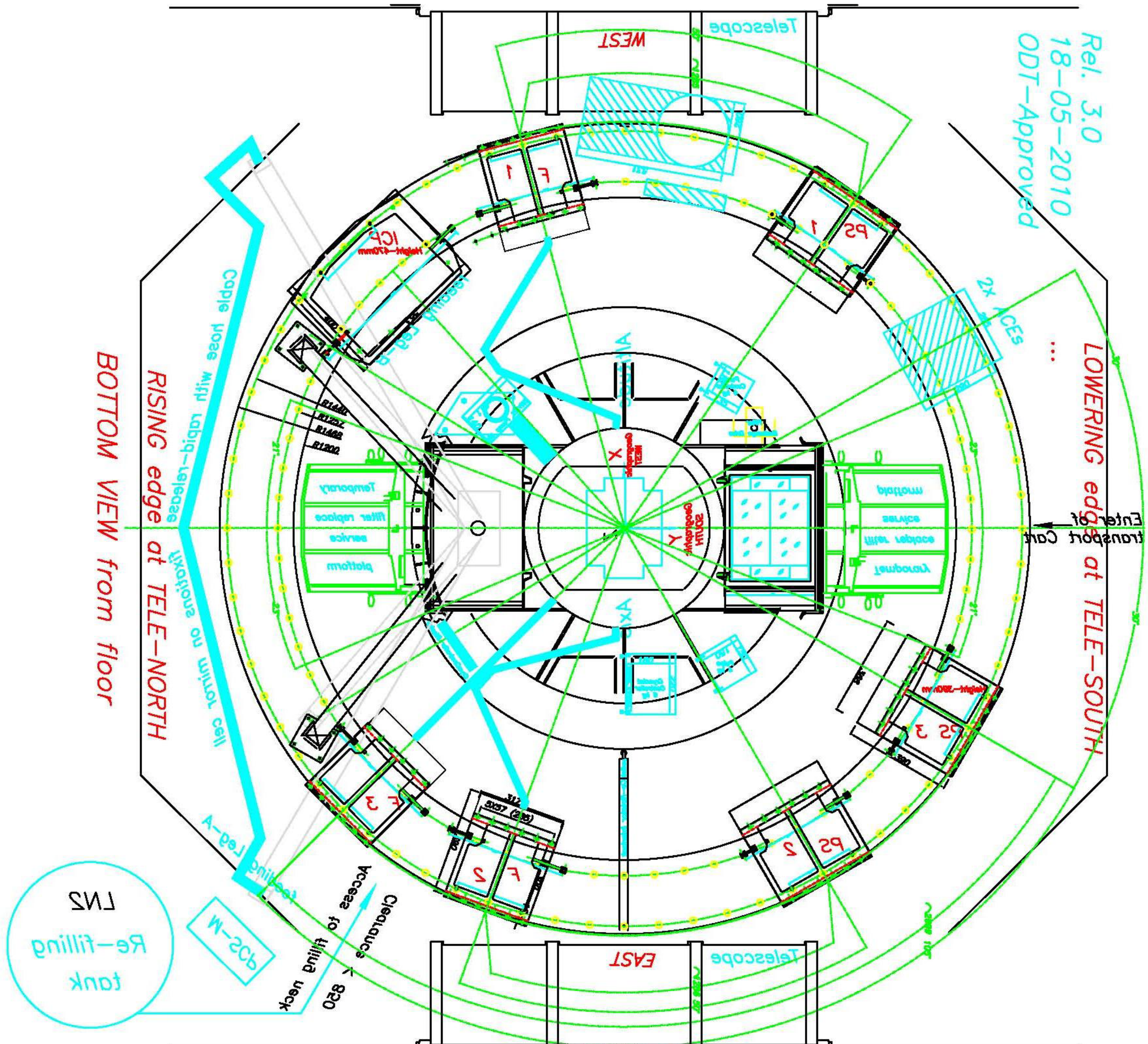

Rel. 3.0
18-05-2010
ODT-Approved
BOTTOM VIEW from floor
RISING edge at TELE-NORTH
LOWERING edge at TELE-SOUTH
Cable hose with rapid-release fixations on mirror cell
WEST
EAST
Telescope
Telescope
2x ACEs
ICP
PS 1
PS 2
PS 3
F 1
F 2
F 3
Temporary filter replace service platform
Temporary filter replace service platform
Enter of transport Cart
Access to filling neck
Clearance > 850
LN2
Re-filling tank

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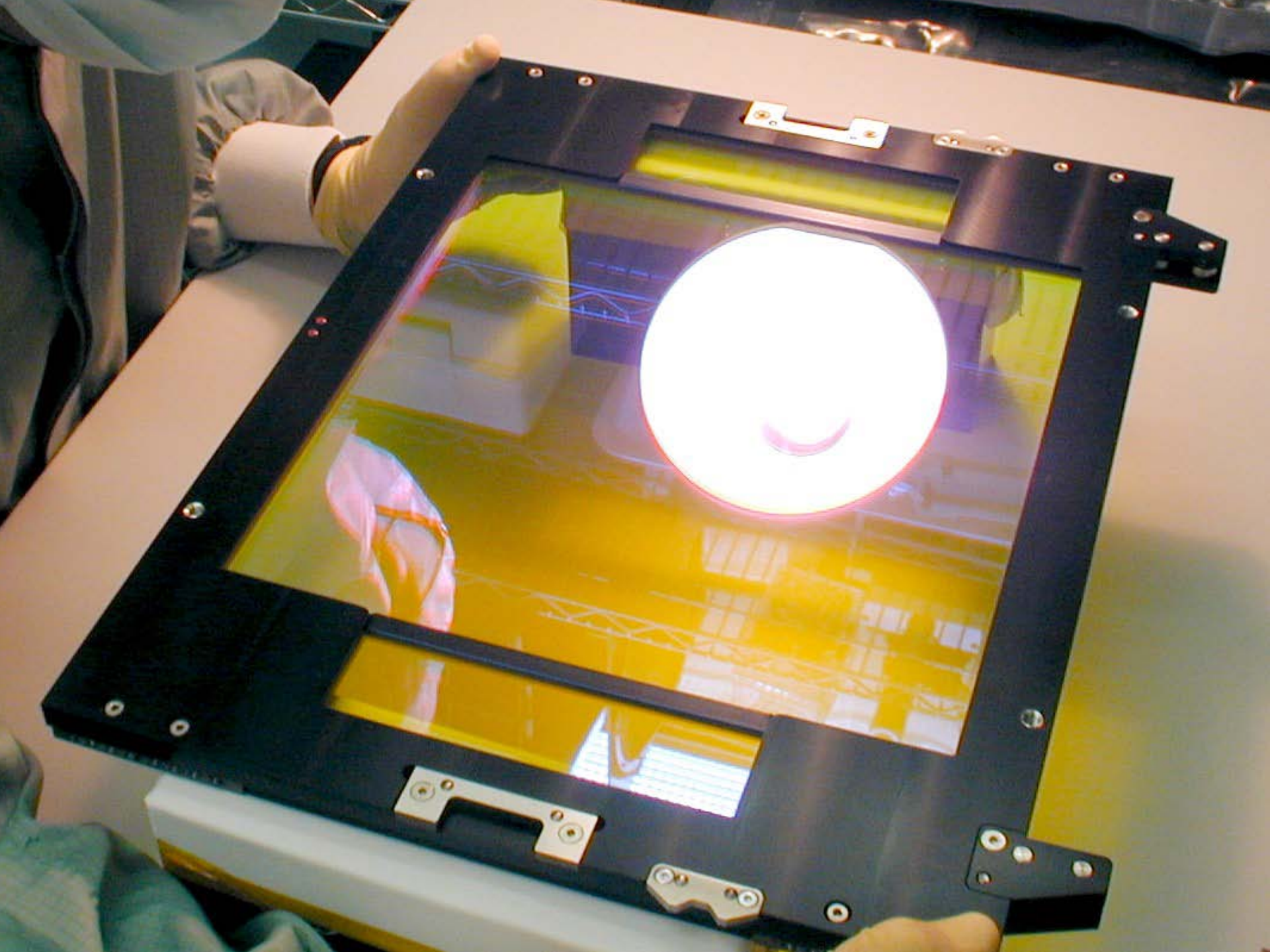

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  - cooling (LN2 to be vibration free)

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OmegaCAM: Performance in the Lab

Differential flexure: < 3 μ

Mosaic readout: RON < 5 e- @ 30 s

Filter change:

Calibration unit:

Control S/W I/F to VST:

Pipeline throughput: no longer an issue

Nominal zeropoints

Filter	mag (AB)
u'	24.9
g'	26.4
r'	26.1
i'	25.6
z'	24.3

Nominal detection limits

Filter	V mag of A0 star
u'	22.6
g'	24.4
r'	24.2
i'	23.5
z'	22.2

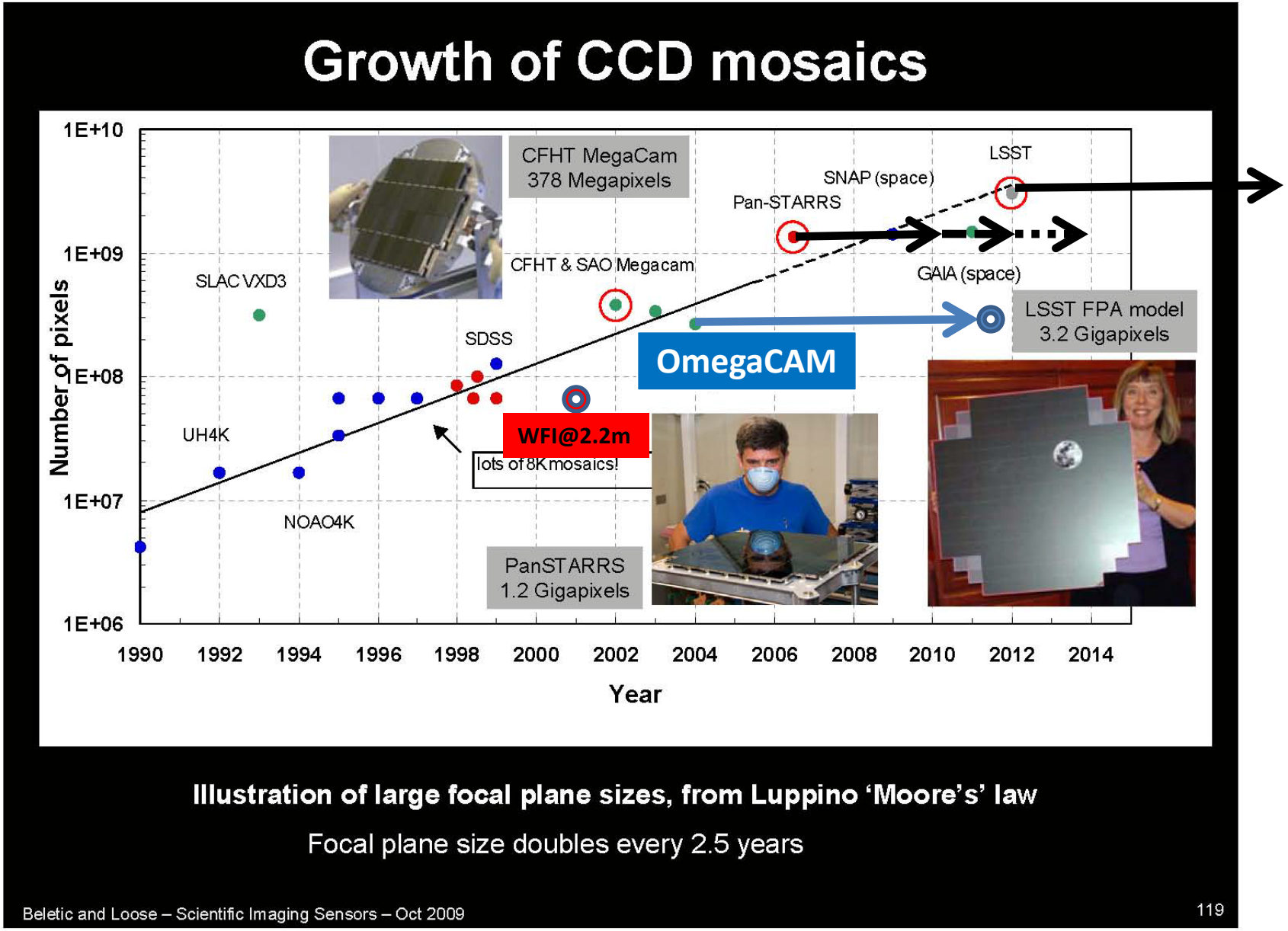
Assumed conditions:

Exp. Time	300 s (single)
S/N	5
Seeing	1.0 arcsec
Age of moon	7 days
ADC	used

OmegaCAM: Status

Overall:	**pre-assembled, tested OK, dismantled, and safely stored on Paranal, ready for commissioning**
Filters:	**received, tested, accepted**
Detector mosaic:	**faulty CCD replaced on Paranal, new one tested OK**
On-line Data Flow:	**not tested with instrument but reported OK**
Electromechanics:	**excellent reliability**
Handling tools:	**successfully tested**
Documentation:	**mostly very good**
Standard stars:	**TBD within one year after first light**

OmegaCAM: Where does it stand relative to others?



OmegaCAM: Commissioning Challenges

- Interfaces VST/OmegaCAM
- Combination of new telescope and new instrument
- Optical alignment
- Image analysis and active optics (open/closed loop)
- Near-time data processing (bandwidth to Europe)
- Detector safety
- On-site data flow system
- Correction for sky concentration
- Secondary standard stars
- Overweight