



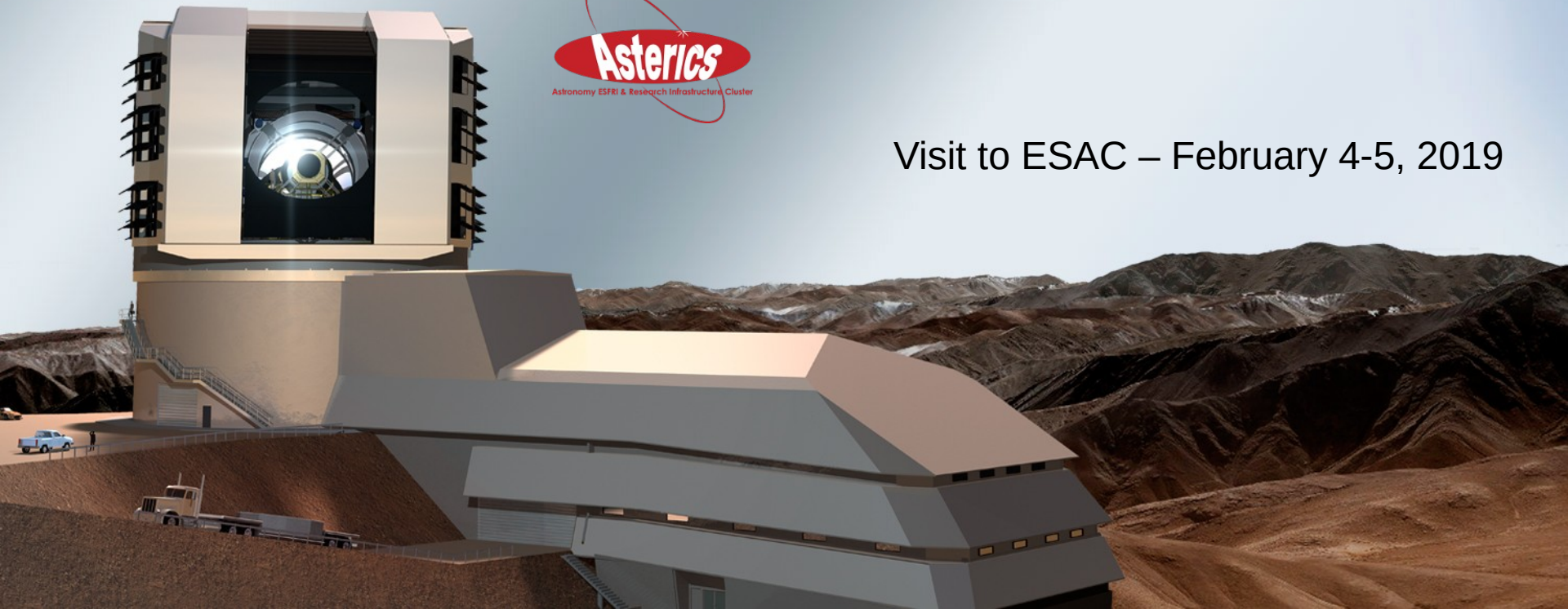
The LSST project at IN2P3

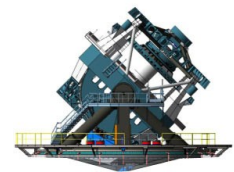
Dominique Boutigny

Laboratoire d'Annecy de Physique des Particules



Visit to ESAC – February 4-5, 2019





IN2P3: a distributed laboratory within CNRS



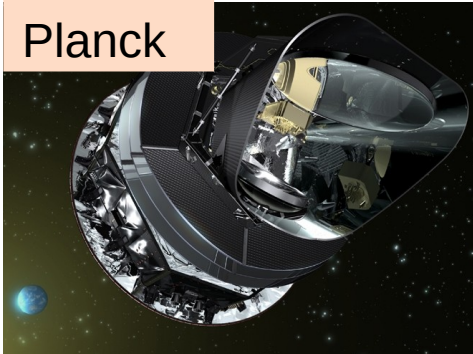
25 laboratories and research platforms in France

~2500 scientists, engineers and technicians

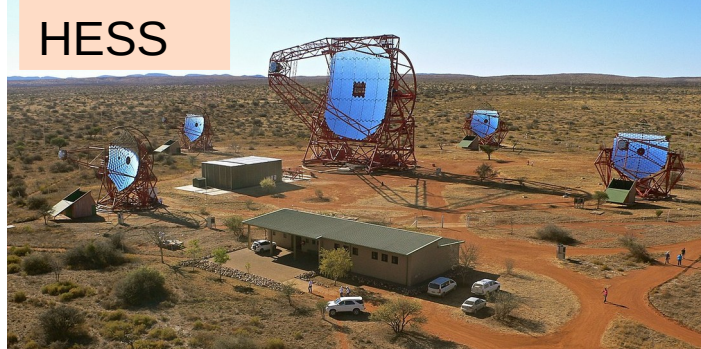
~700 post-docs and PhD students

10 IN2P3 laboratories are involved in LSST

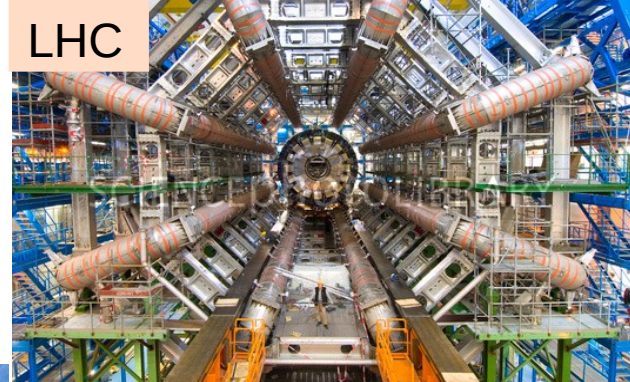
Planck



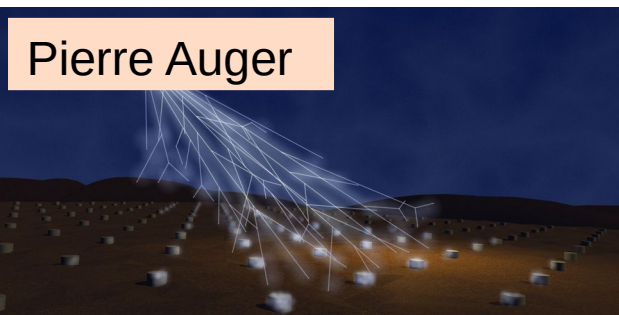
HESS



LHC



Pierre Auger



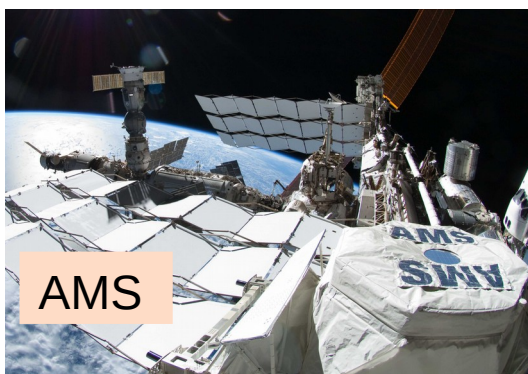
Virgo



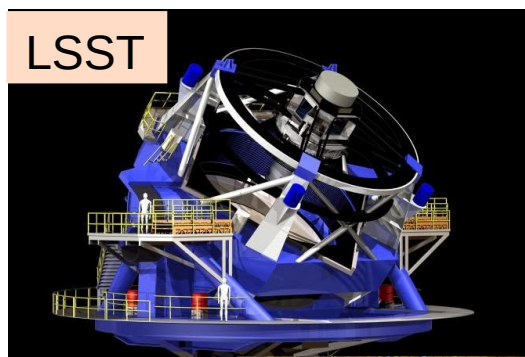
CTA



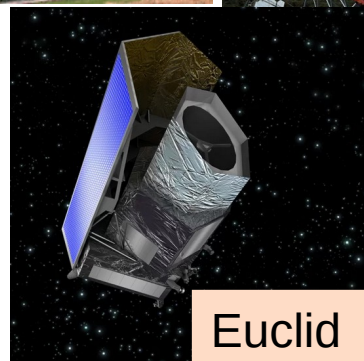
AMS



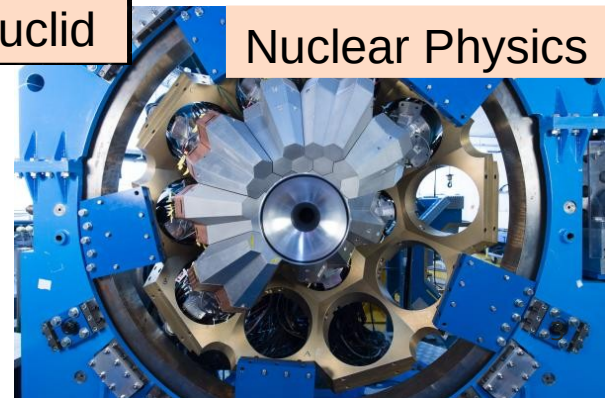
LSST



Euclid



Nuclear Physics



Neutrinos



Fermi



The LSST project

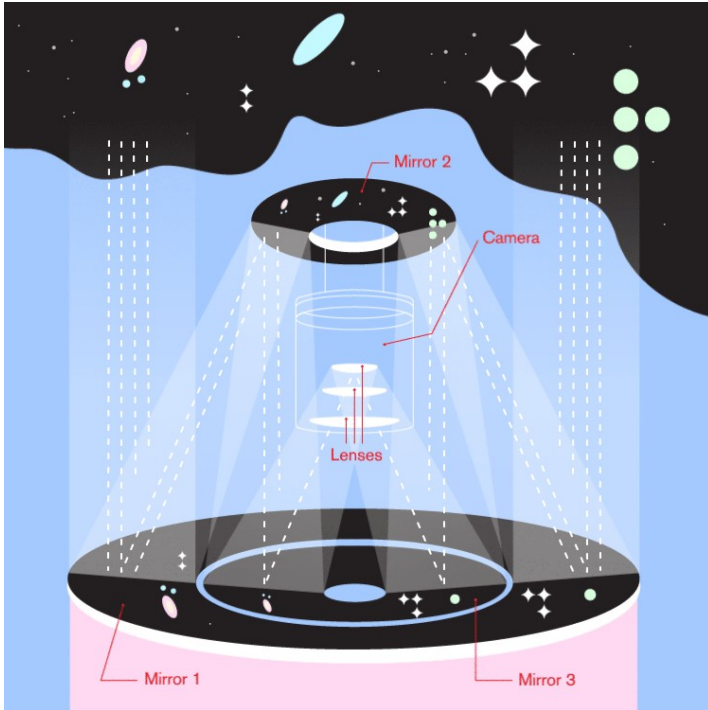


Modified Paul-Baker optical formula

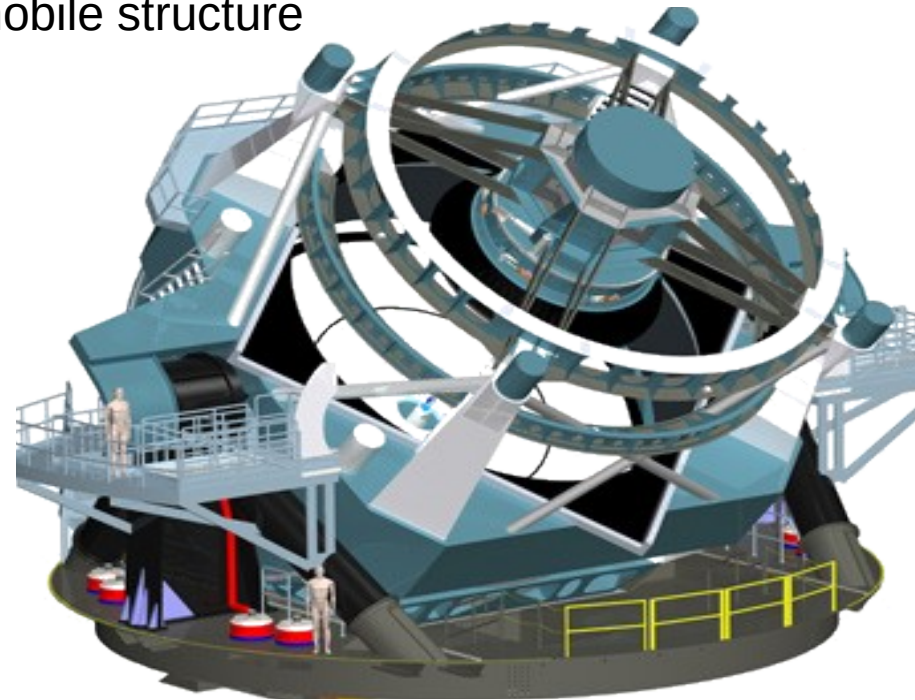
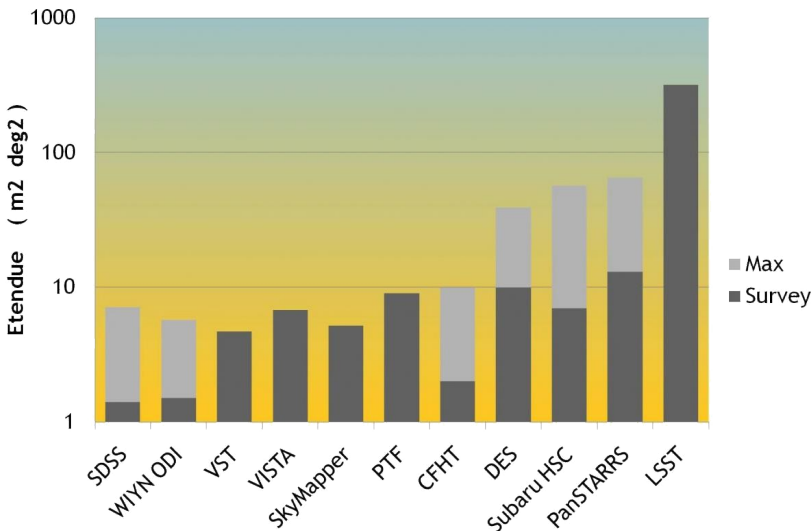
$D = 8.4 \text{ m}$ (6.7m effective)

$f/d = 1.23$

350 t mobile structure



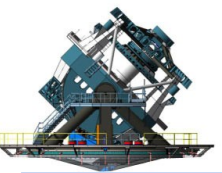
Artwork by Sandbox Studio, Chicago with Ana Kova



Étendue = surface X field of view

→ LSST: 319 m².deg²

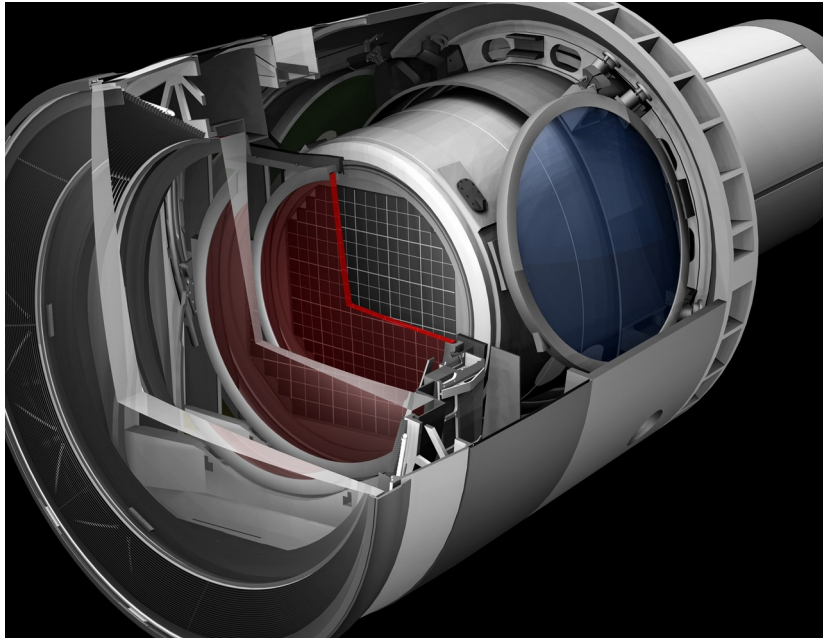




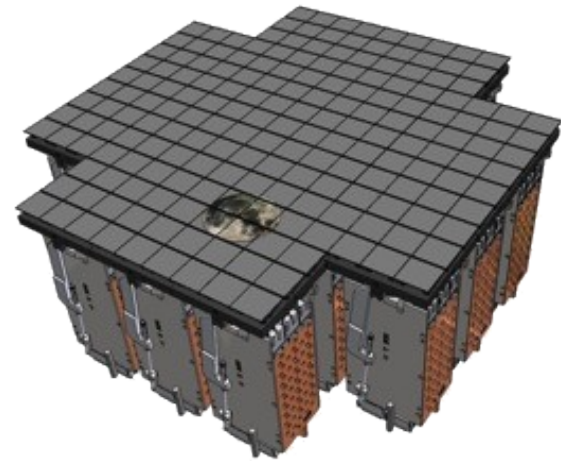
The LSST Camera



Field of view: 9.6 deg^2

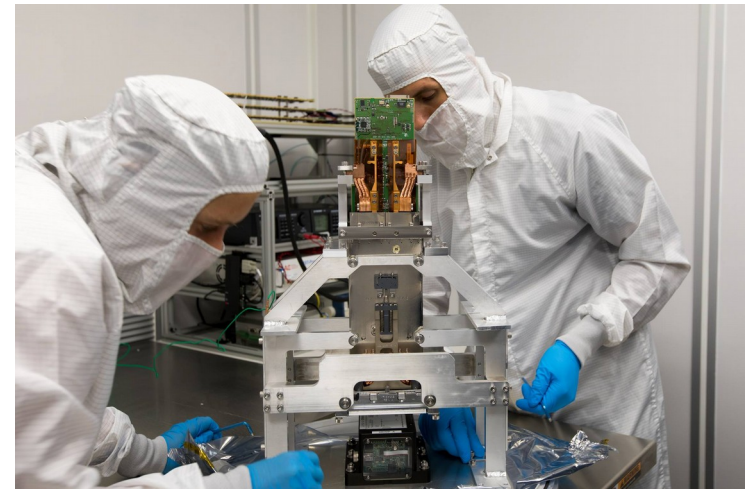


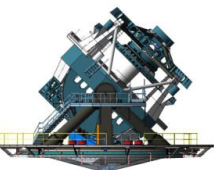
3.2 Gpixels – $0.2''$ / pixel
189 CCD (4k x 4k) deep depleted



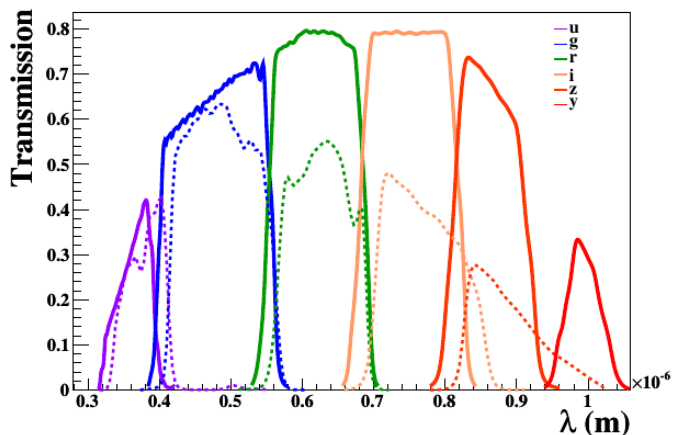
Highly segmented electronics → the full focal plane is read in 2 s

2 x 15 s exposure → 40 s total time / visit
5 s to slew to a new position





LSST Filters and French Contributions



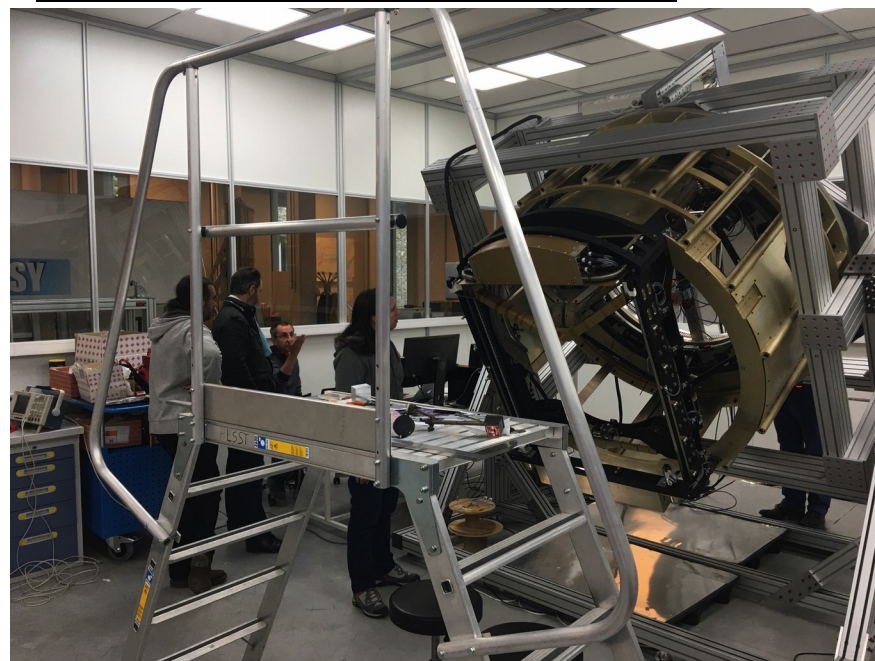
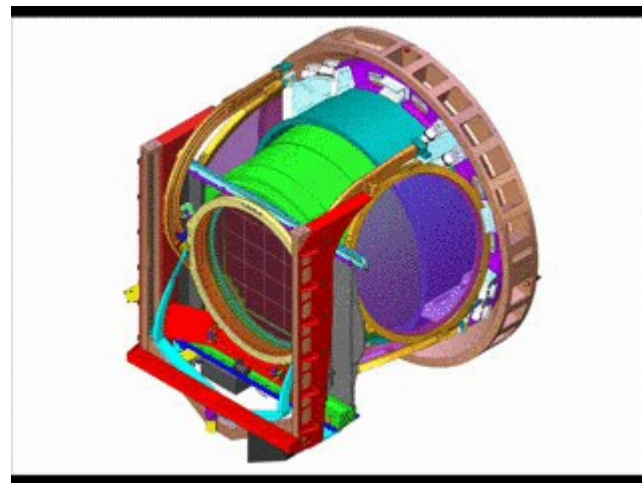
6 filters 320 – 1070 nm

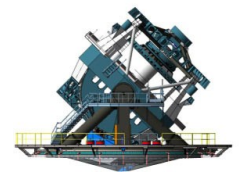
- Main tool to determine photometric redshifts

The filter exchange system design and construction is a French contribution to LSST

France is also contributing to

- CCD procurement and Electronics
- Slow control
- Stand alone Optical Bench





Fast – Wide - Deep



- Survey time : 10 years
- Main survey area : 18 000 deg²
- 2.75 10⁶ visits in 10 years
- <825> visits / pointing

LSST will visit Deep Drilling Fields several times / night → ***Transient events detection***

- ~1 million alerts / night

Working hard to define the best observing strategy

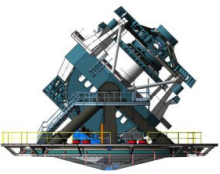
	u	g	r	i	z	y
Single visit	23.9	25.0	24.7	24.0	23.3	22.1
10 years	26.1	27.4	27.5	26.8	26.1	24.9

LSST is particularly optimized for

- Fast detection of faint objects
- Transient event detection
- Precise measurement of Star positions and colors
- Precise measurement of Galaxy shapes and colors

Science Collaborations

- Solar System
- AGN
- Dark Energy
- Milky Way, Stars and Local Volume
- Galaxies
- Informatics and Statistics
- Strong Lensing
- Transients and Variable Stars



Summit Site at Cerro Pachón



Février 2017



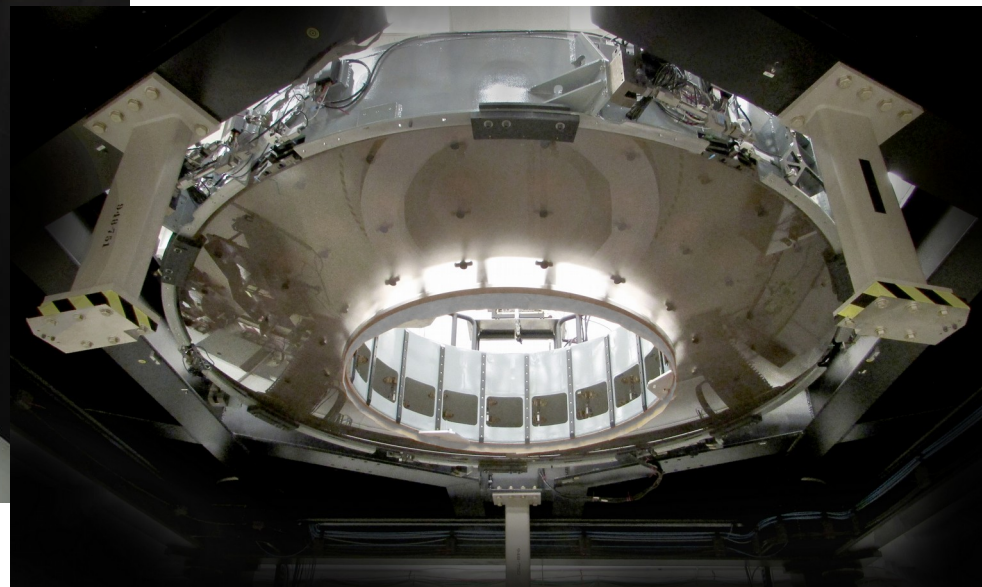
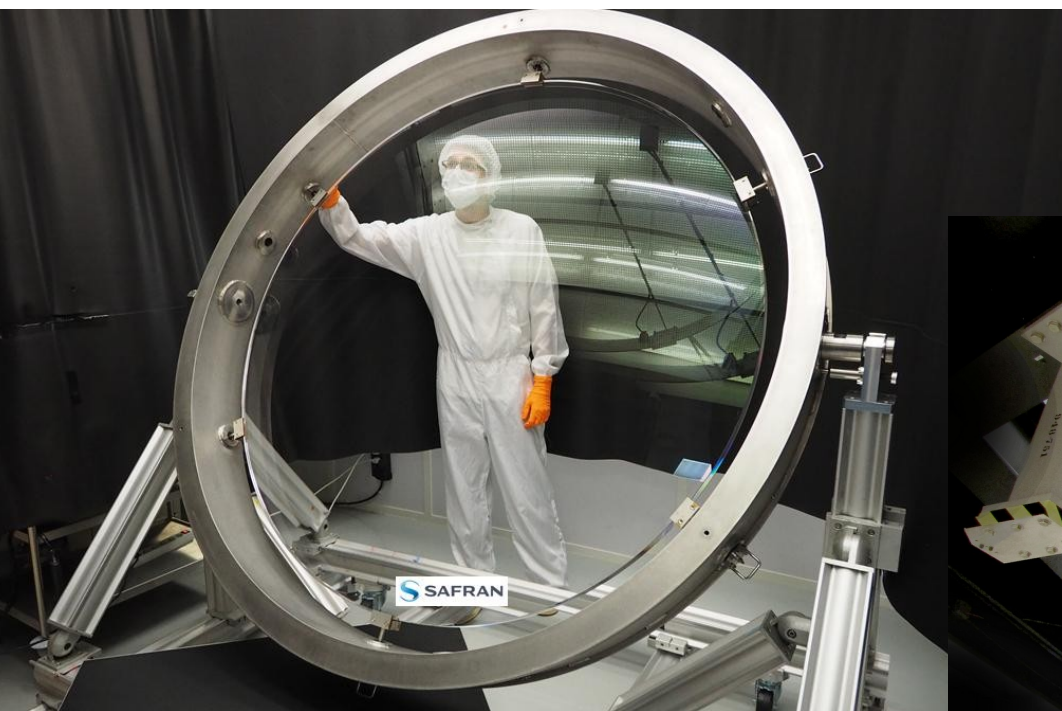
© Wil O'Mullane

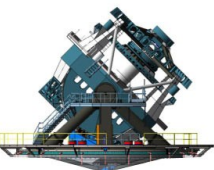
Octobre 2018



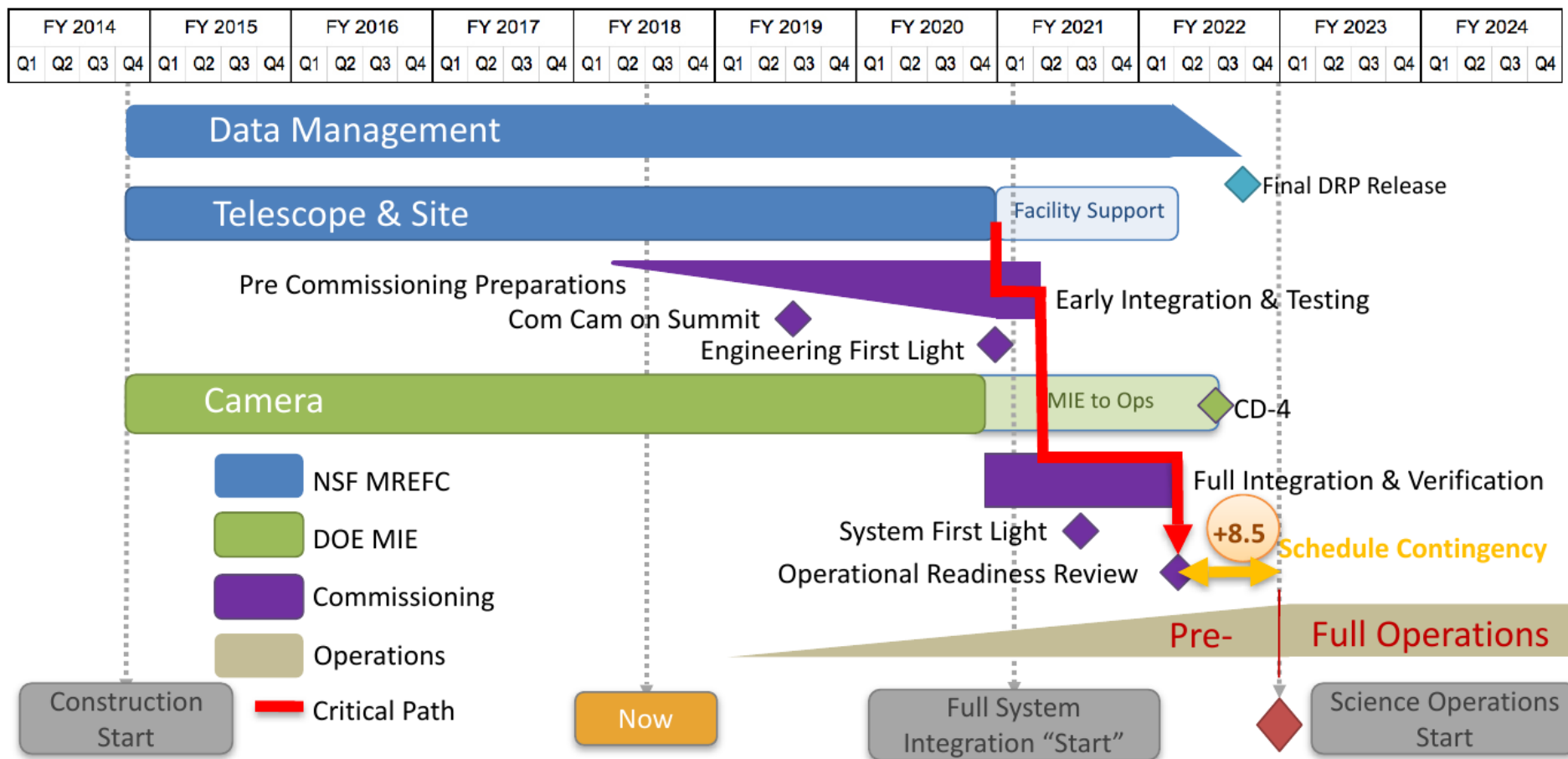


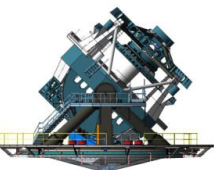
Asturfeito, S.A., Spain





LSST Schedule





Only country involved in LSST construction outside US and Chile

- Focal plane – Filter exchange system – Slow control – Camera Optical Bench

Responsible for 50% of the annual Data Release Production @CC-IN2P3

- Full dataset available including raw images

IN2P3 is mainly involved in the Dark Energy Science Collaboration

- Large Scale Structures / BAO
- Galaxy Clusters
- Supernovae



Currently busy within DESC with a 300 deg² Data Challenge (DC2) :

- Cosmo catalog
- Image simulation
- **Catalog generation**

