

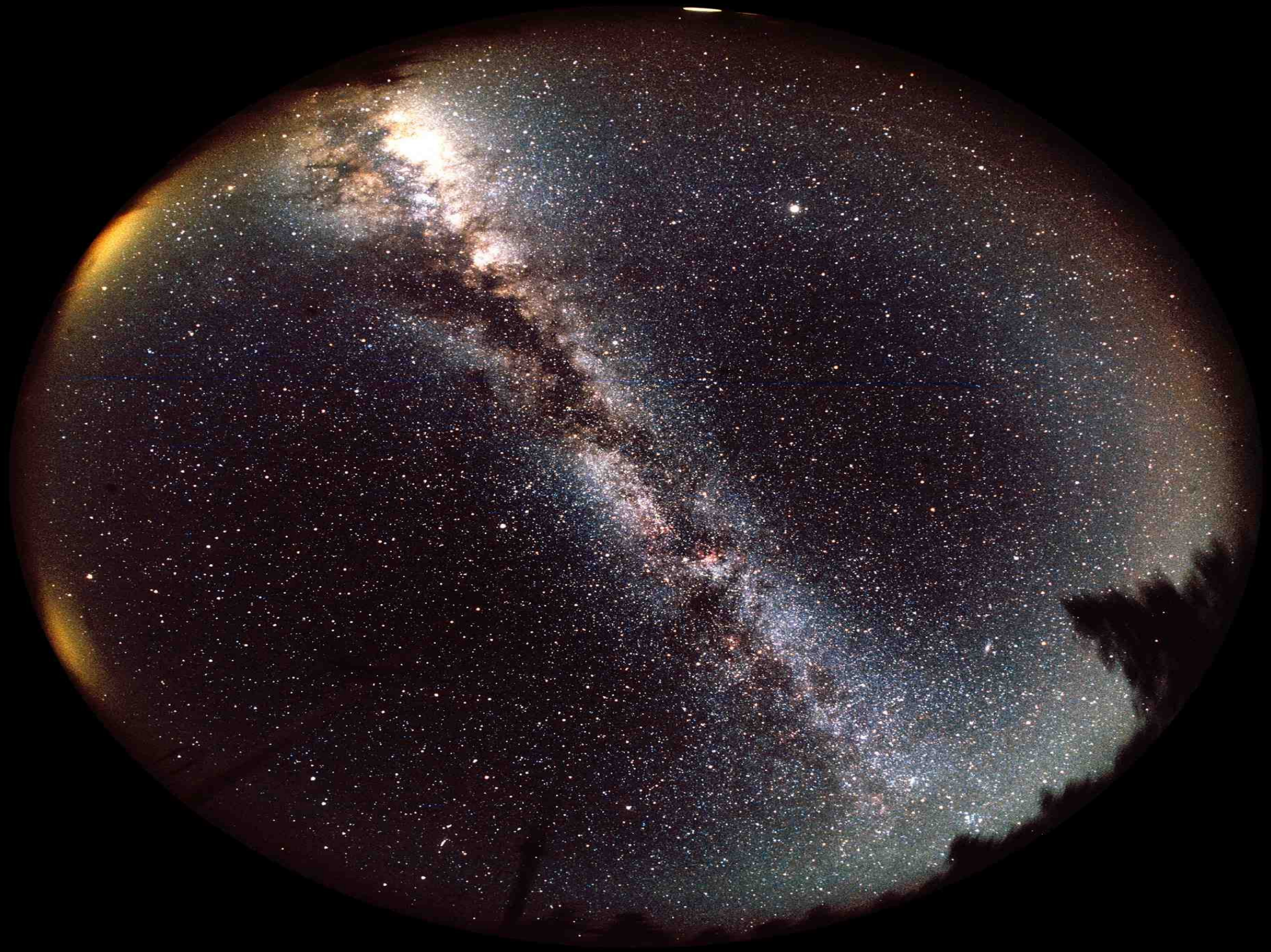
Telescópios



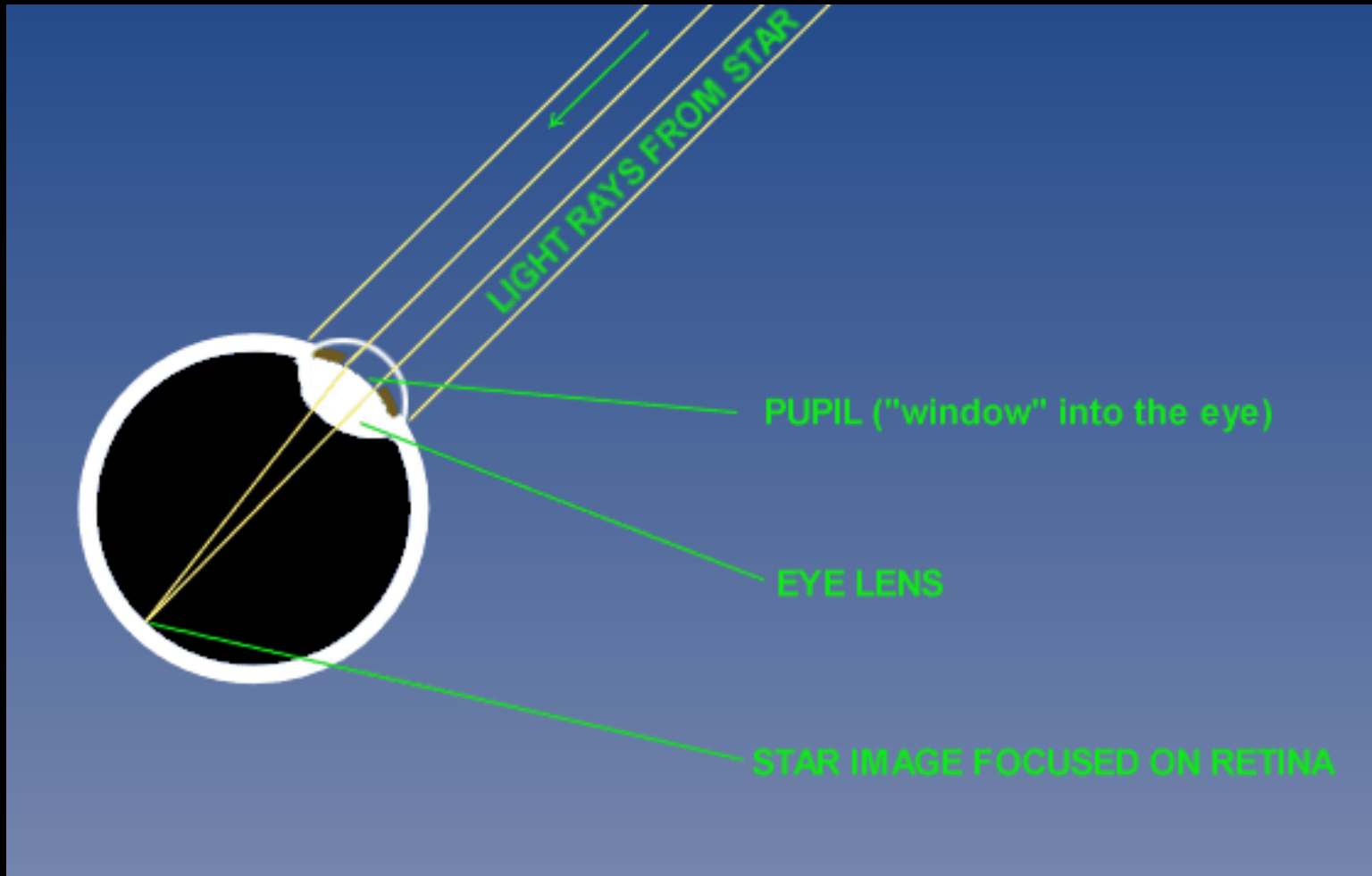
AGA 210 – Introdução à Astronomia
Ana Cecília Soja
2011

Resumo

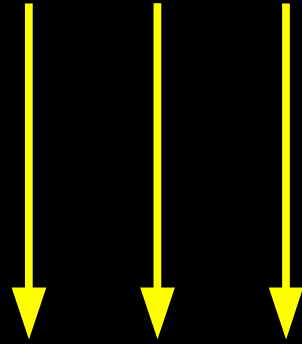
- O que é o telescópio?
- História do Telescópio
 - _ Primeiros telescópios e observações
- Telescópios Ópticos
 - _ Refratores X Refletores
 - _ Técnicas de observação
- Telescópios não ópticos
- Telescópios no Brasil



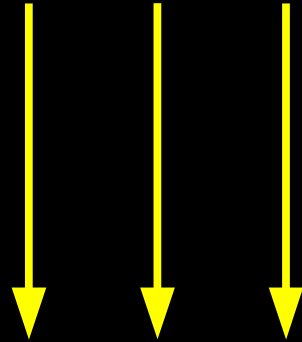
Telescópio



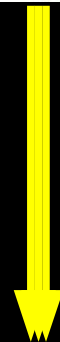
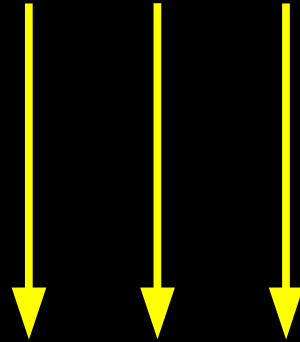
Telescópio



Telescópio



Telescópio

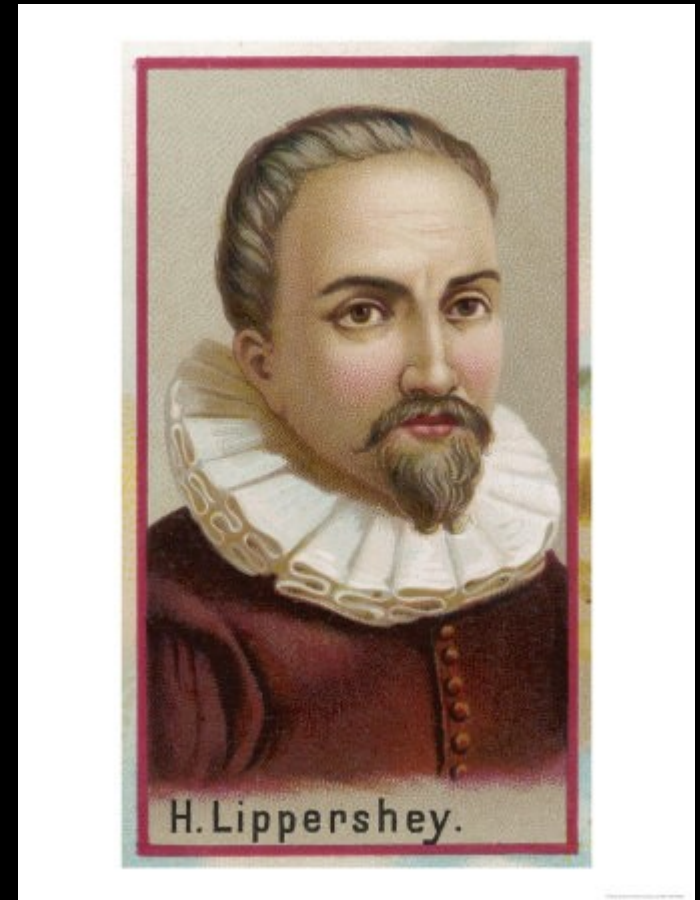
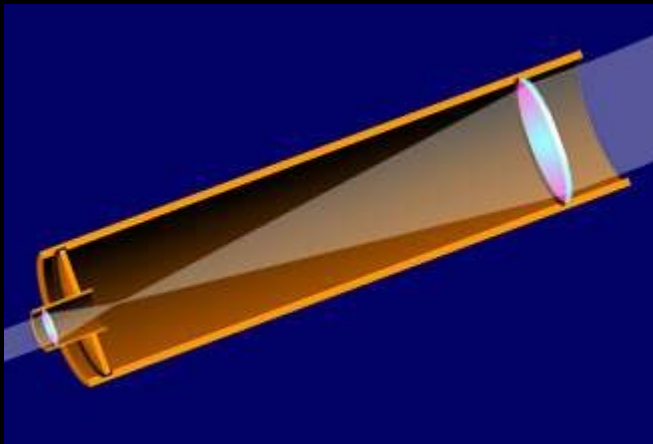


Telescópio



História

- 1608: Hans Lipperhey
 - Considerado o inventor do telescópio.

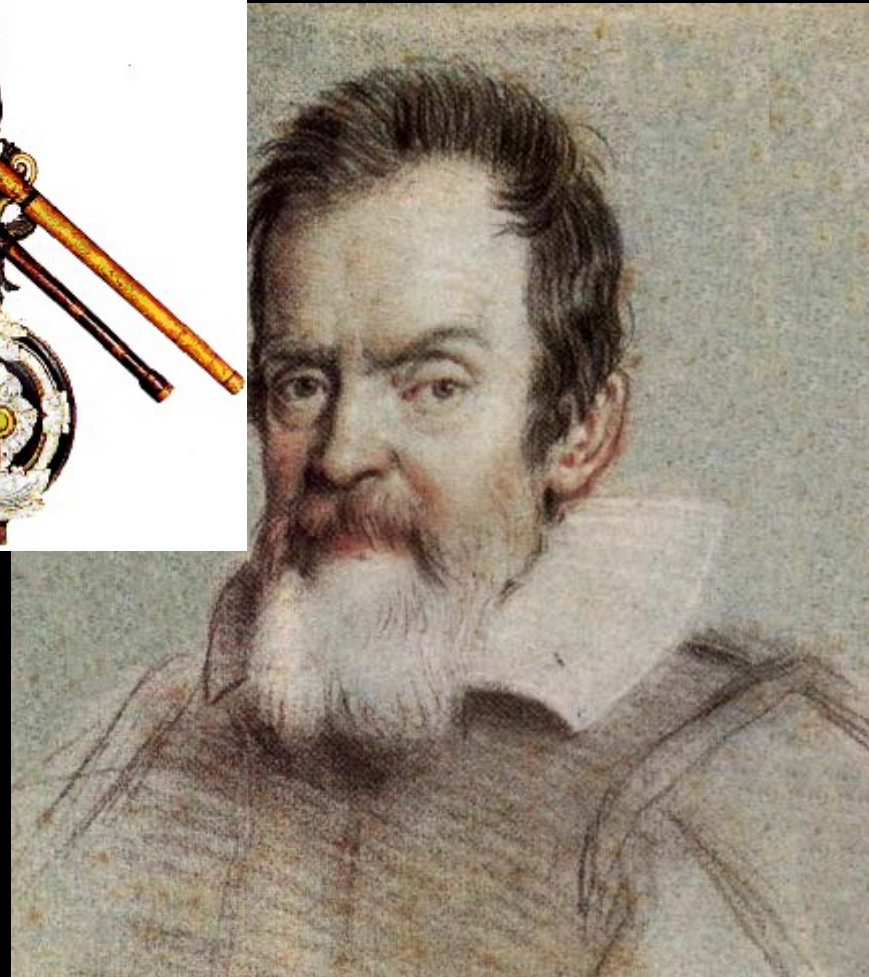
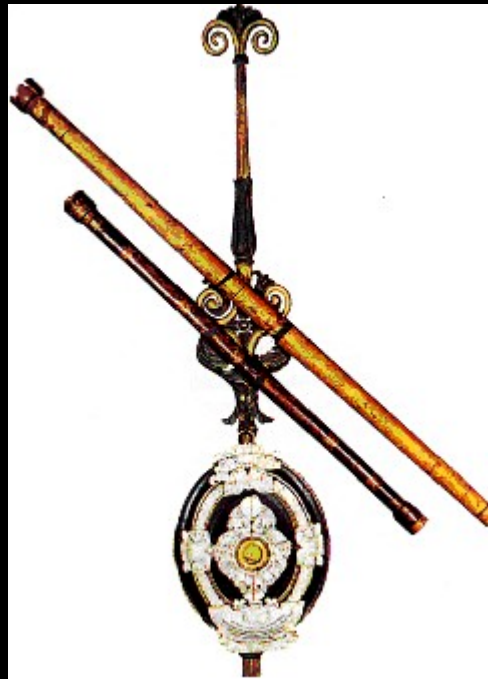


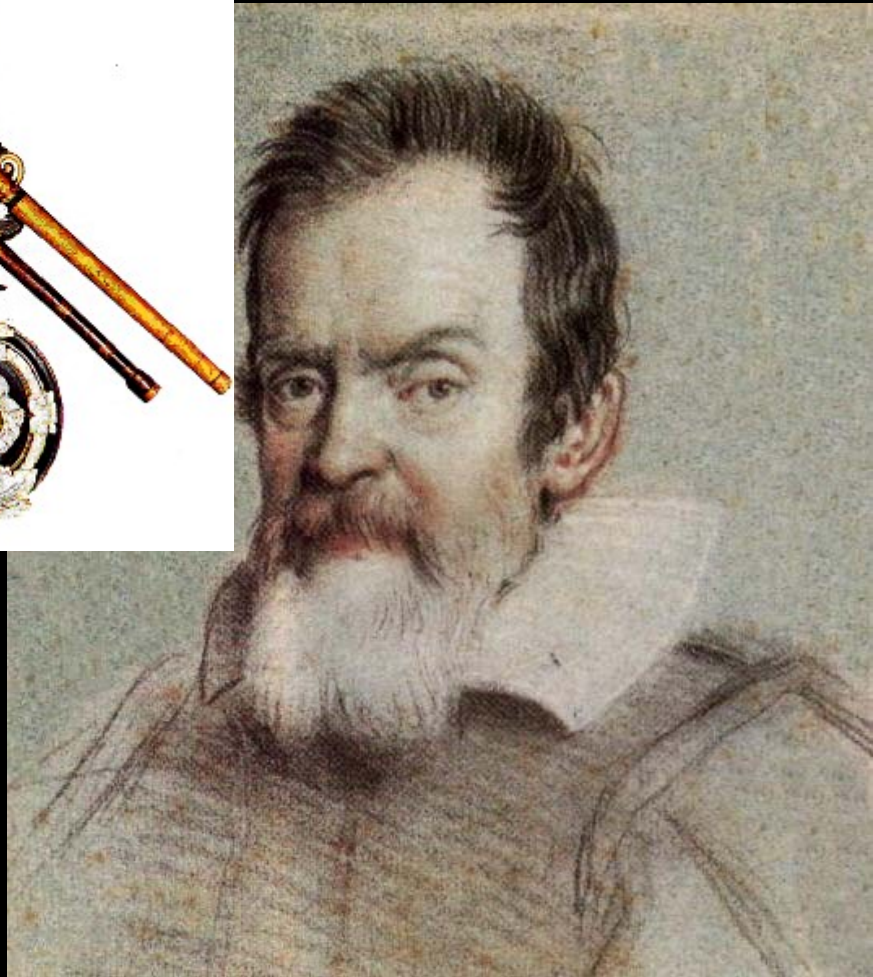
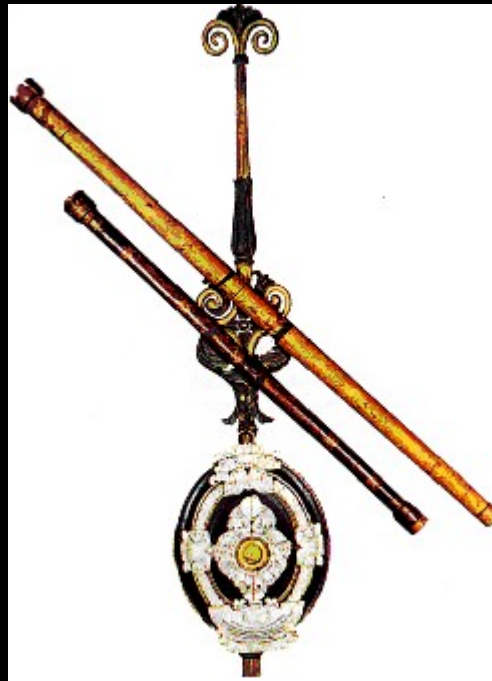
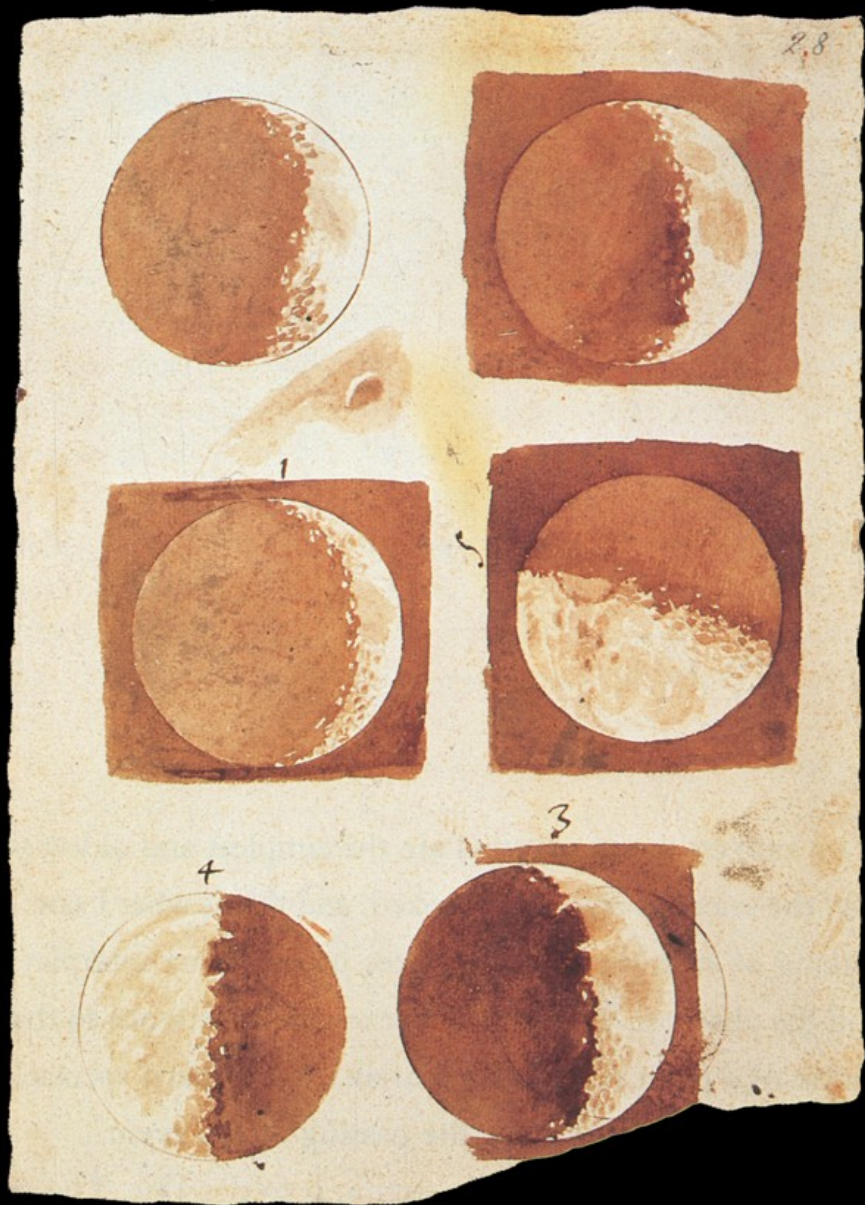
História

- 1609: Galileo Galilei
 - Primeiro a observar o céu com um telescópio.
 - Responsável por grandes e surpreendentes descobertas!



Luas de Júpiter





Rugosidade da Lua

Telescópio

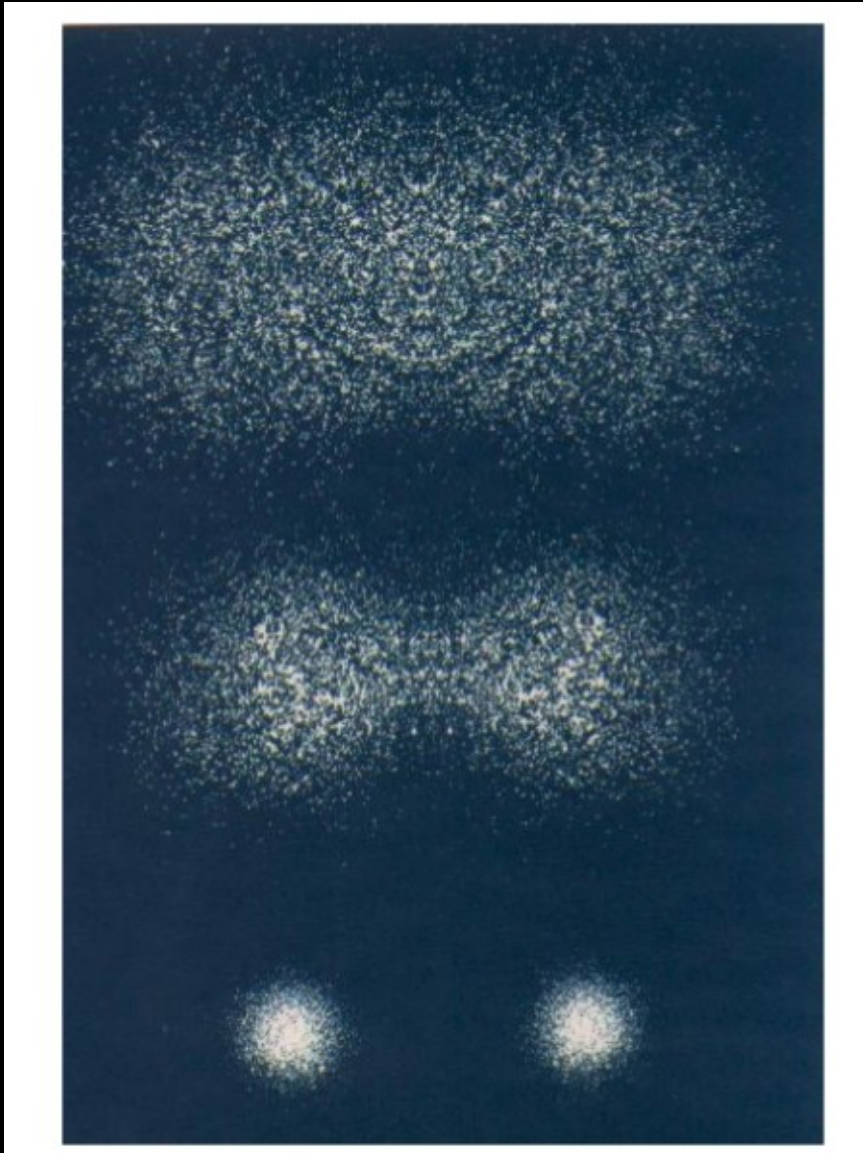
Importância do tamanho



musée de la ville de
Lyon



Exemplo de Resolução Angular



$$\theta \text{ (rad)} = \frac{\lambda}{D}$$

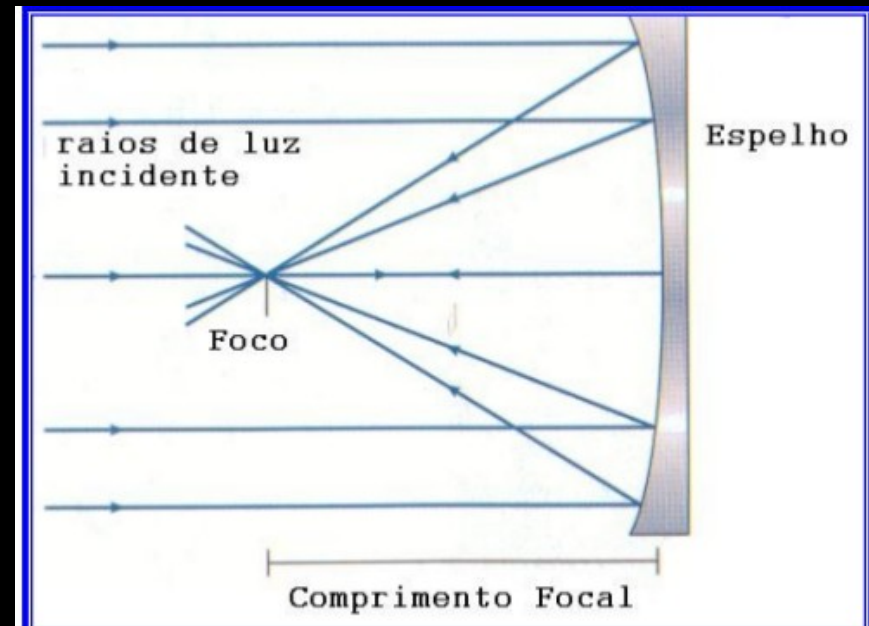
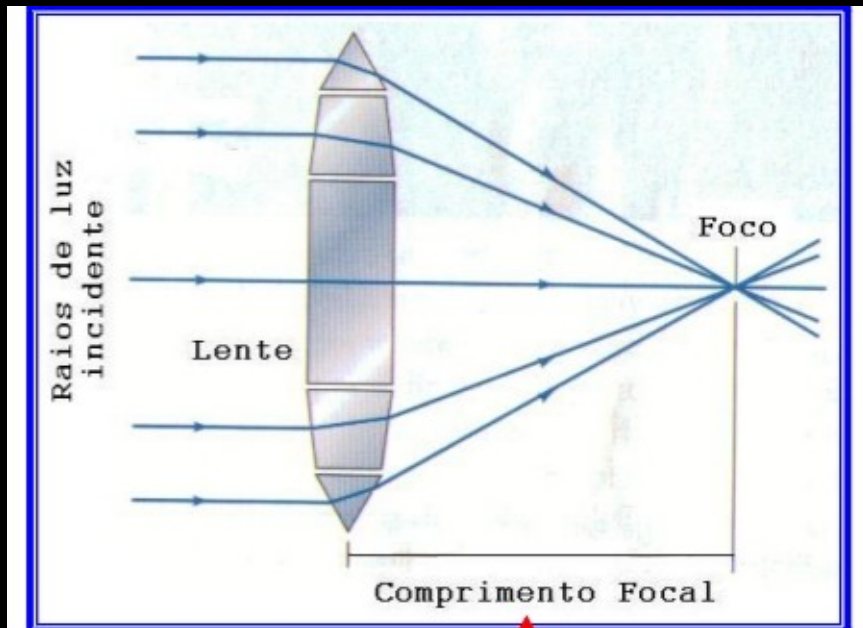
Para um mesmo comprimento de onda, quanto maior o Diâmetro, maior a resolução.

Yerkes Observatory

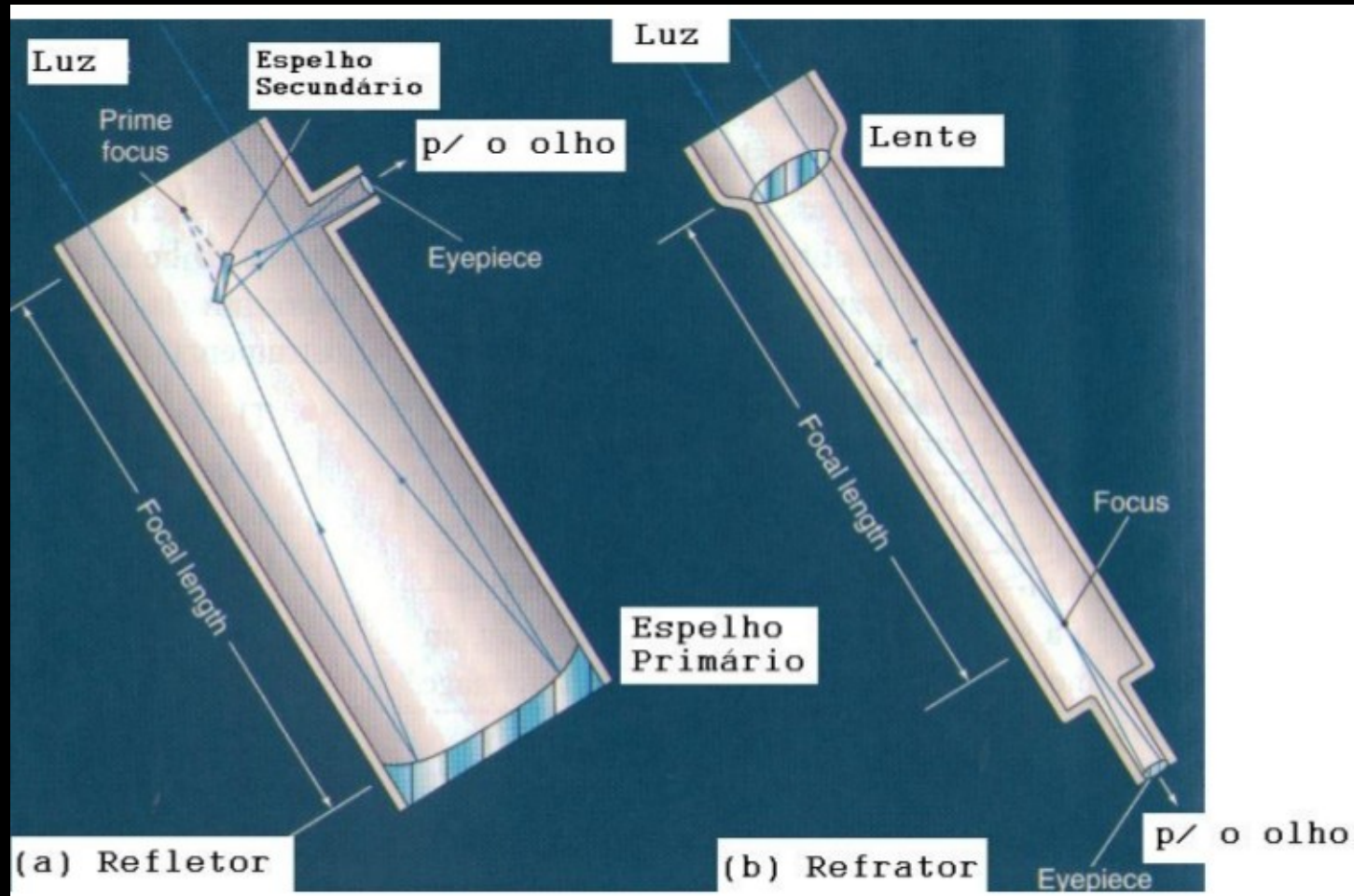
Lente de
aproximadamente 1m
– que deformava a si
mesma.



Refrator X Reflector



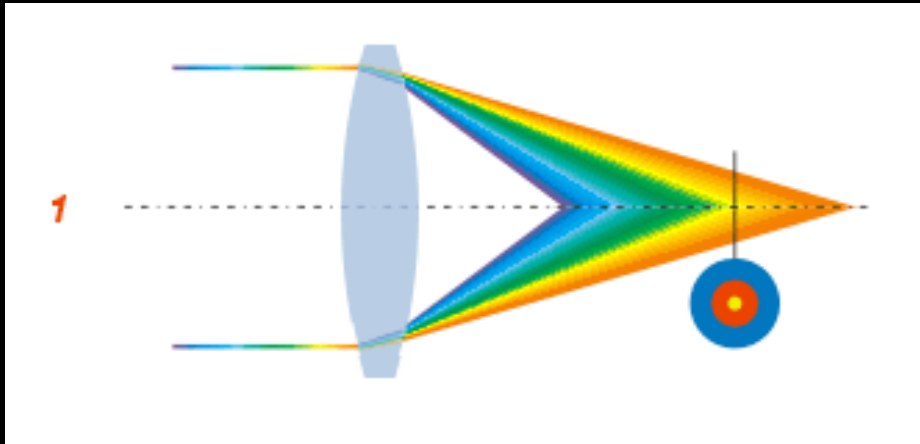
Refrator X Reflector



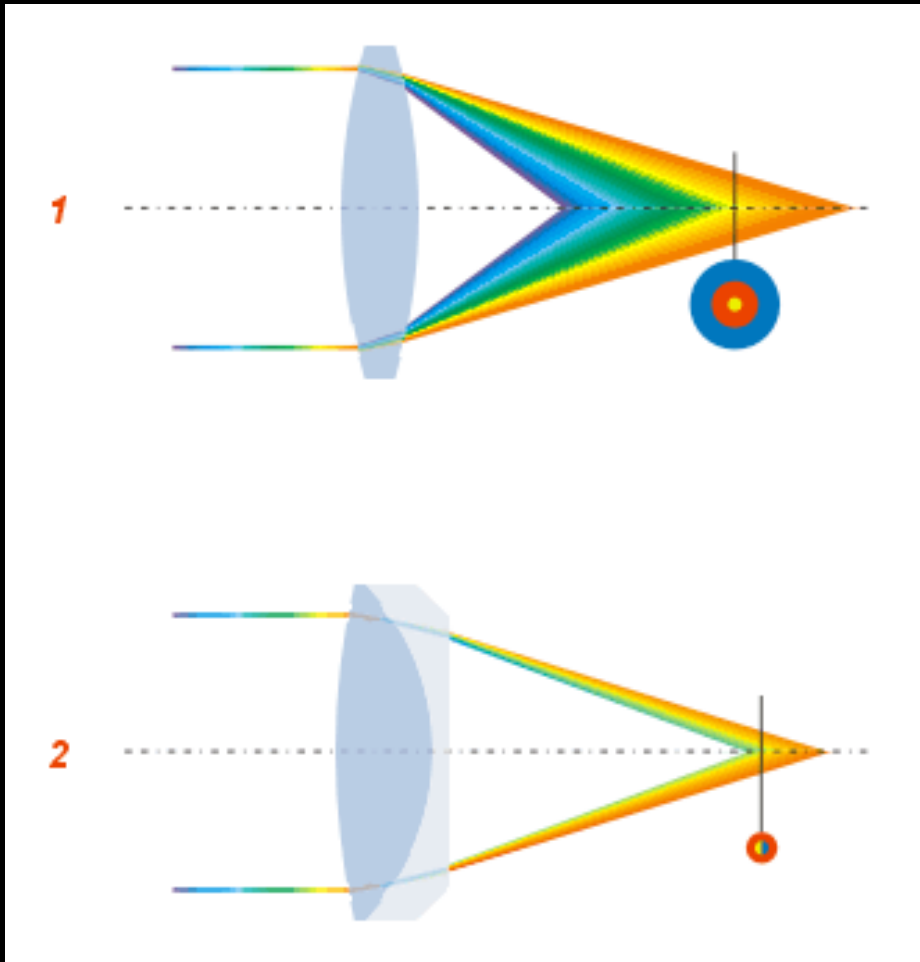
Refrator X Refletor



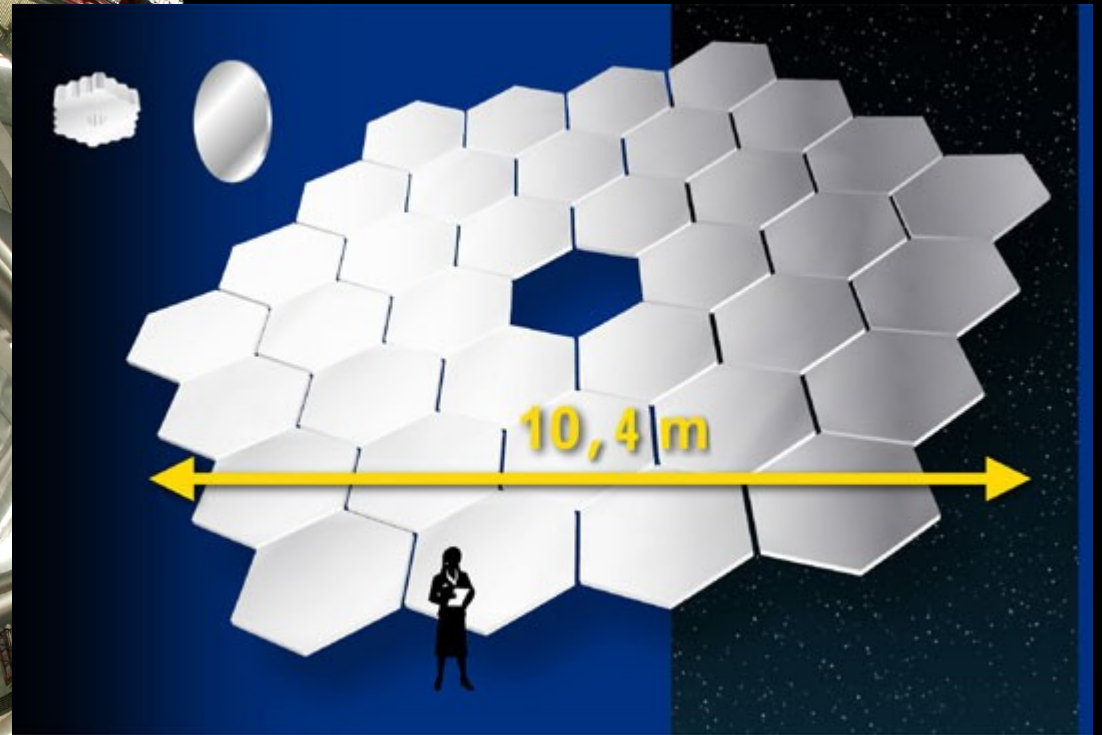
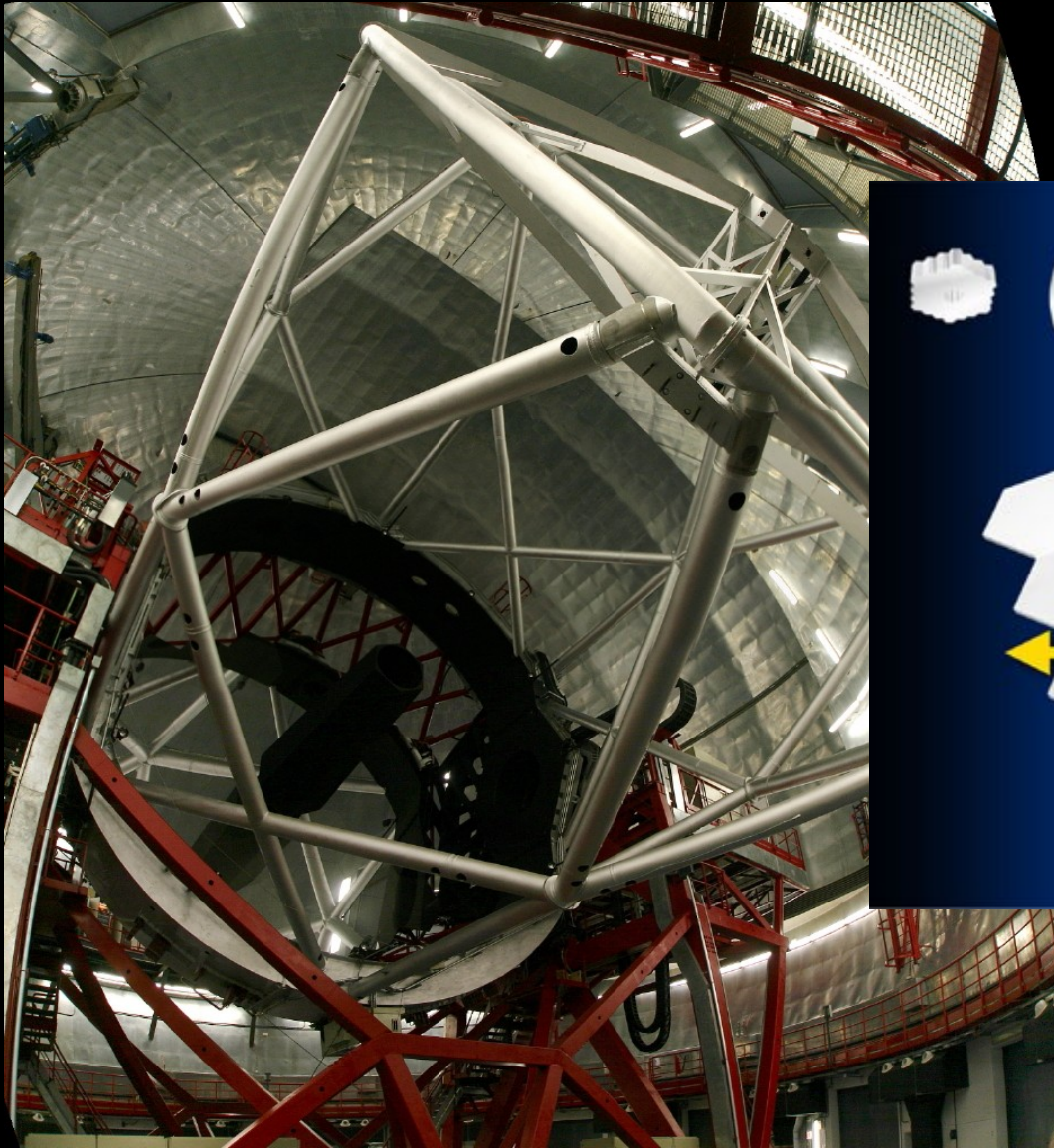
Refrator X Refletor



Refrator X Refletor



Refrator X Refletor



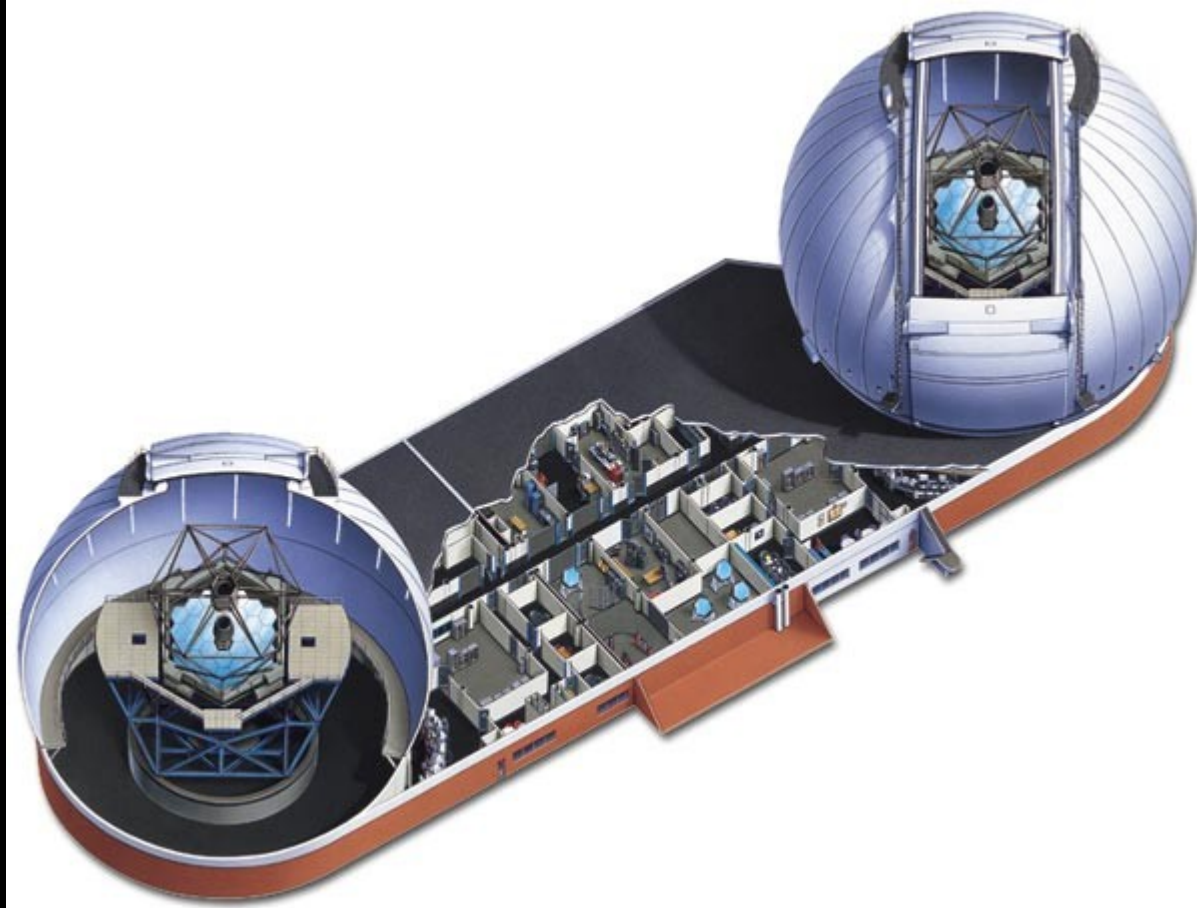
Gran Telescopio Canárias
2007

Keck

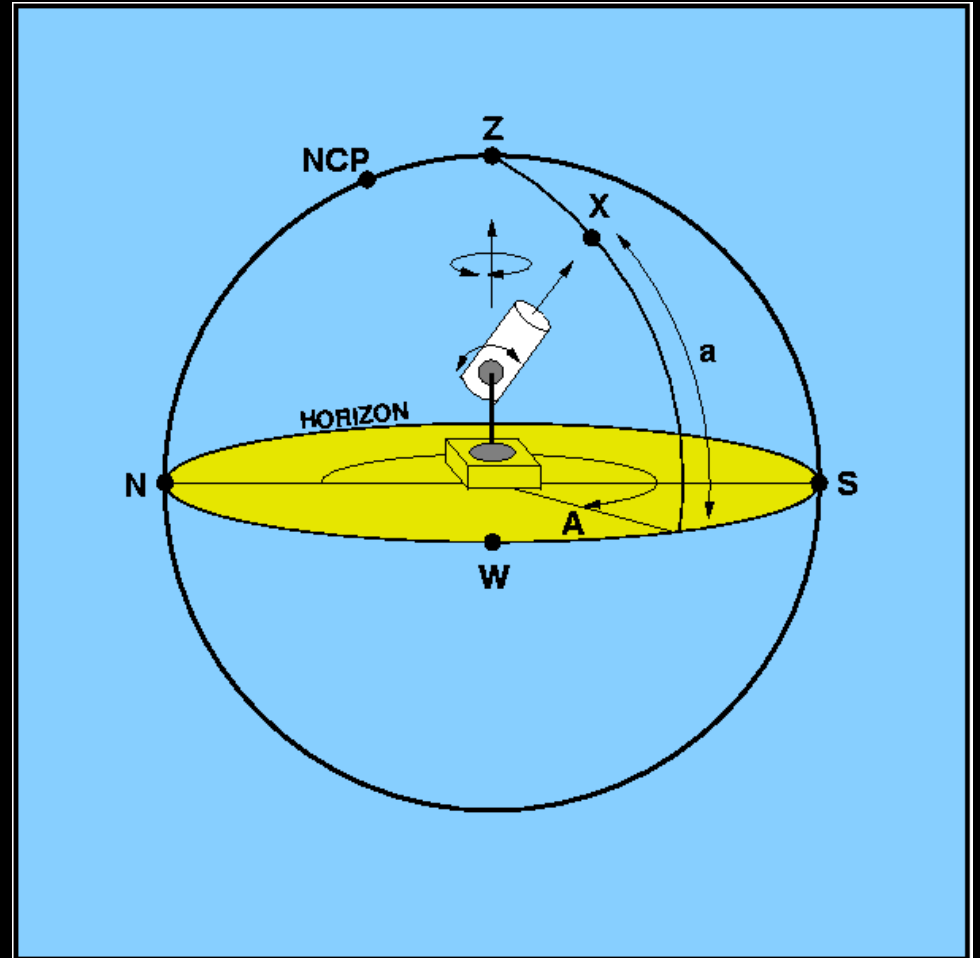
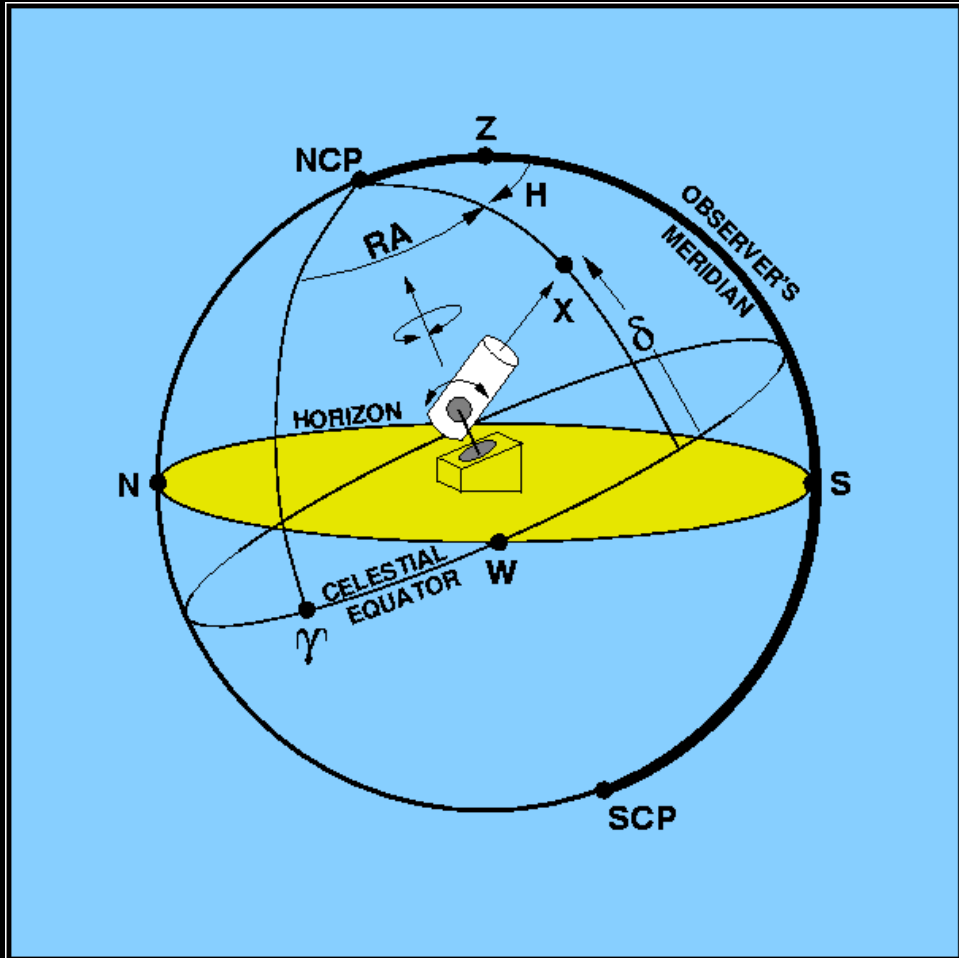
Mauna Kea (Hawaii)
Estados Unidos
4200 m
10m cada
1993,1996



Keck



Montagens



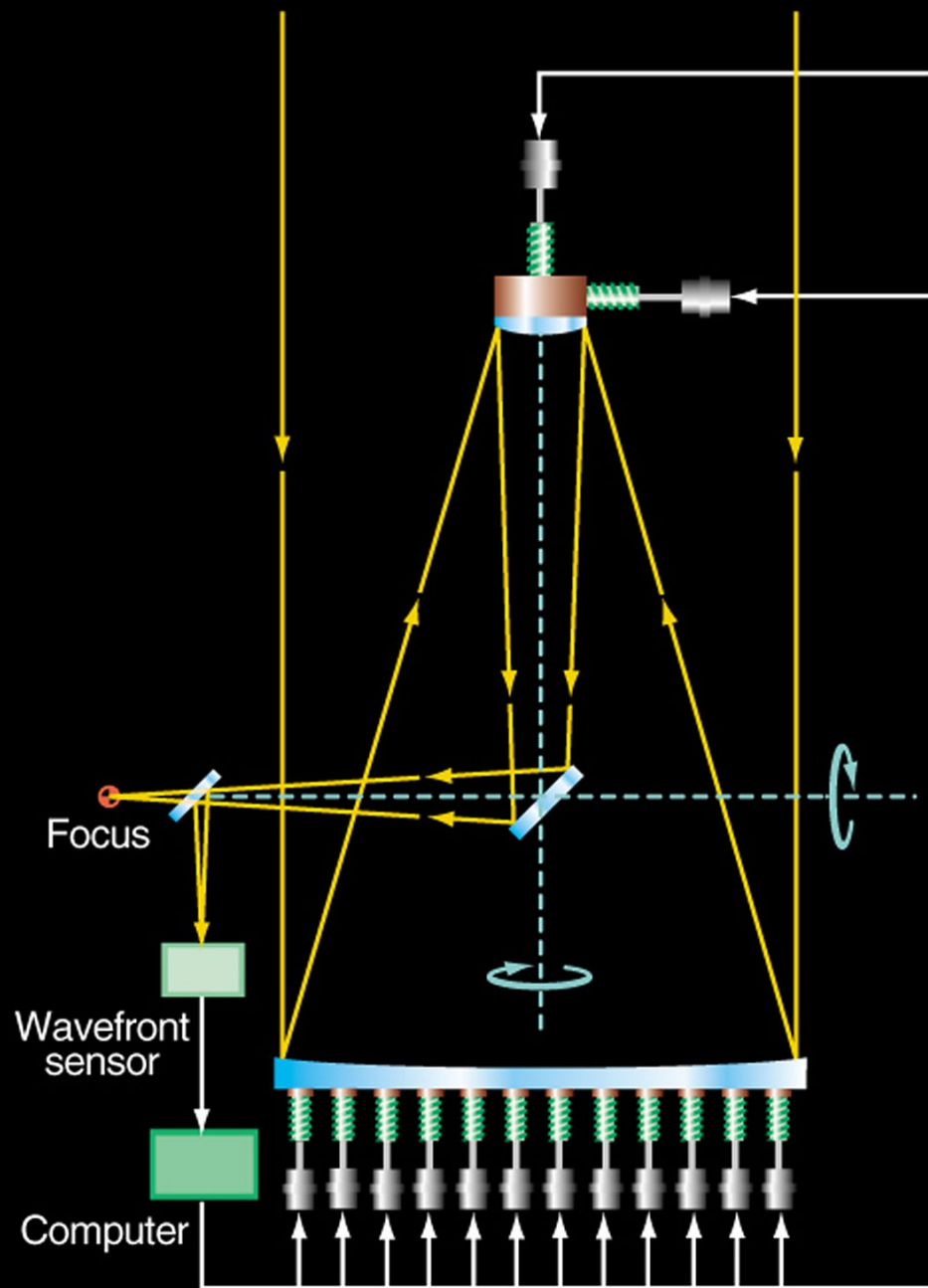
Montagem Equatorial



Montagem Azimutal

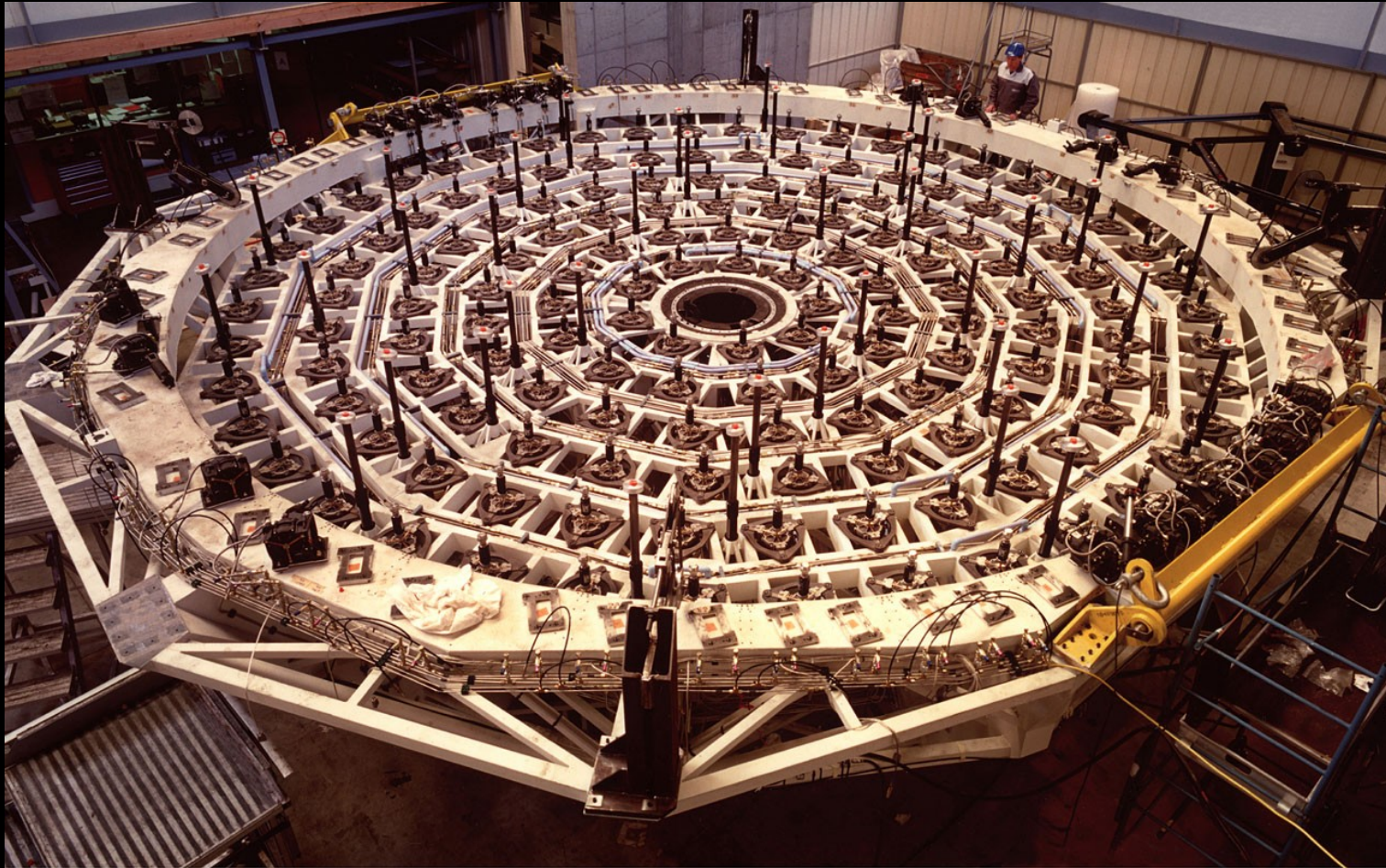


Óptica Ativa



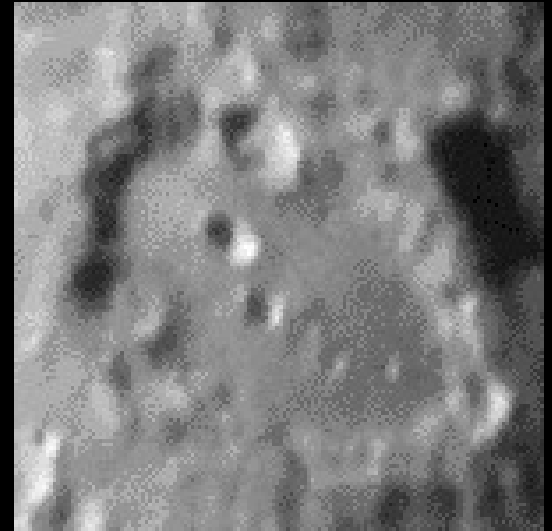
Ajustes para evitar deformidades no espelho.

Óptica Ativa



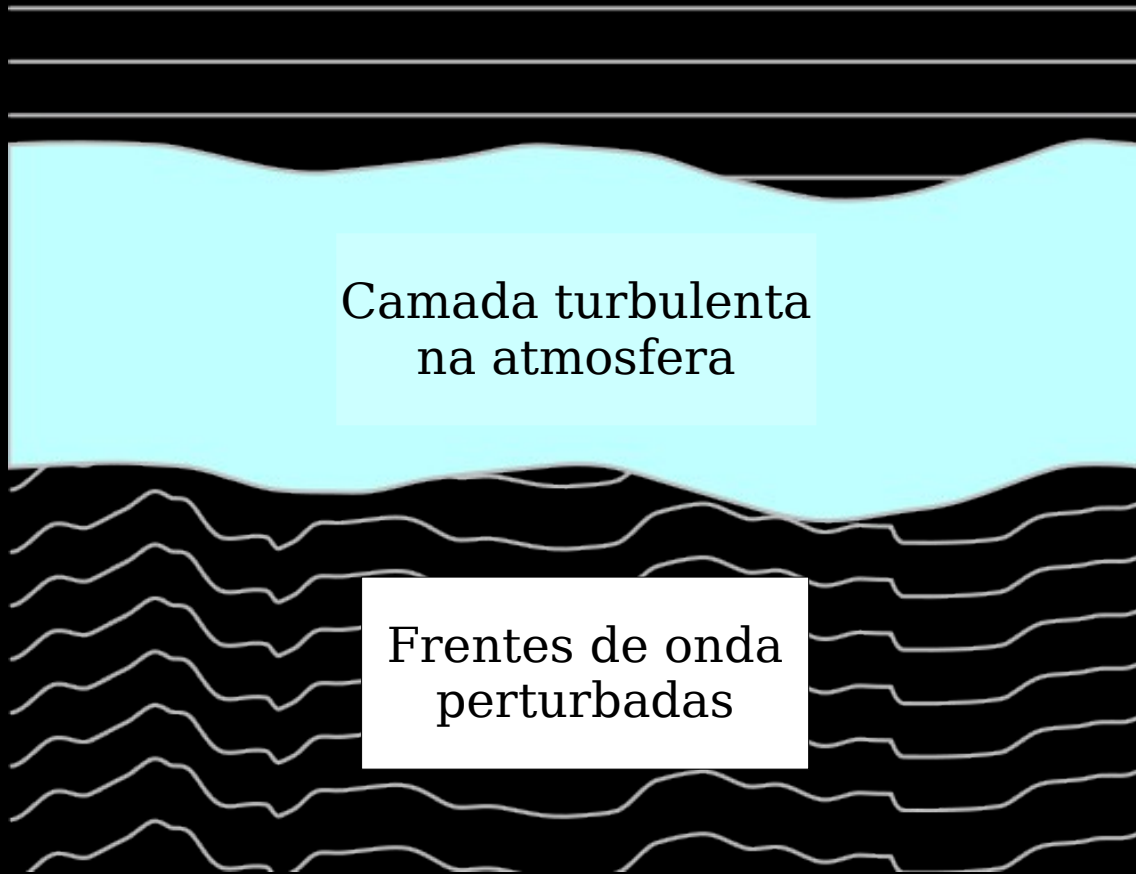
VLT - 8,2m - 150 atuadores - 17 cm de espessura - 22 toneladas





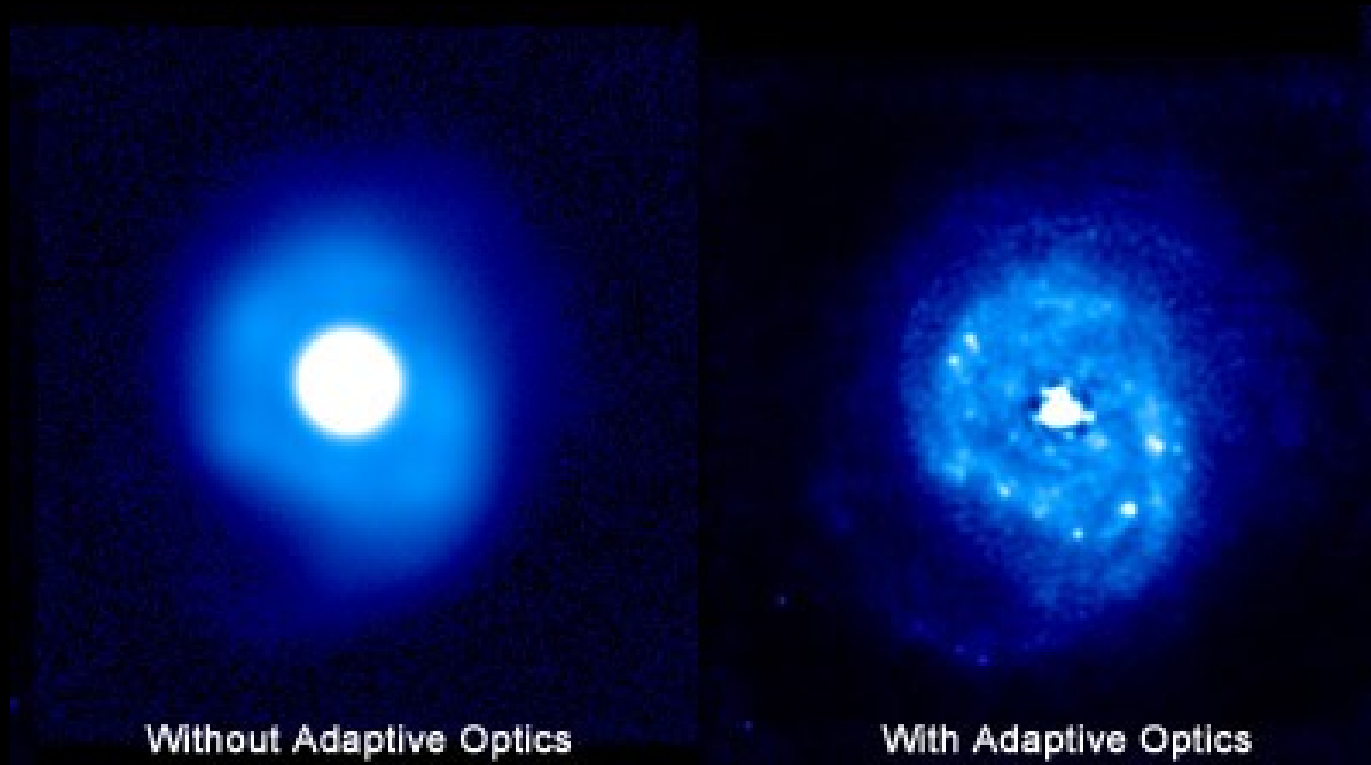
“Seeing”

Ondas planas de fonte distante





Óptica Adaptativa



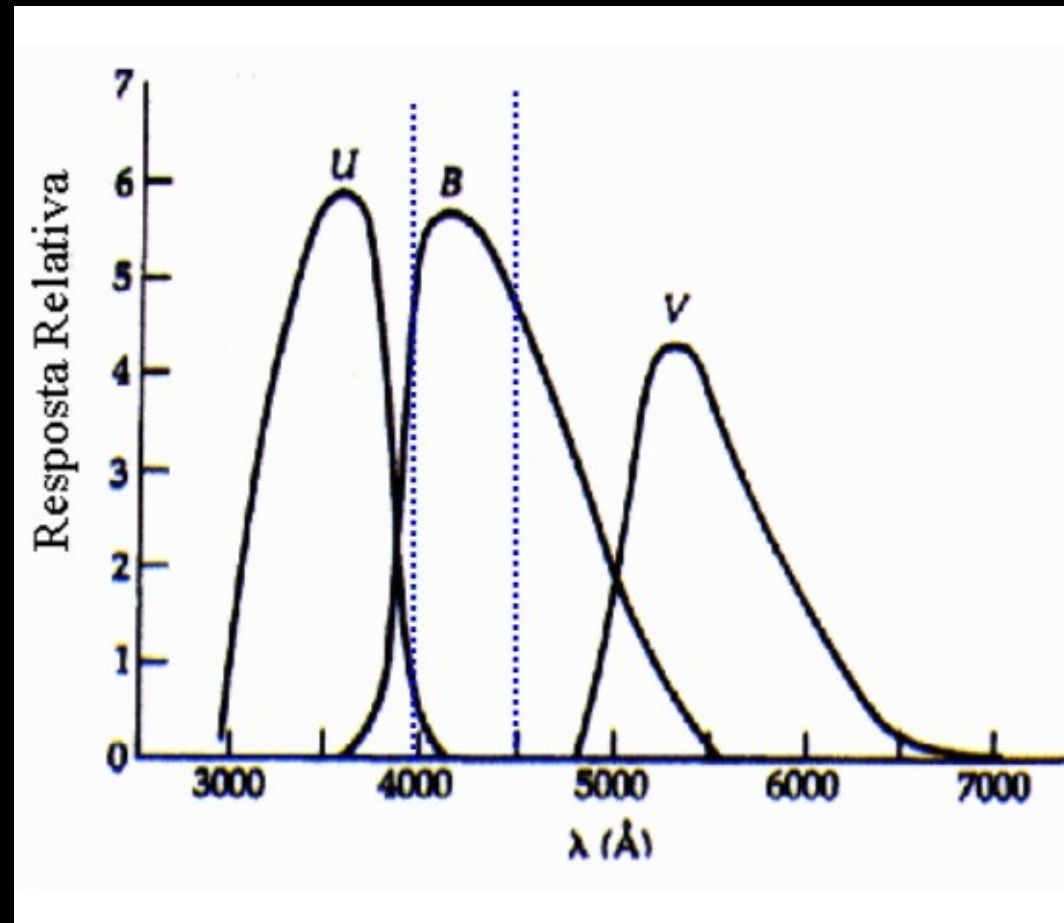
NGC 7469 - CFHT

CCD

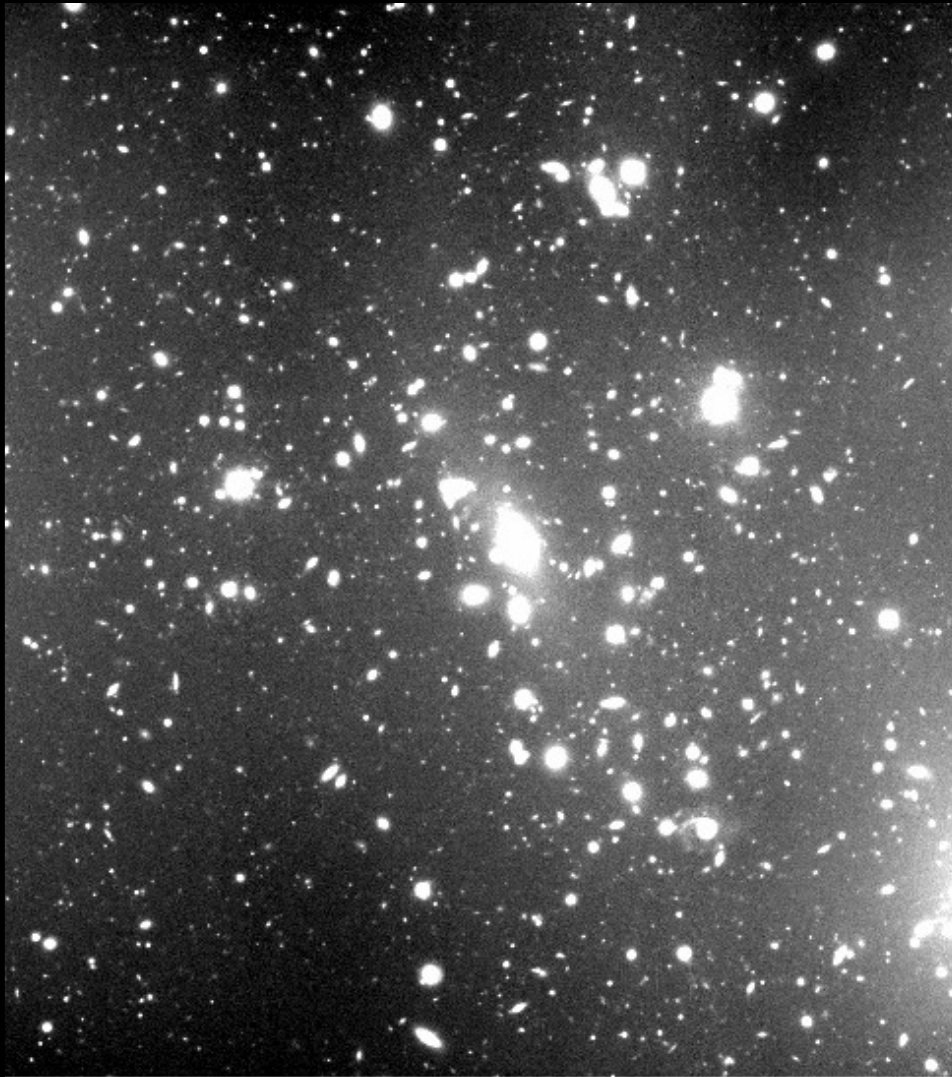
- CCD (Charge-Coupled Devices): pastilha de silício (chip) dividida em vários elementos chamados pixels (picture elements)
-
- Quando a luz atinge um pixel uma carga elétrica é liberada no CCD.
-
- A quantidade de carga é diretamente proporcional ao número de fótons incidentes naquele pixel.
-
- “intensidade” de luz recebida naquele ponto.
-

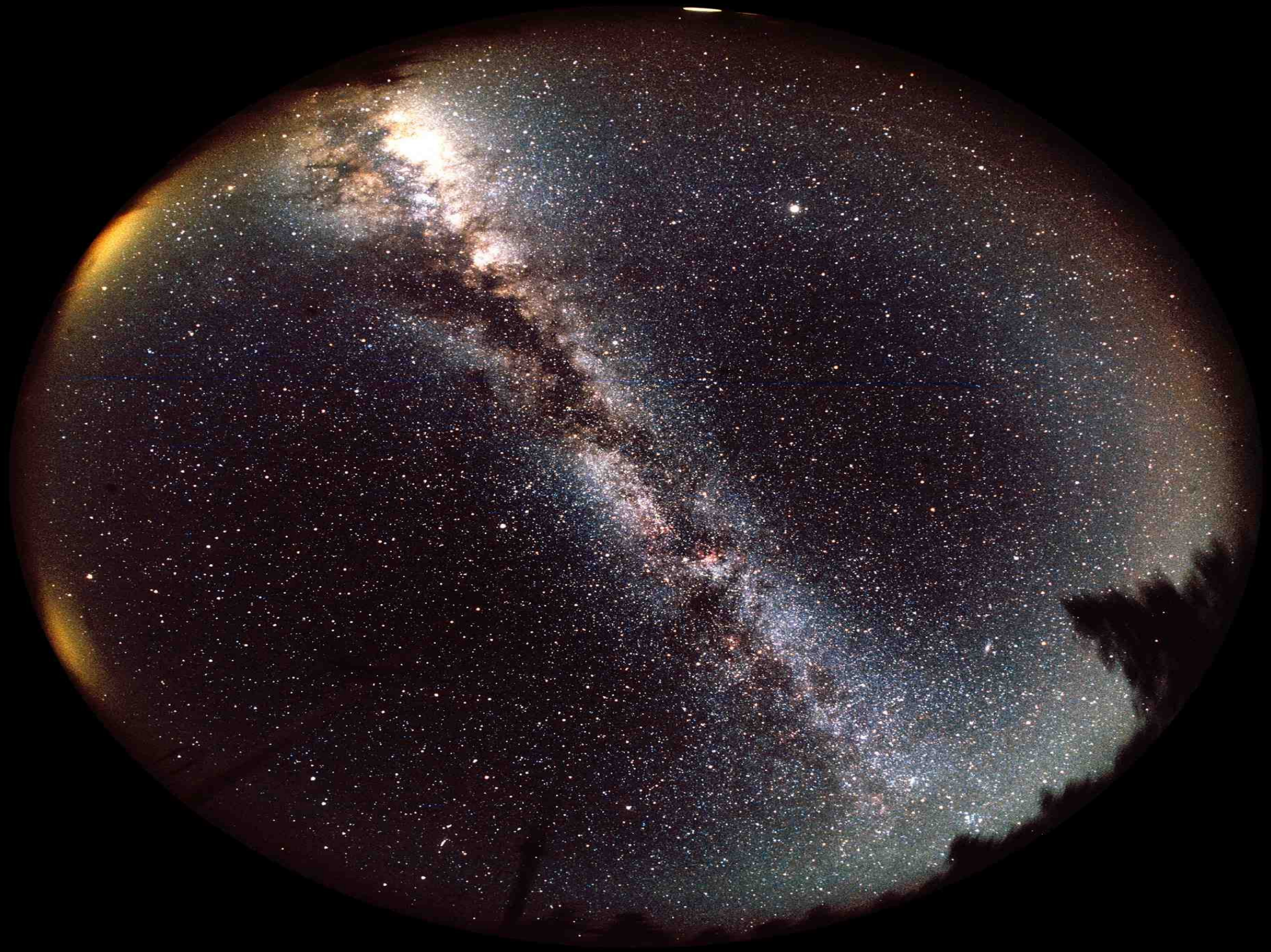
Cores

Uma forma de obter cores em Imagens é combinando vários filtros.



Cores



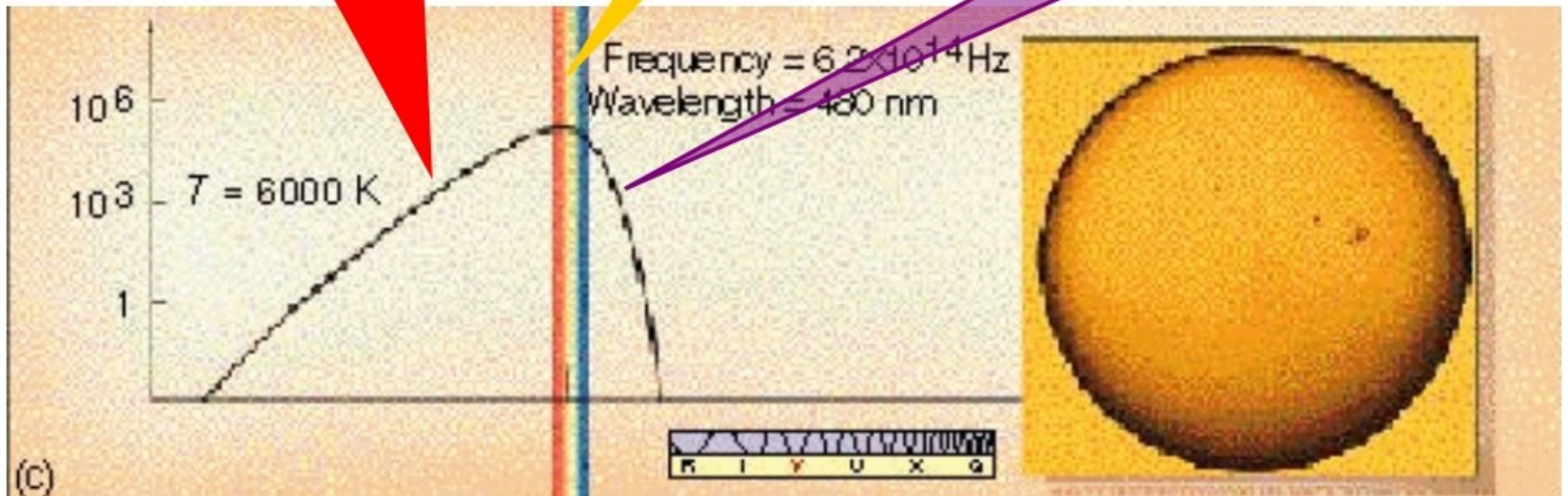


Comprimentos de onda

infravermelho

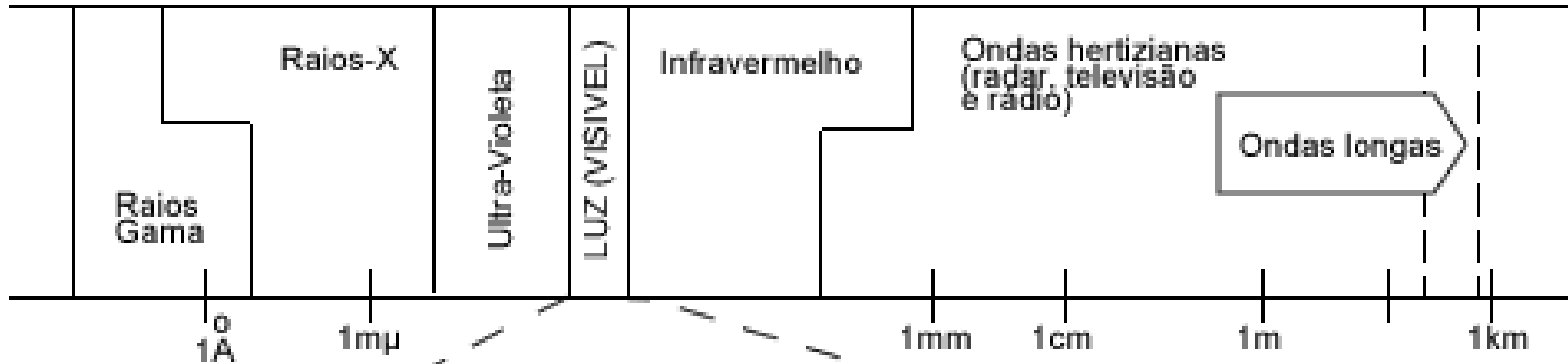
visível

ultravioleta

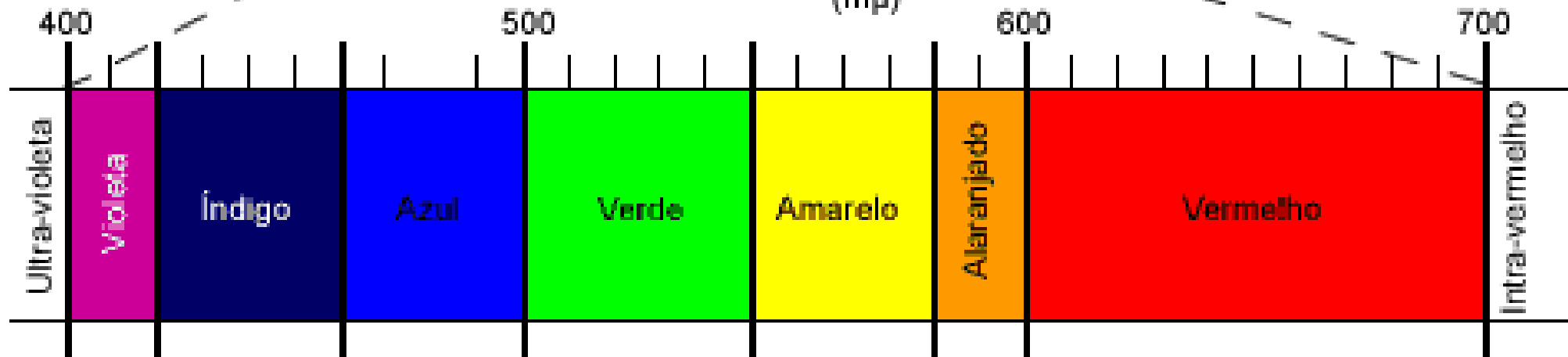


Comprimentos de onda

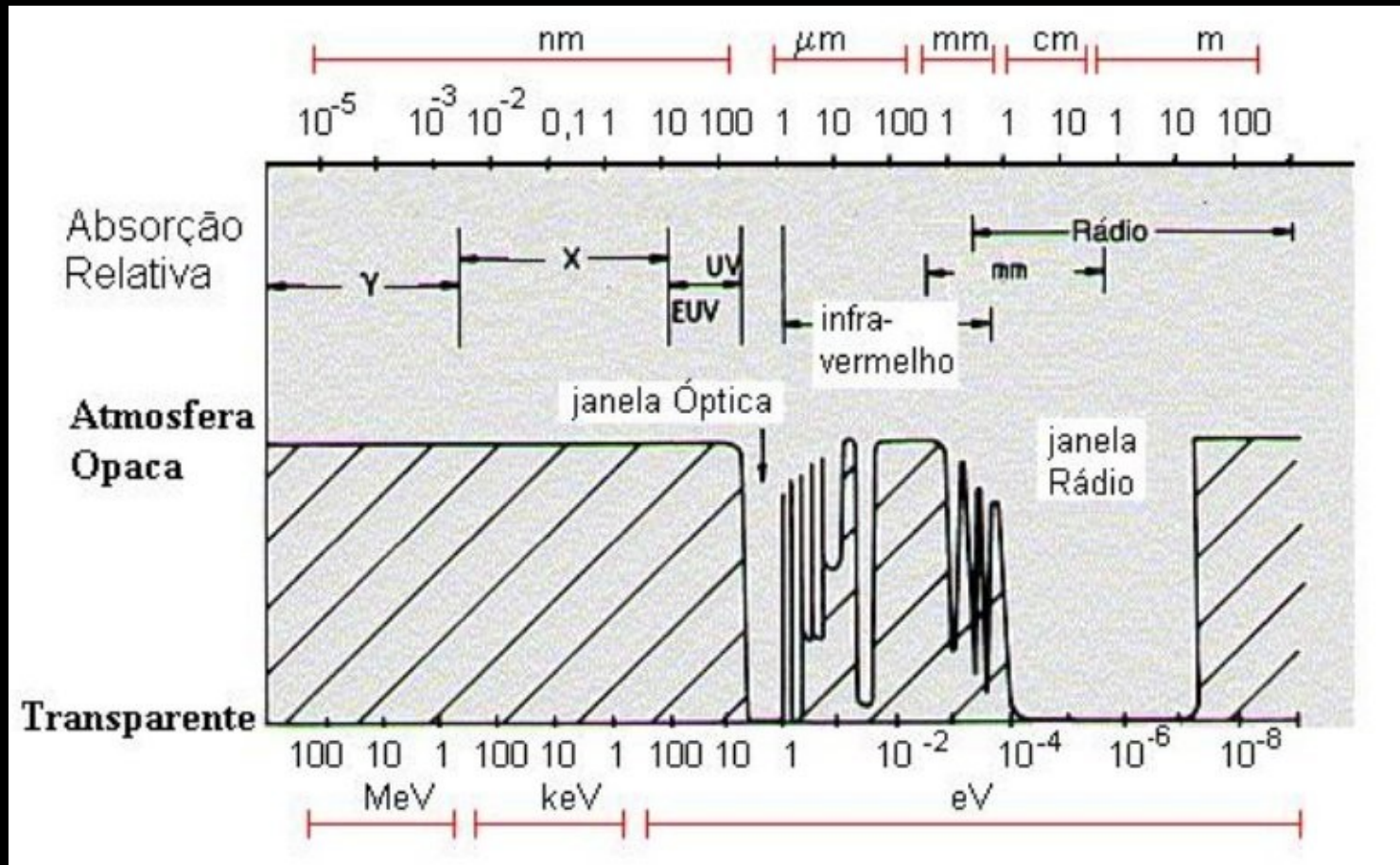
ESPECTRO ELETROMAGNÉTICO



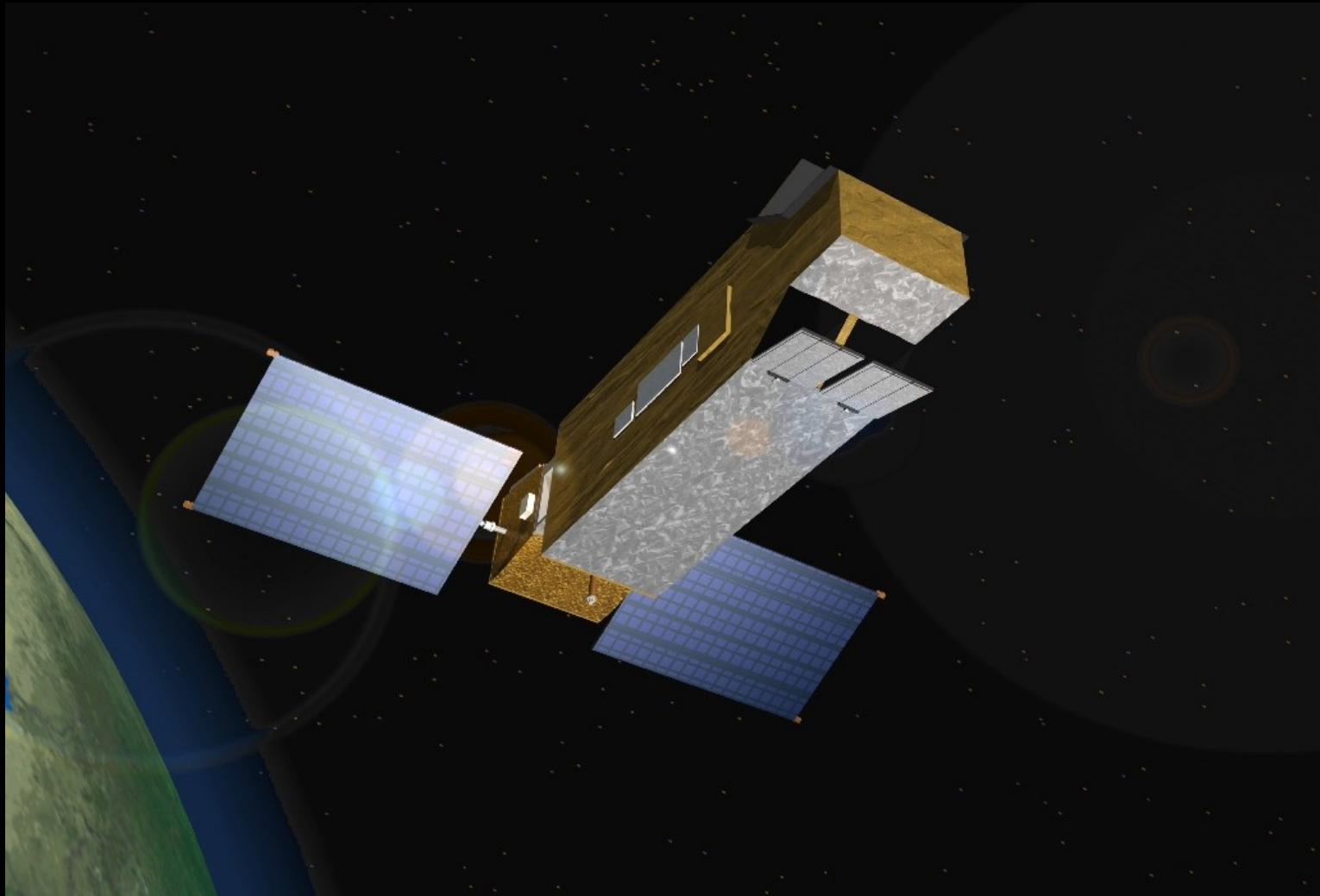
ESPECTRO VISÍVEL (m μ)



Comprimentos de onda



Ultravioleta



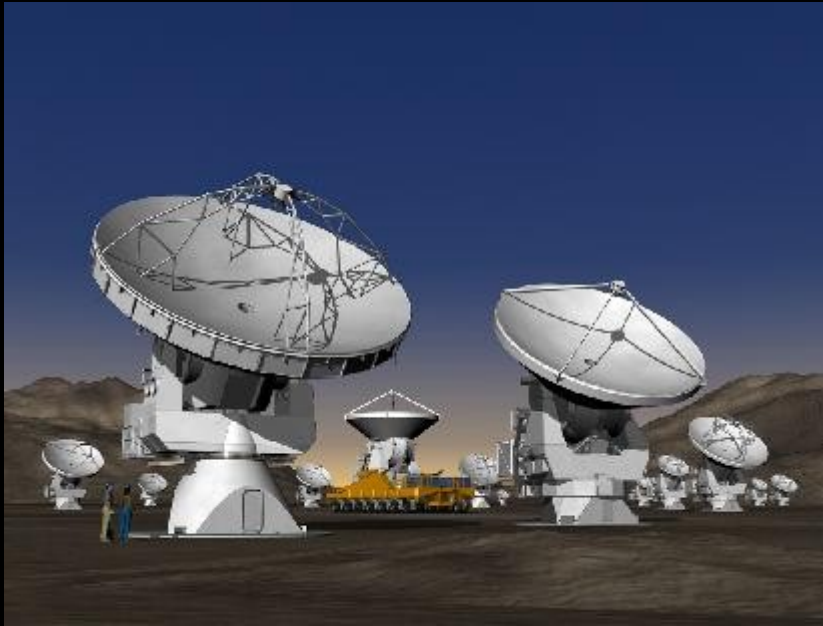
Telescópio
FUSE

RADIO



O arranjo das 27 antenas (com 25m de diâmetro cada) dispostas sobre trilhos em forma "Y" formando o VLA

RADIO



ALMA terá 66 antenas:

- conjunto principal com 50 antenas de 12m, que funcionarão como um único interferômetro
- conjunto adicional de 4 antenas de 12m
- outro conjunto adicional de 12 antenas com 7m
- comprimentos de onda de 0,3 a 9,6 mm. .

RADIO



RAIOS X

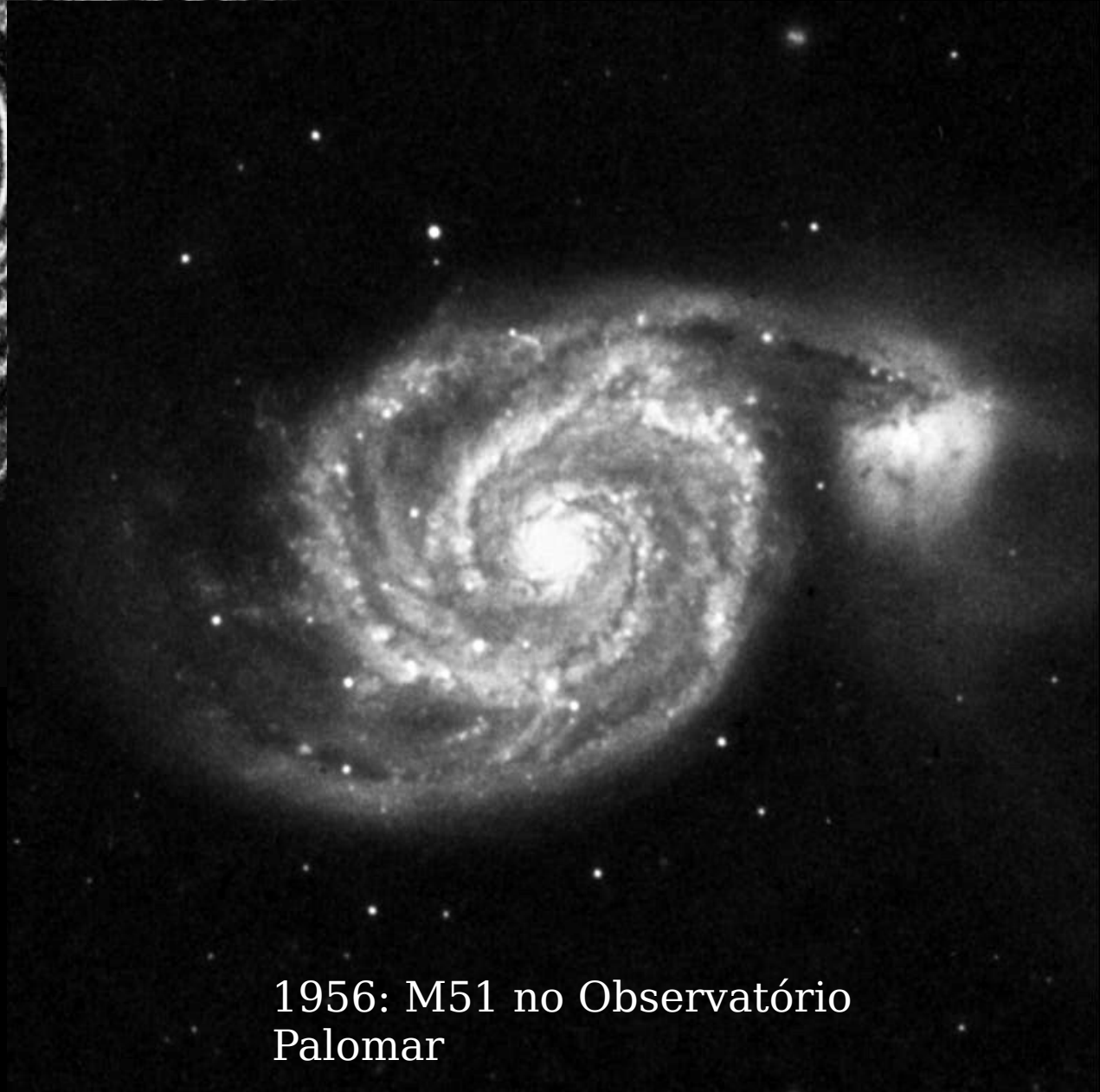
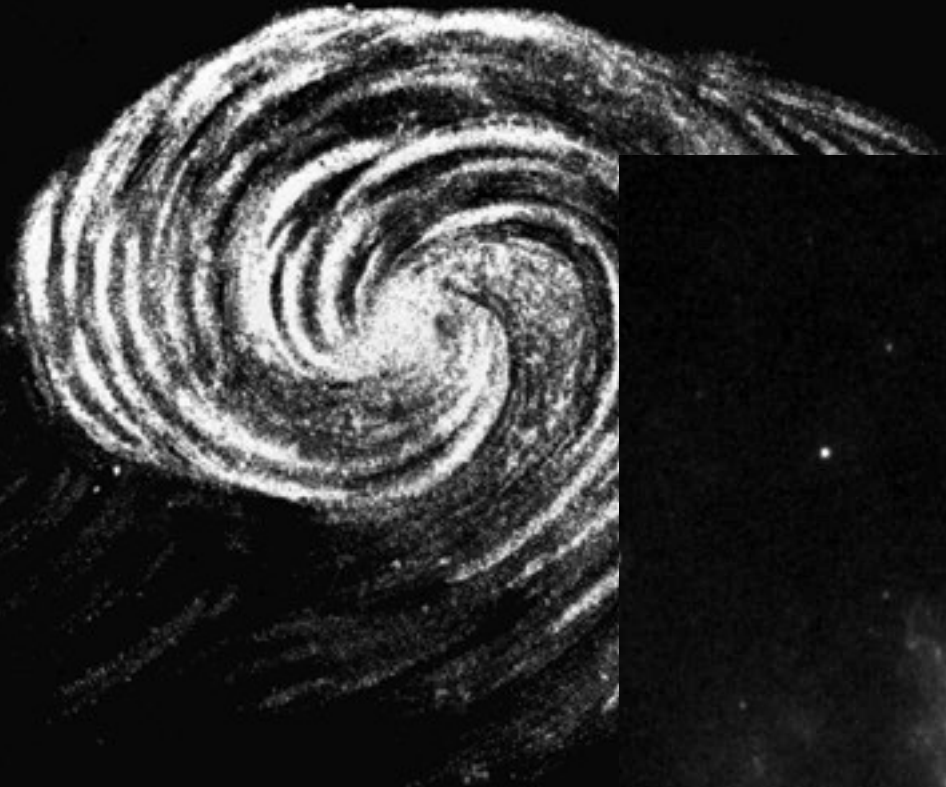


Chandra
Diâmetro: 1,2m

ESPACIAIS



1845: M51 por William Parsons



1956: M51 no Observatório
Palomar



Hubble Space Telescope

Brasil

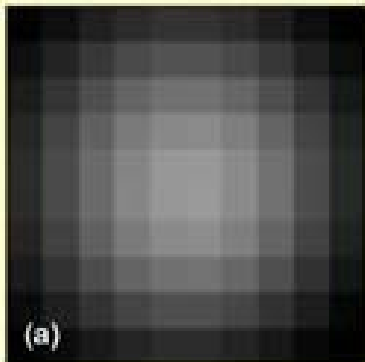


Custos

- Keck (10m):
 - US\$ 94 milhões
- Hubble:
 - US\$ 1,5 bilhões (iniciais!!!)

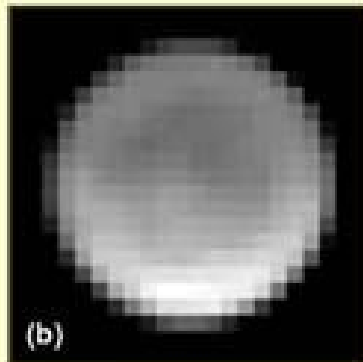


Titan (Saturn's Largest Moon)



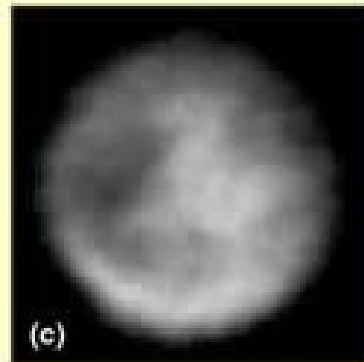
(a)

Conventional Telescope



(b)

Hubble Space Telescope



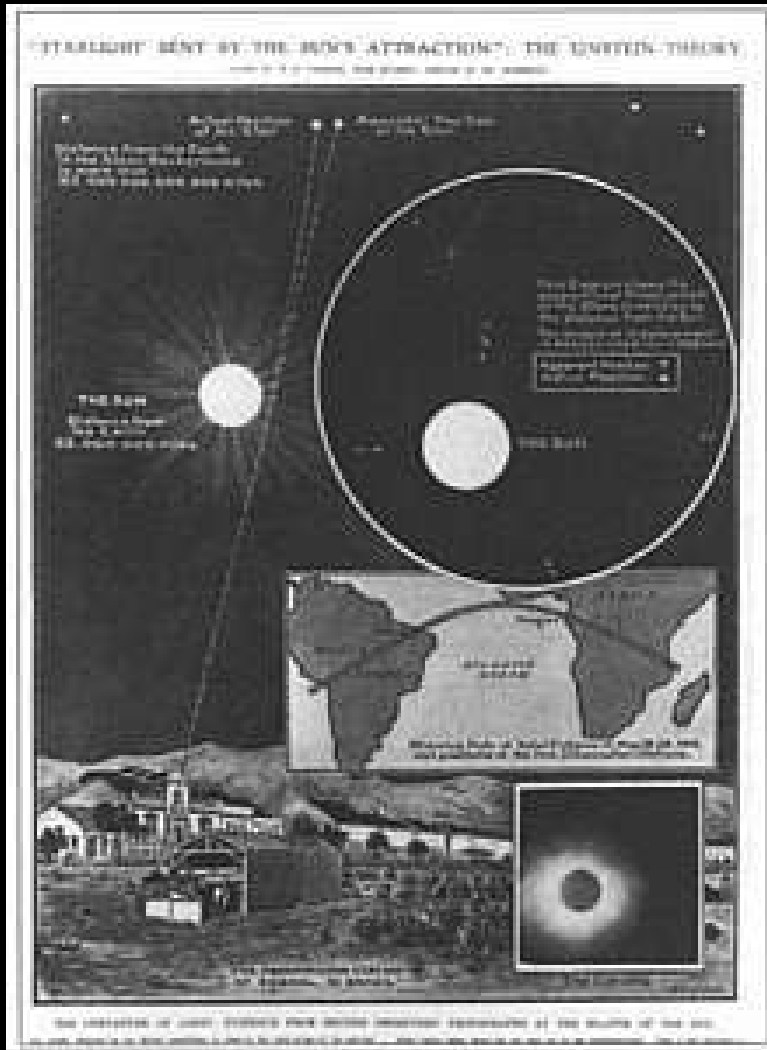
(c)

Keck Telescope with AO

ON



Sobral



Observatório do Pico dos Dias

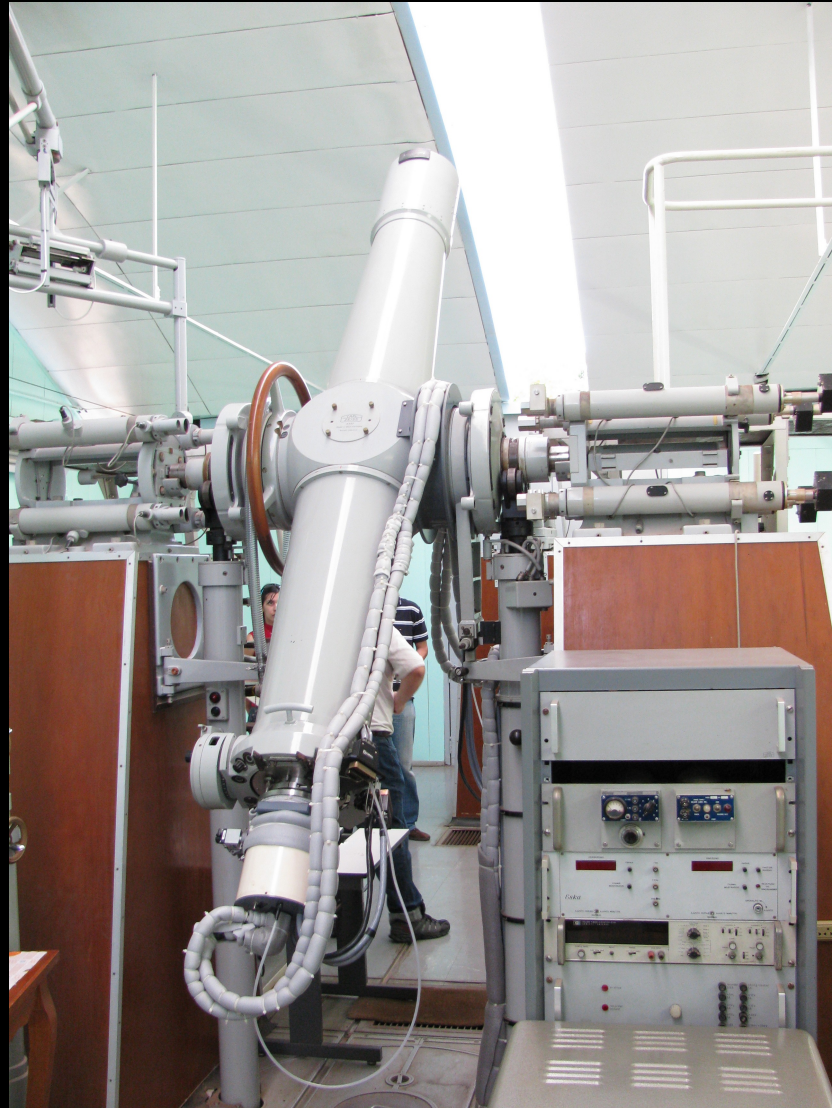


Brasópolis – Sul de Minas



1,6m

Círculo Meridiano

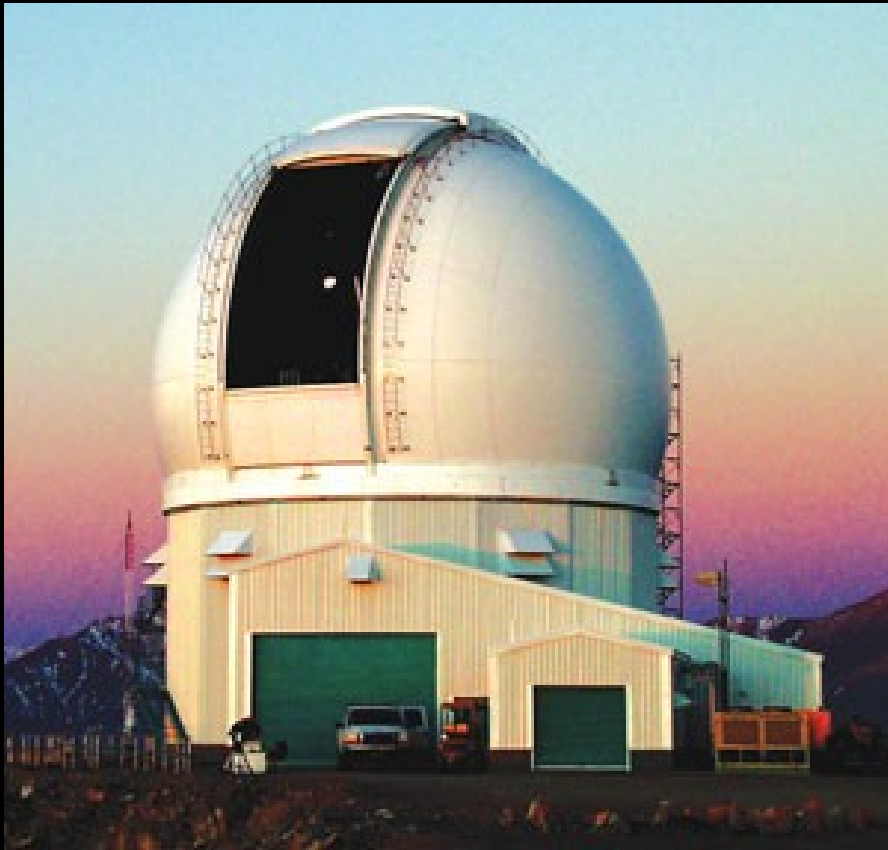


Observatório do Itapetinga



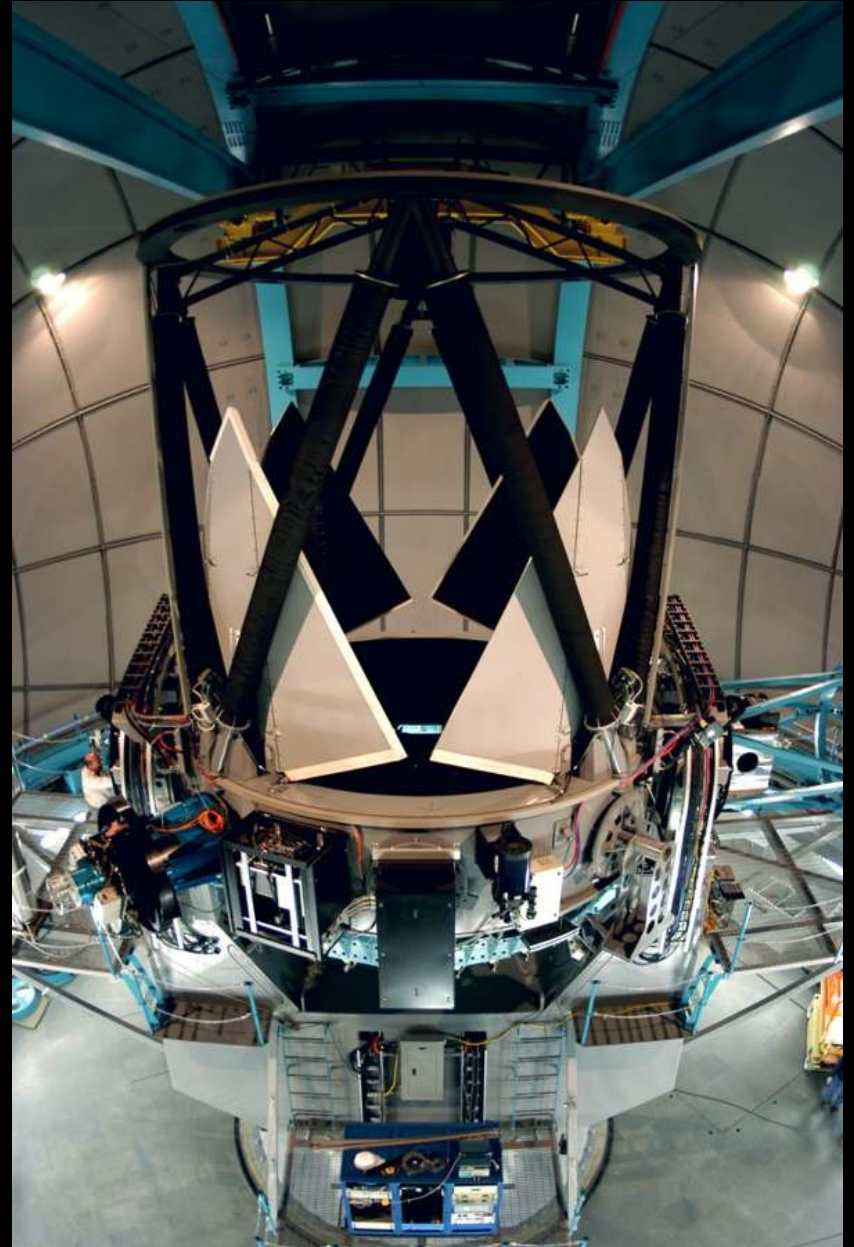
SOAR

Southern Astrophysical
Research Telescope



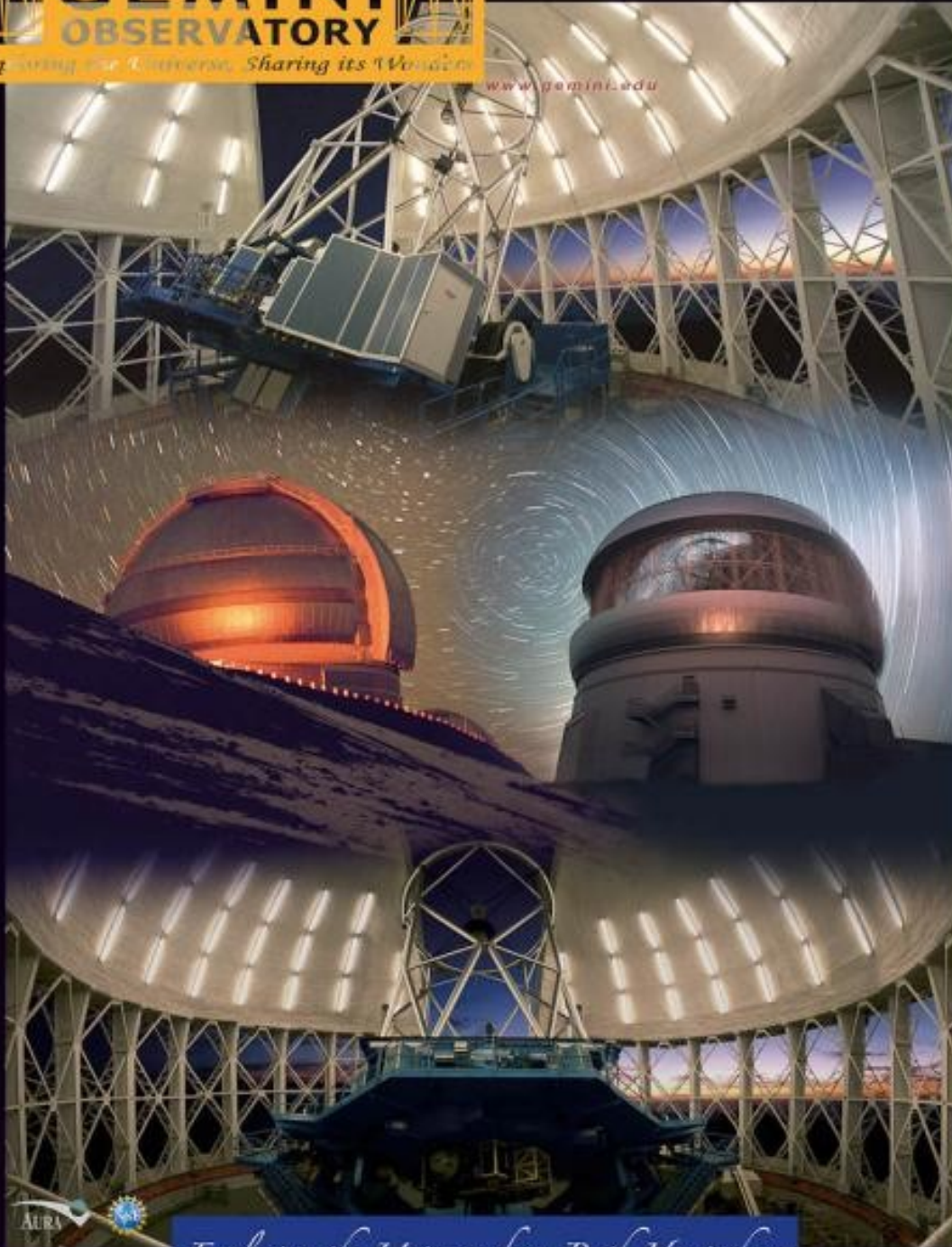
2003, 1/3 Brasil
2700 m

4,2m



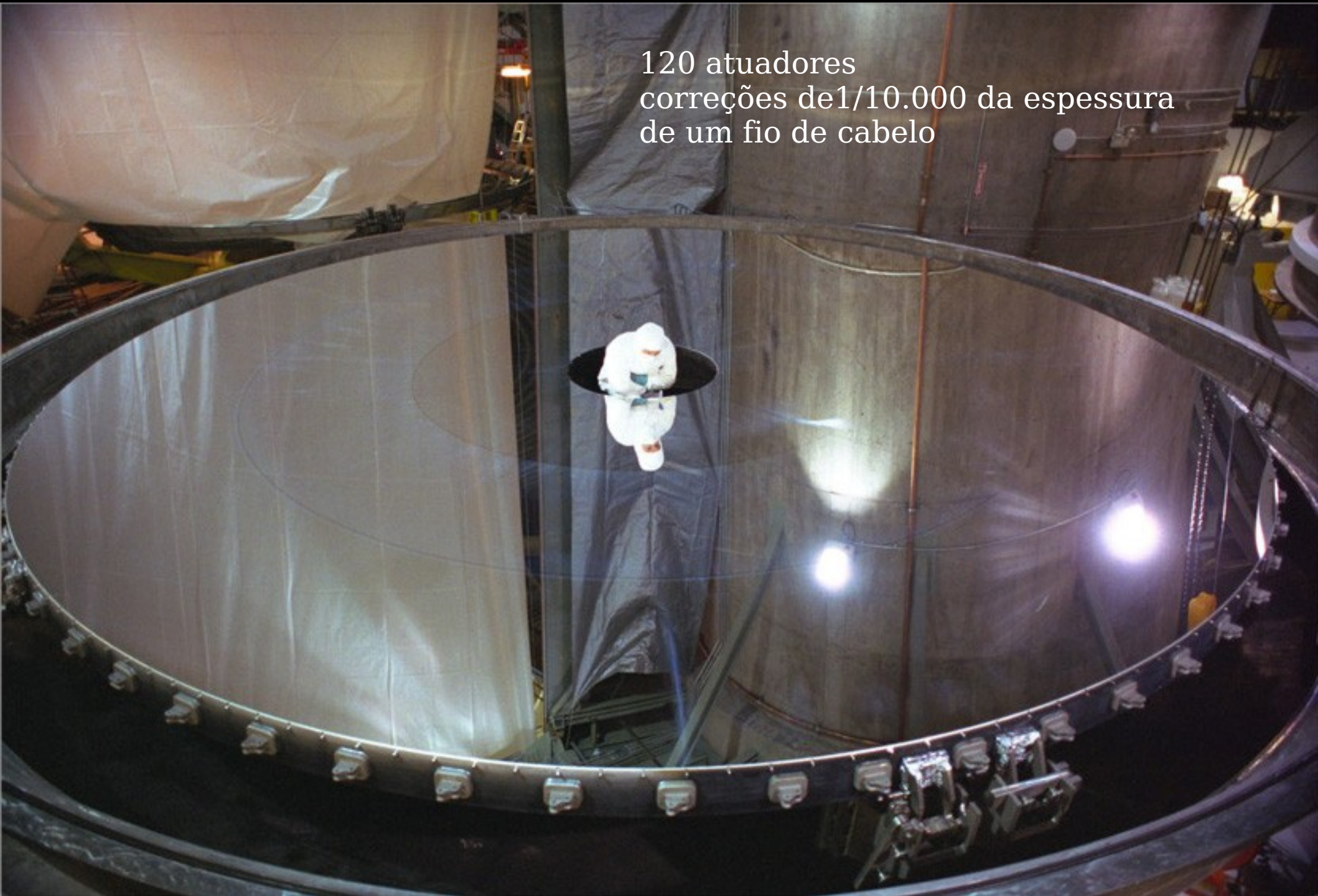
Cerro Pachón



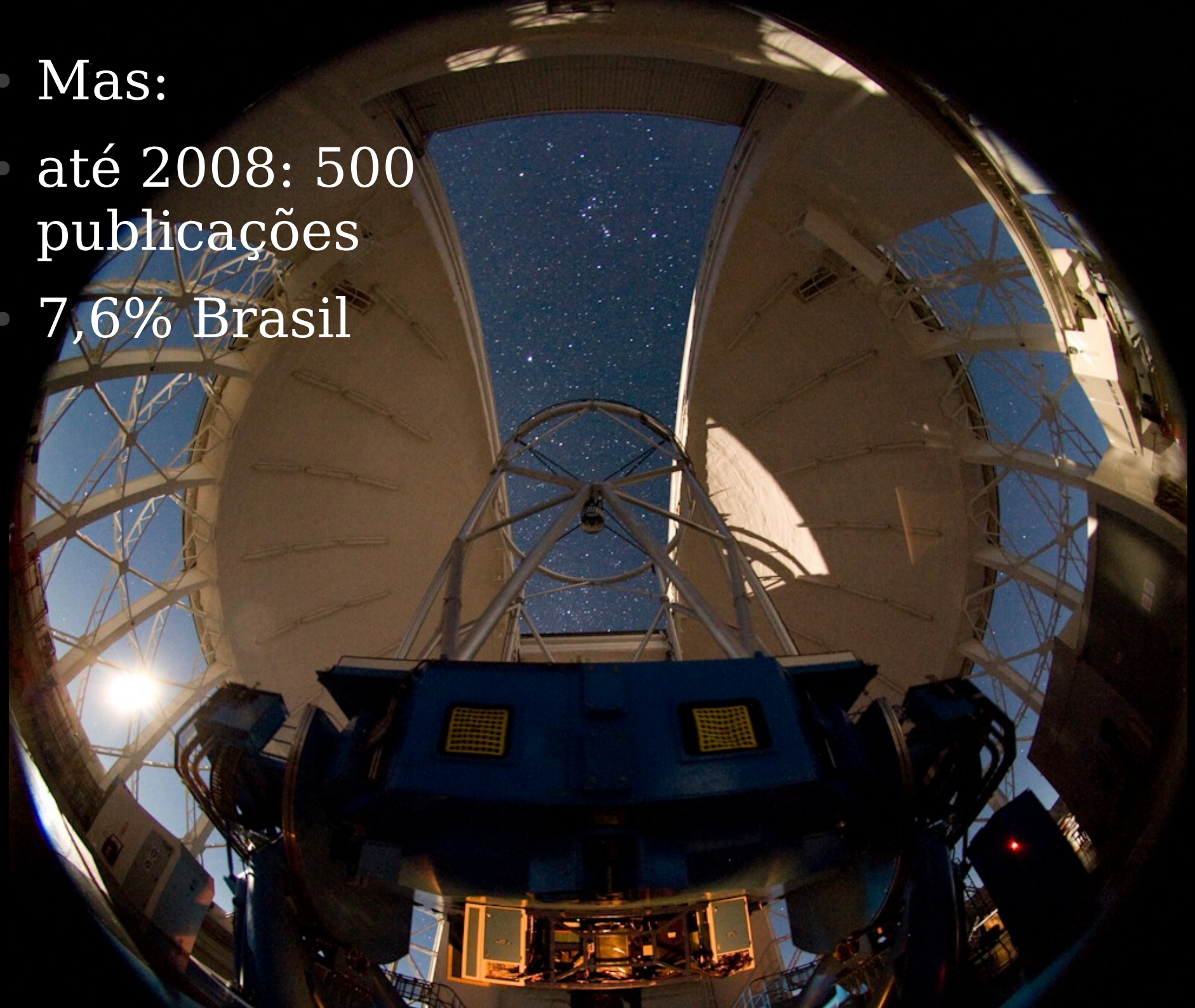


- 2001: 1st light
- US (42%)
- UK, Canadá, Chile, Austrália
- Brasil (5% = 17 noites em cada)

120 atuadores
correções de $1/10.000$ da espessura
de um fio de cabelo



- Mas:
- até 2008: 500 publicações
- 7,6% Brasil



ESO



European
Southern
Observatory



ESO — Reaching New Heights in Astronomy



[ESO Home](#)

[User Portal](#)

[Contact](#)

[Site Map](#)

[Go!](#)

01 Sep 20

ESO for the Public

[About ESO](#)

[Images](#)

[Videos](#)

[News](#)

[ESOshop](#)

[Telescopes and Instrumentation](#)

[Science with ESO Telescopes](#)

[Events, Exhibitions & Campaigns](#)

[Outreach](#)

[Products](#)

[Relations with Industry](#)

[Working at ESO](#)

[ESO in your Language](#)

Science Users

[Intranet](#)

ESO, the European Southern Observatory, builds and operates a suite of the world's most advanced ground-based astronomical telescopes.

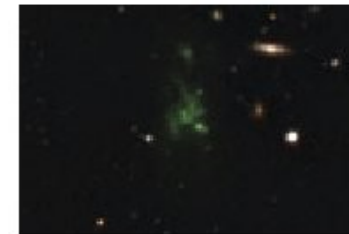
Latest Press Releases



[The Star That Should Not Exist](#)



[VLT Looks into The Eyes of the Virgin](#)



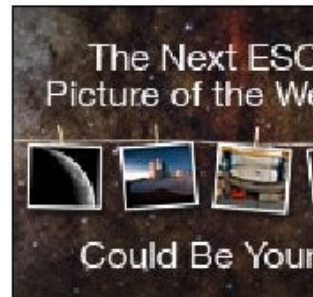
[Giant Space Blob Glows from Within](#)

[Giant Space Blob Glows from Within](#) Observations from ESO's Very Large Telescope have shed light on the power source of a rare vast cloud of glowing gas in the early Universe. The observations show for the first time that this giant "Lyman-alpha blob" — one of the largest single objects known — must be powered by galaxies embedded within it. The results appear in the 18 August issue of the journal Nature.

Picture of the Week



[First 7-metre ALMA Antenna Arrives at Chajnantor](#)



[Could Be Your](#)

ESO is the foremost intergovernmental astronomy

Now available
[Outreach Community Newsletter August](#)

