



Trinity College Dublin  
Coláiste na Tríonóide, Baile Átha Cliath  
The University of Dublin



I-LOFAR

# Telescopes through the Ages

Past, Present & Future



# What light can we capture?

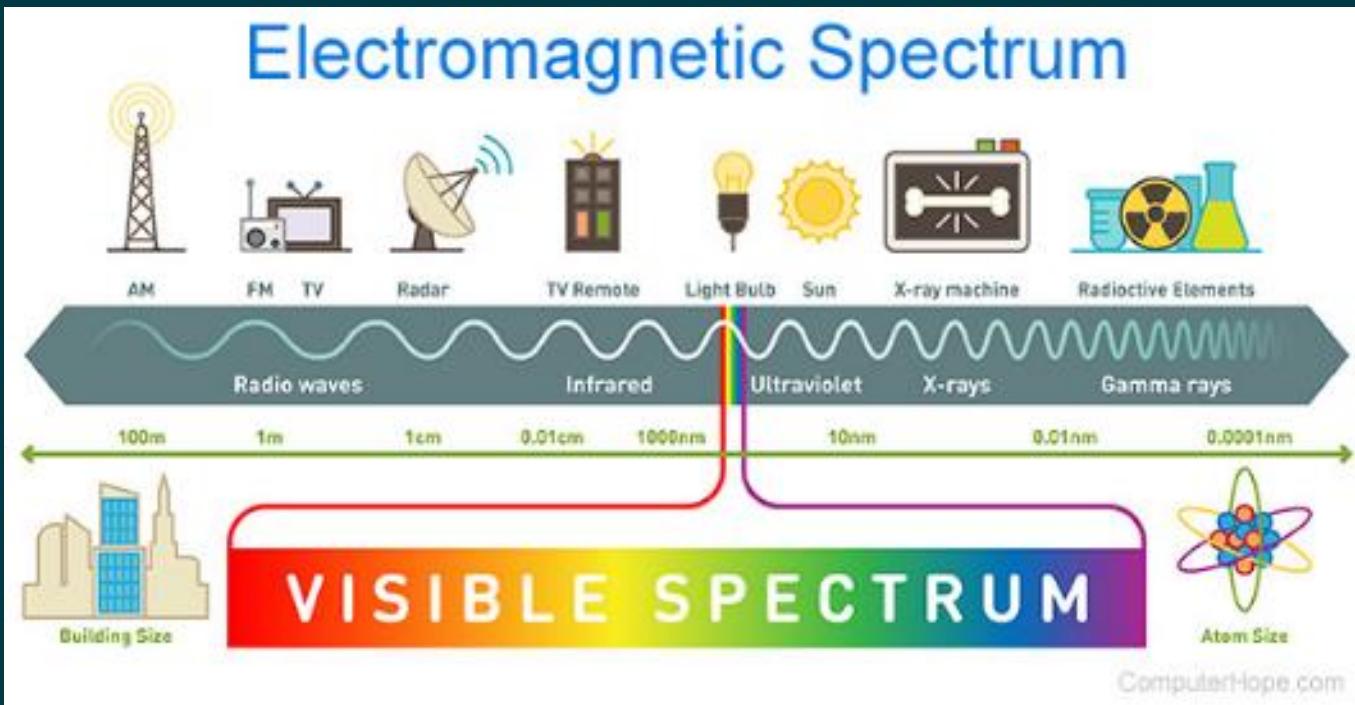
Traditional telescopes as we might understand them use visible light.

BUT what about when it's cloudy or if we want to observe during the day?



Like in an airport when we use x-rays to look into something we can't see, we collect different forms of EM radiation to create a clearer image of space.

One way to see into space is with radio waves that aren't blocked out by our atmosphere

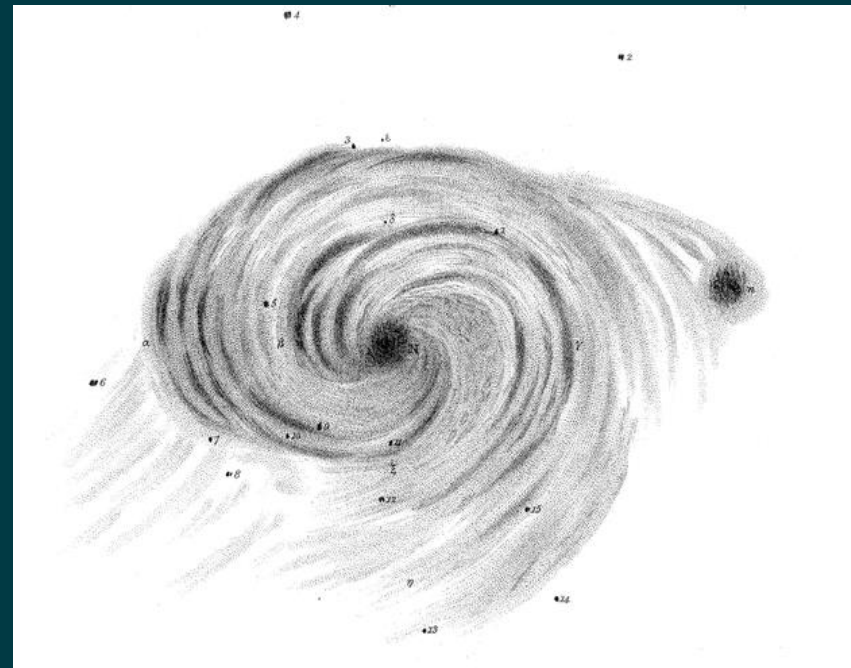


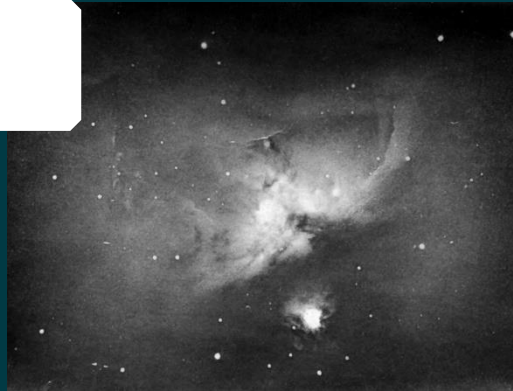
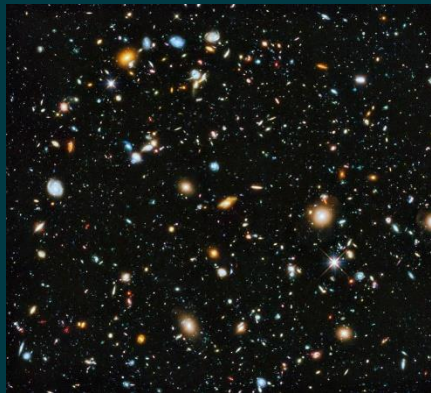
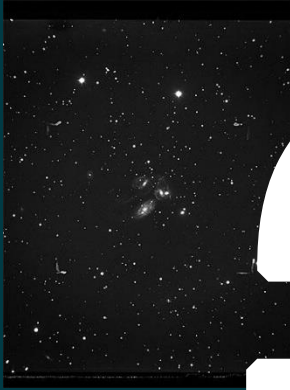
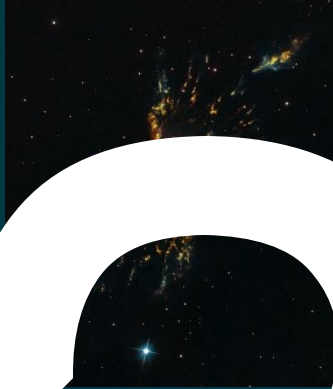
Nearly 200 years of  
astronomical  
research in Birr,  
from the Leviathan  
to I-LOFAR...

# Astronomy at Birr Castle



The Leviathan Telescope at  
Birr Castle Demesne







1845



1850



1883



1900



1902



1922



1964



1971



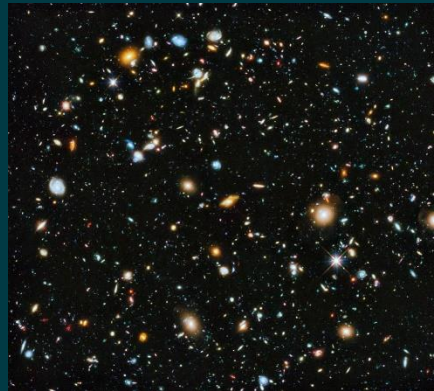
1985



1990



2005



2013



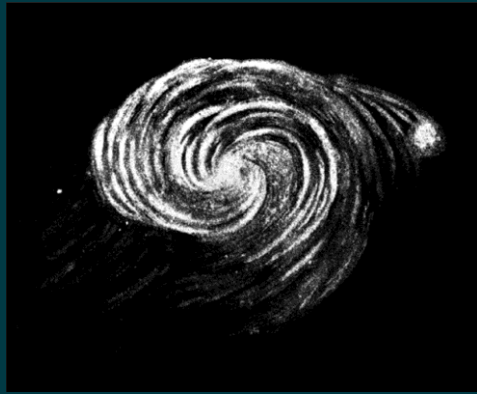
2014



2018



2019



1845

Drawing of M51 the Whirlpool Galaxy as observed through the Leviathan in Birr in 1845



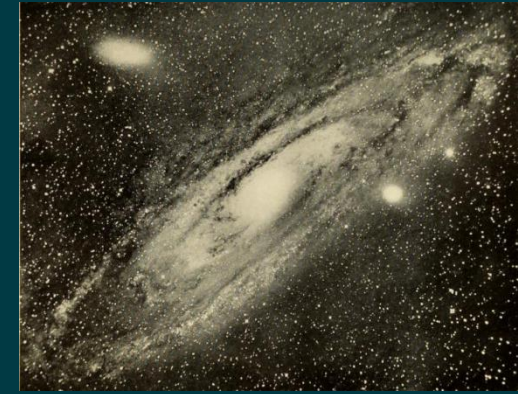
1850

Drawing of M33, the Triangulum Spiral Galaxy, from observations with the Leviathan, around 1850



1883

Photograph of the Orion Nebula using a 36 inch reflecting telescope in the UK in 1883



1900

Andromeda Galaxy, Yerkes Observatory USA around 1900

A photo of the Whirlpool Galaxy, M51 taken in Yerkes Observatory USA 1902

Supernova using the Hale telescope at Palomar Observatory USA in 1964

N81 obtained at the ESO 3.6 m telescope in November 1985



1902



1922



1964



1971



1985



1990

Andromeda, through the Hooker Telescope USA by Edwin Hubble 1920-22

Supernova using the Hale telescope at Palomar Observatory USA in 1971

Nearby galaxy M100 viewed in the early 1990s with Hubble Space Telescope



Whirlpool  
Galaxy, M51 by  
Hubble Space  
Telescope,  
released 25  
April 2005

Hubble Ultra  
Deep Field taken  
and released in  
2013-2014

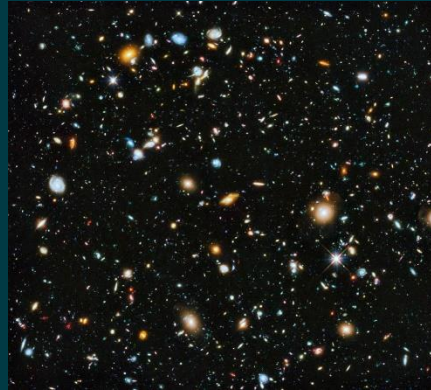
Triangulum  
Galaxy, M33,  
recorded with  
the ESO VLT  
Survey Telescope  
2014

Nearby galaxy  
M100 with  
Hubble Space  
Telescope

The Southern  
Crab Nebula  
by Hubble  
Space  
Telescope, 18  
April 2019



2005



2013



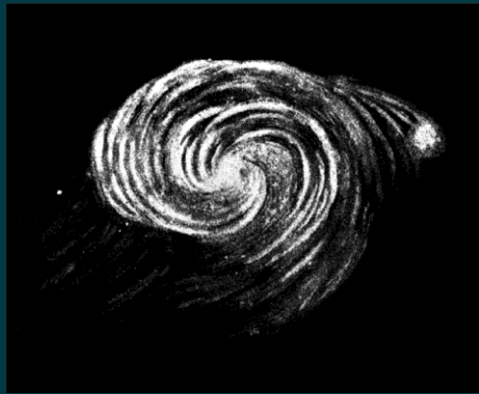
2014



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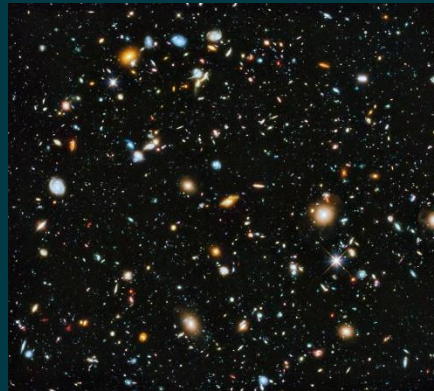
1985



1990



2005



2013



2014



2018



2019

**How can we make  
better telescopes?**

# Discussion:

## How can we make better telescopes?

- Materials
- Size
- Magnification capabilities
- Longevity & maintenance
- Position
- Type of EM radiation

Discussion:

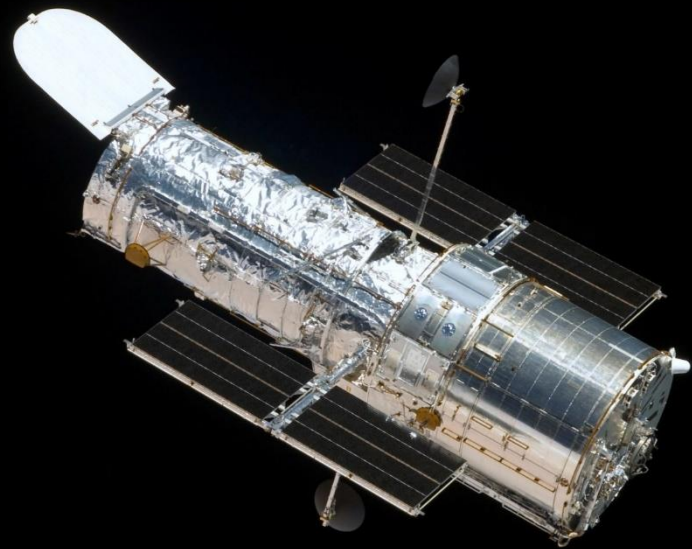
How can we make better telescopes?

Can we just keep making bigger and bigger telescopes?

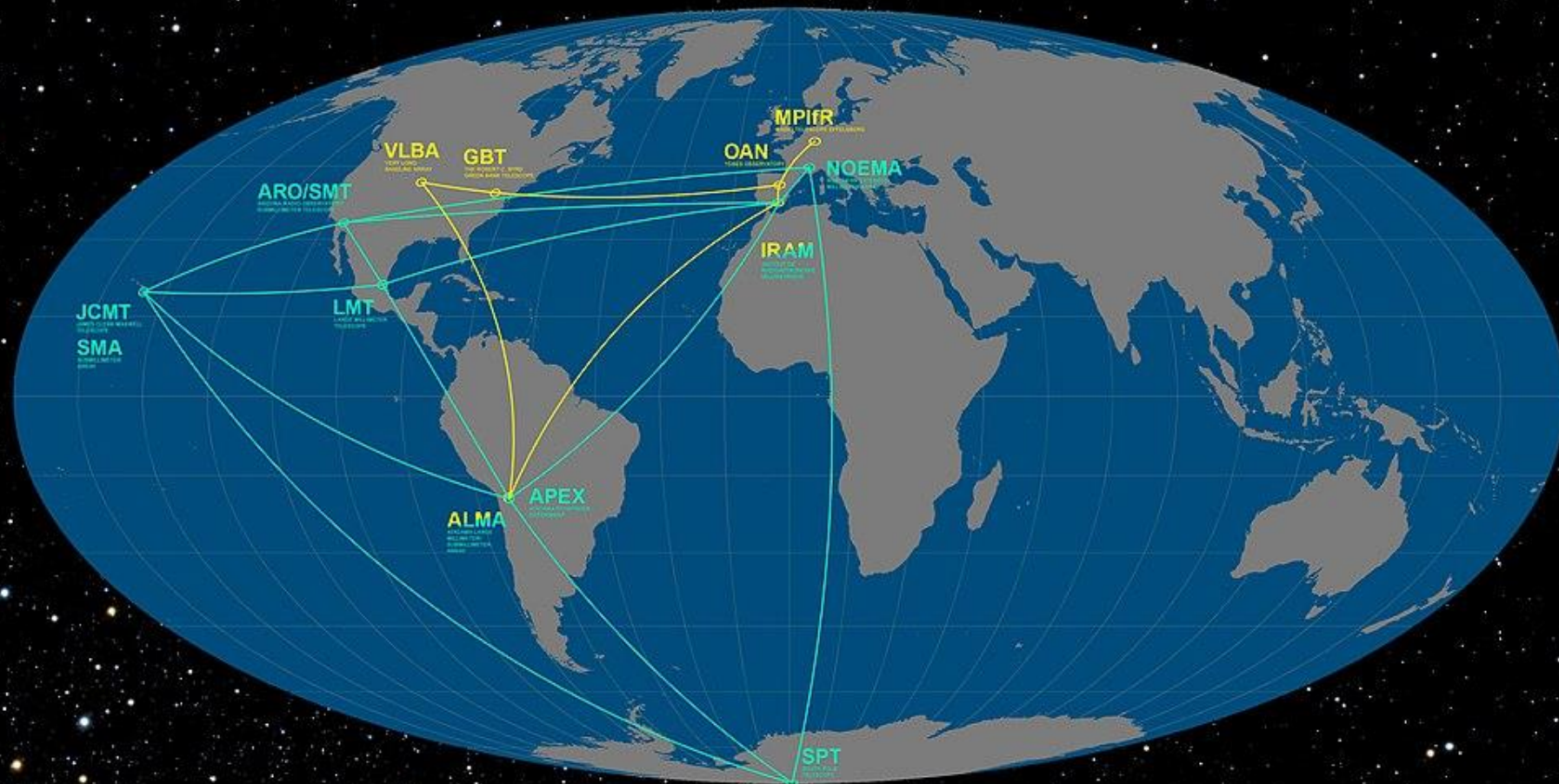


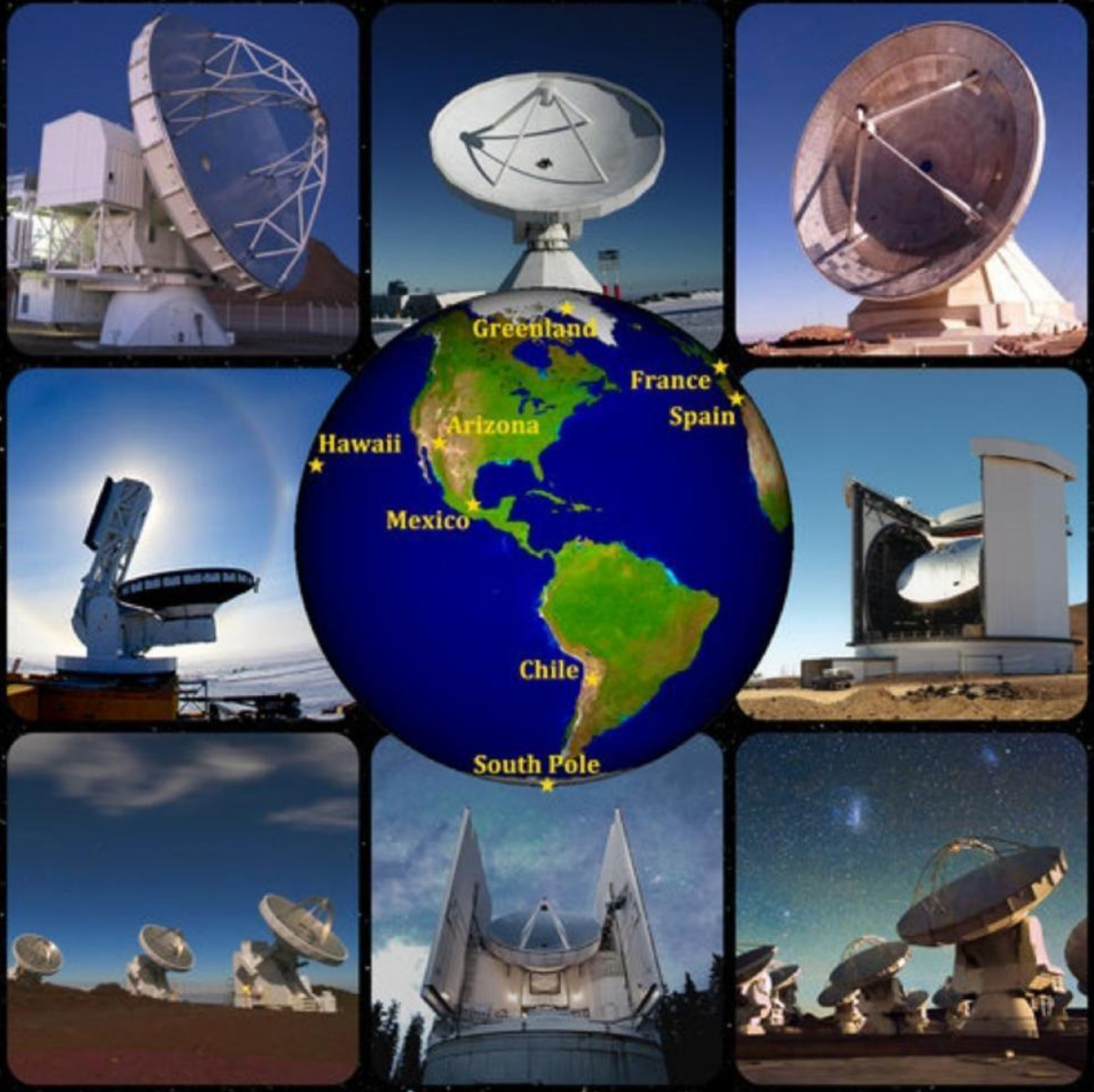
# Physical Limitations

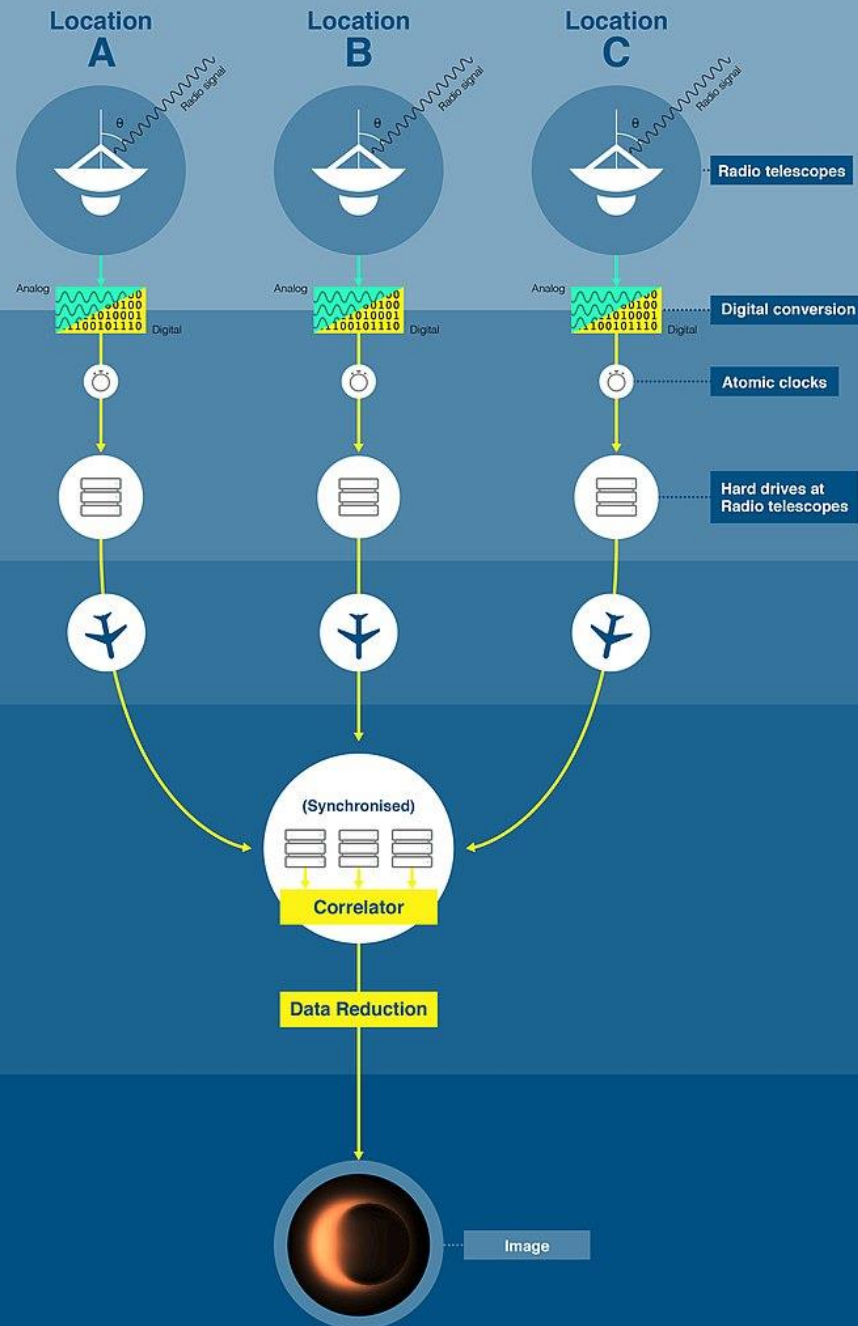


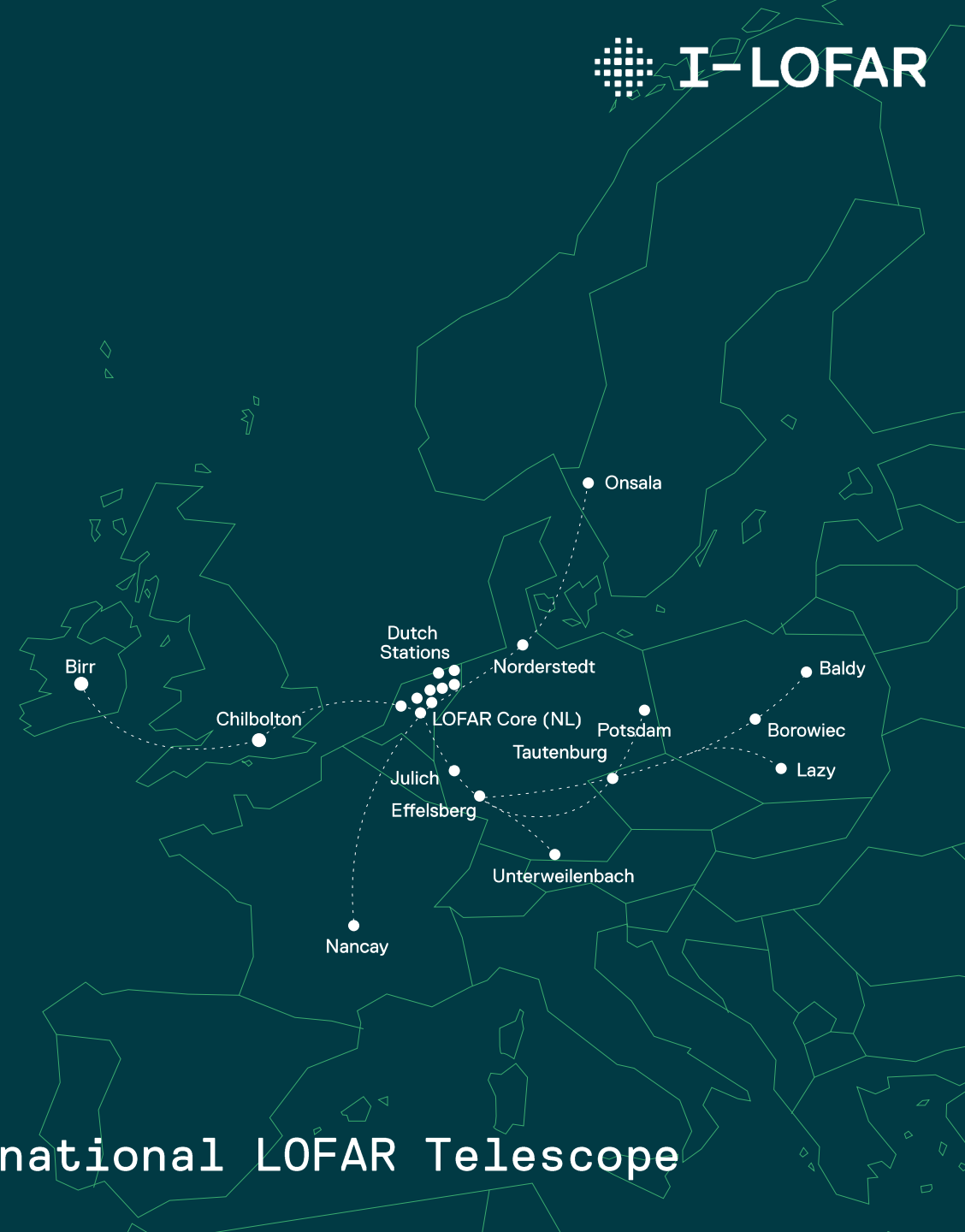










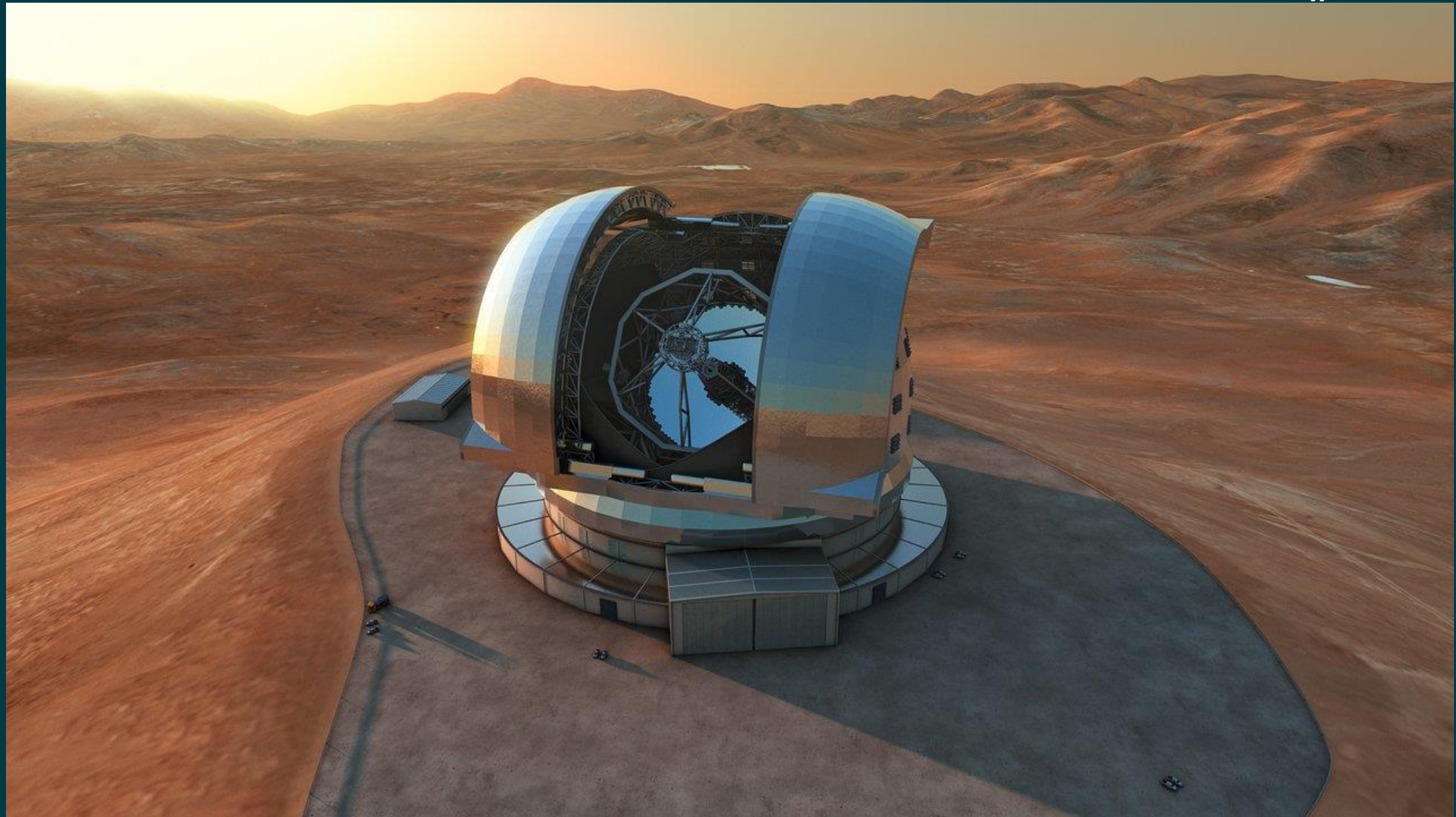


# International LOFAR Telescope

# Future telescopes...









**What might we discover  
with future telescopes?**