ARE WE ALONE?

Jill Tarter
Director Center for SETI Research
SETI Institute, Mountain View CA

Goddard Space Flight Center
Greenbelt, Maryland
Employee Gate
North Gate
South Gate
Main Gate
Here
SOIL CONSERVATION SERVICE ROAD
HUBBLE ROAD
COBE ROAD
NIMBUS ROAD
MINITRACK
TIROS ROAD
EXPLORER ROAD
AQUA ROAD
GOODLUCK ROAD
ICESAT Road
WMAP Road
GODDARD ROAD
AEROBEE ROAD
GREENBELT ROAD - MD ROUTE 193
IUE Road
083
025
028
029
015
010
007
020
019
026
090
018
005
027
016W
097
004
034
031
095
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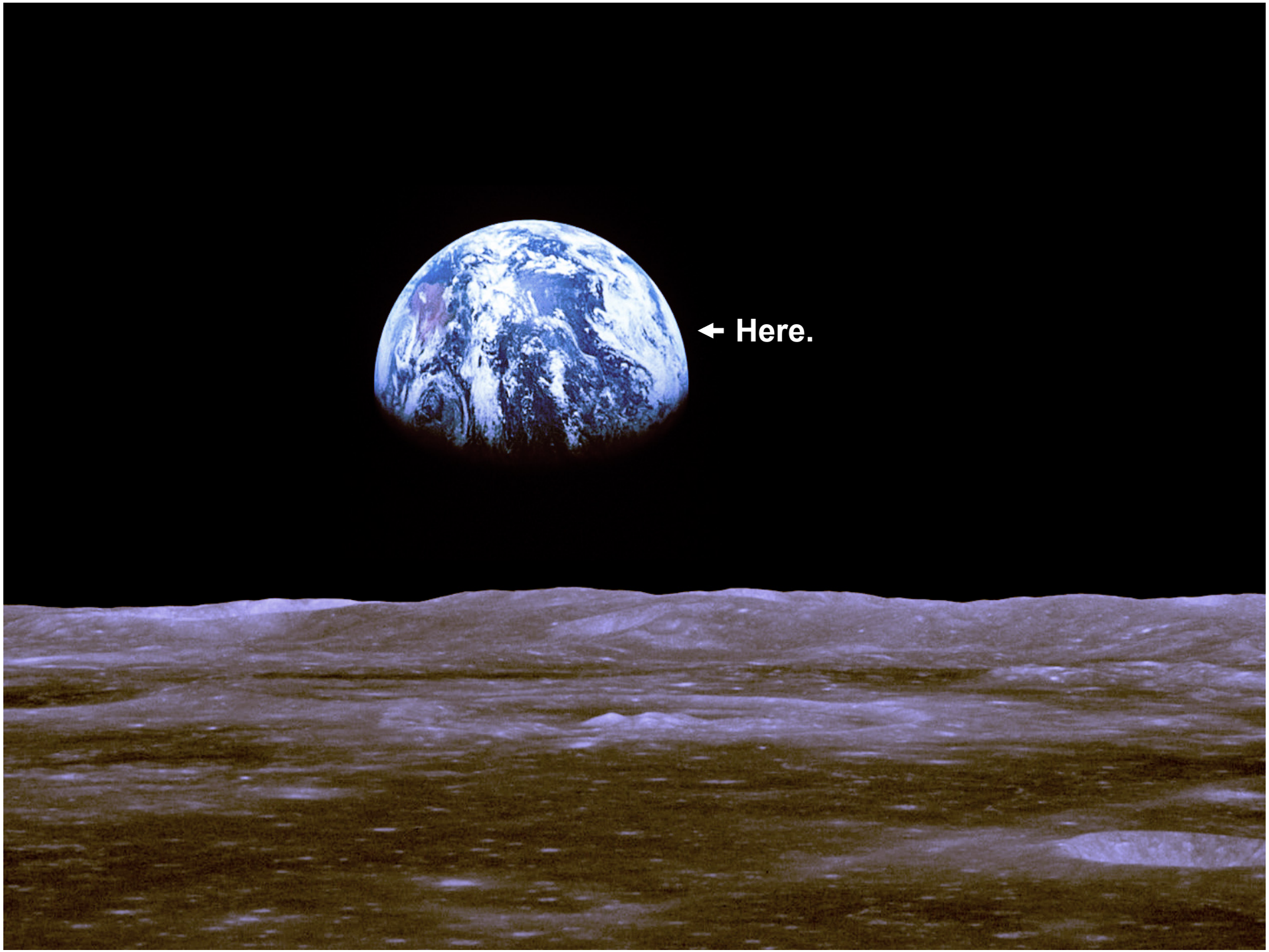
002
009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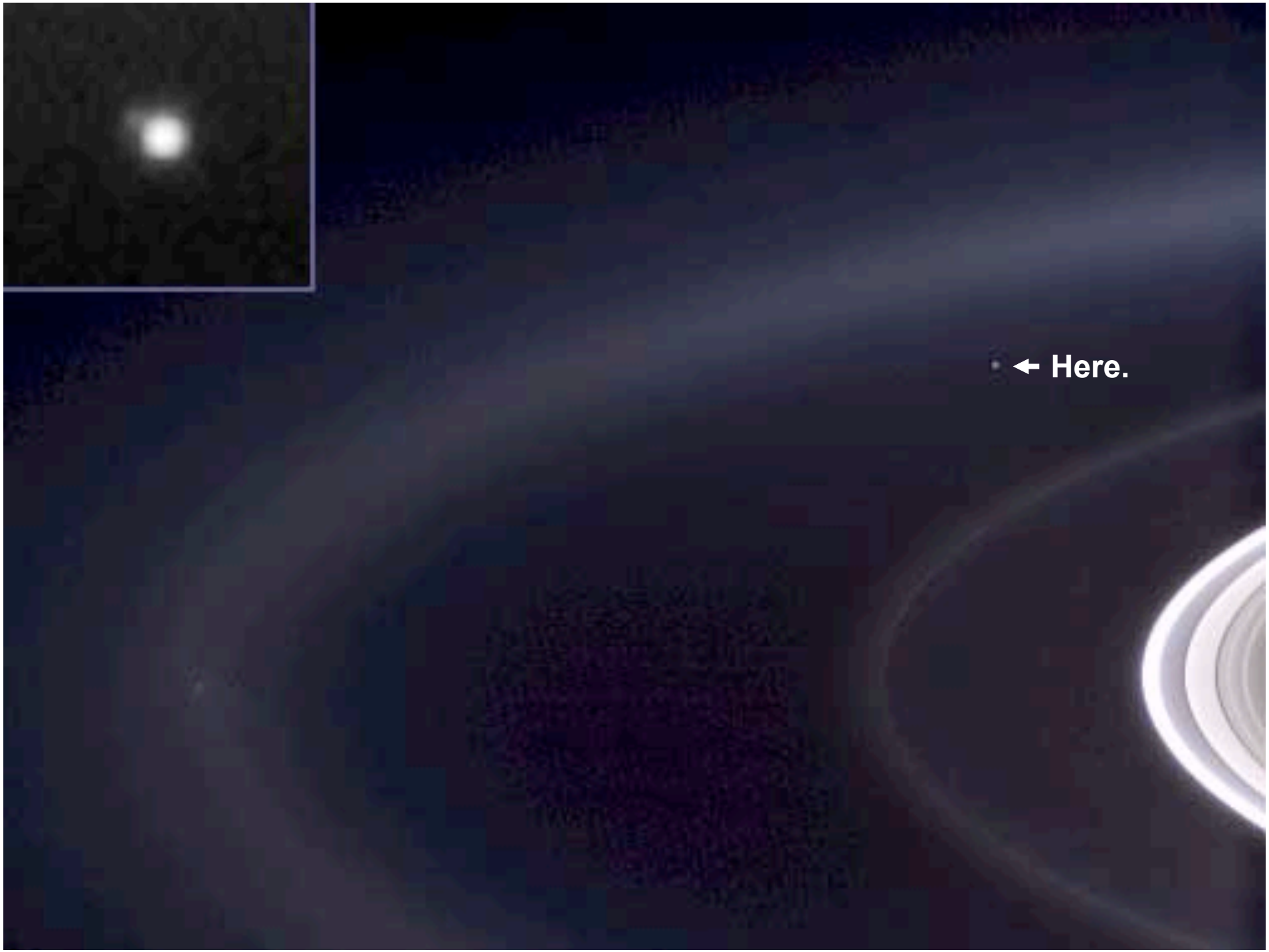
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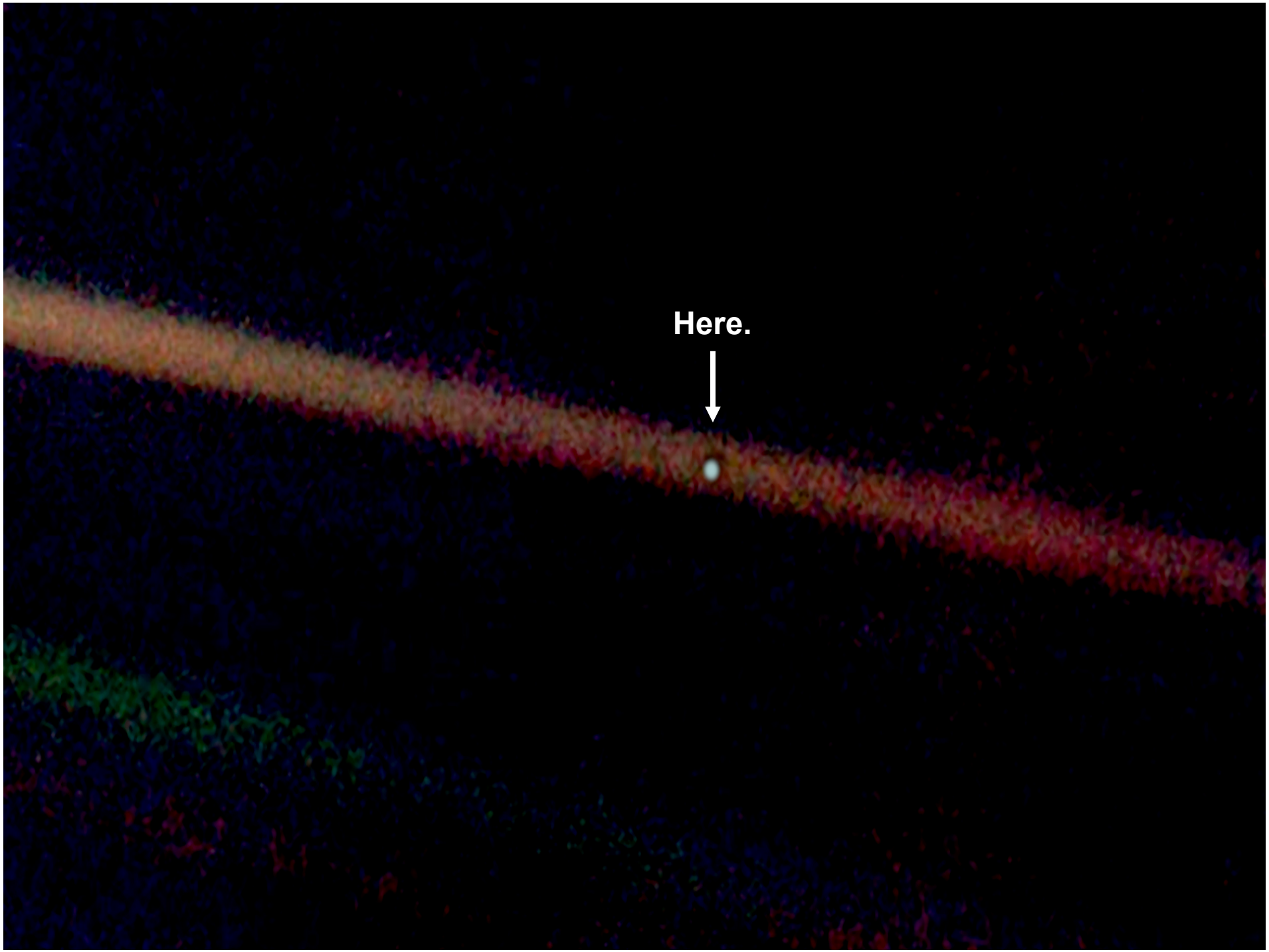
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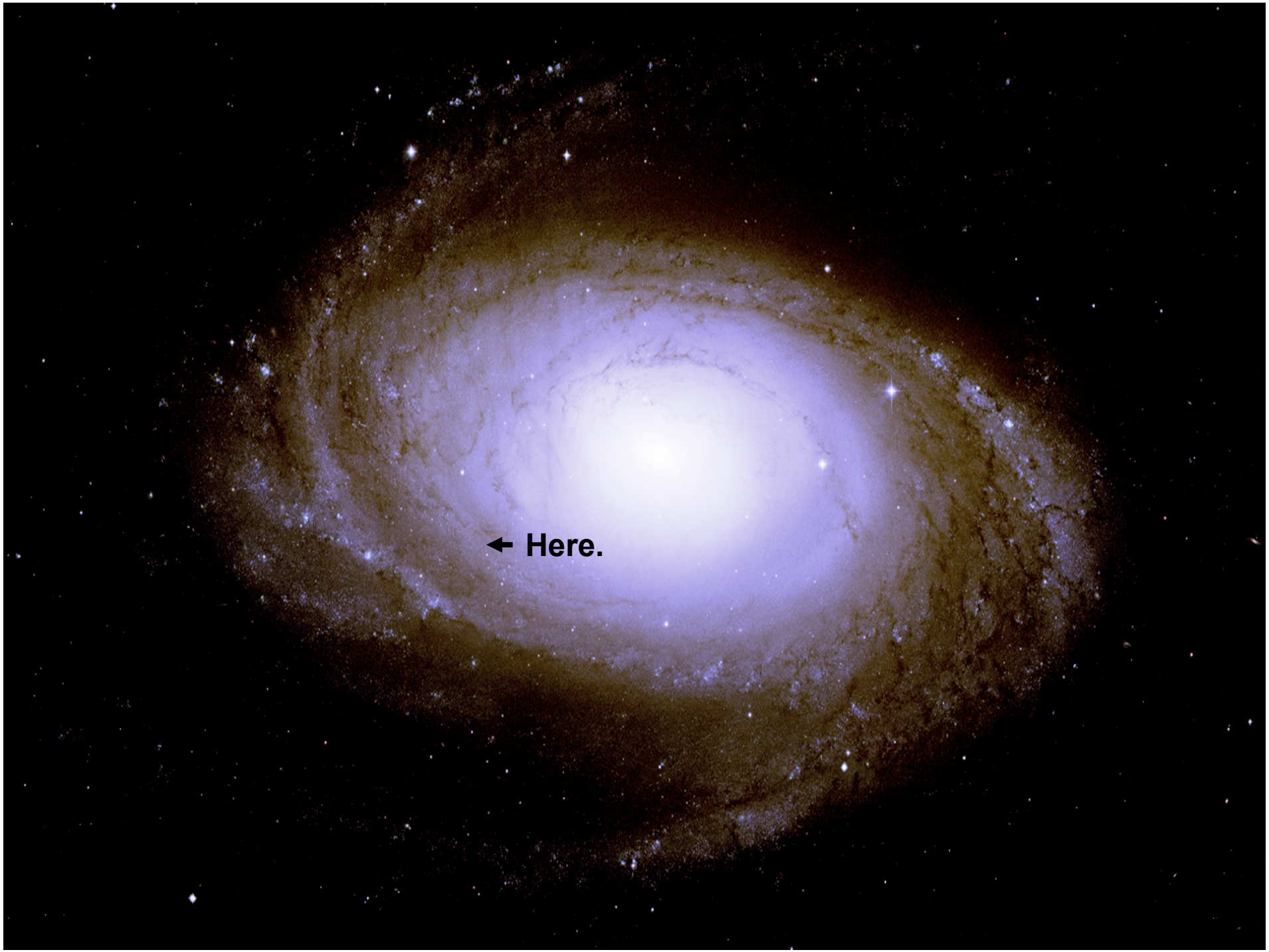
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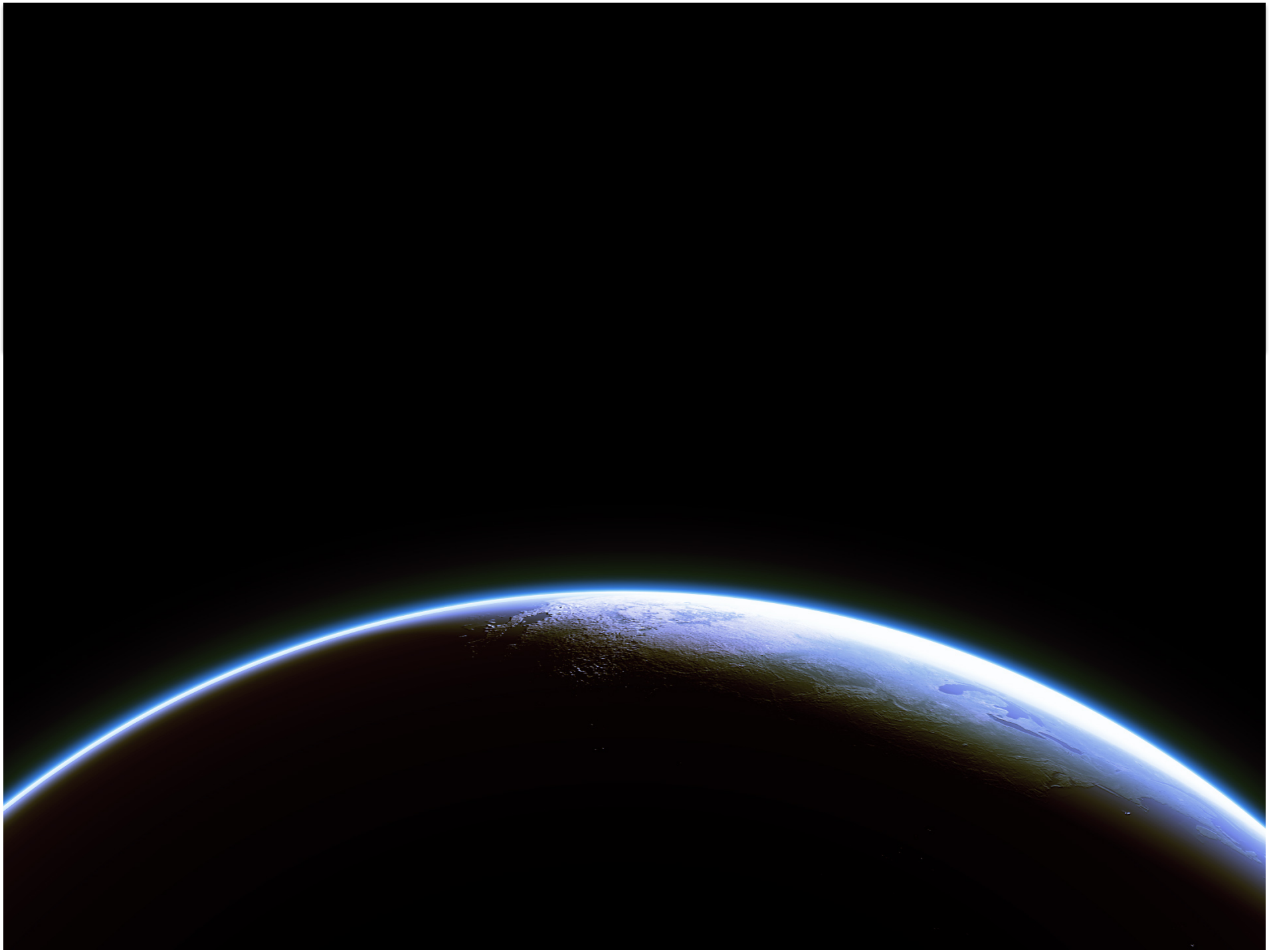
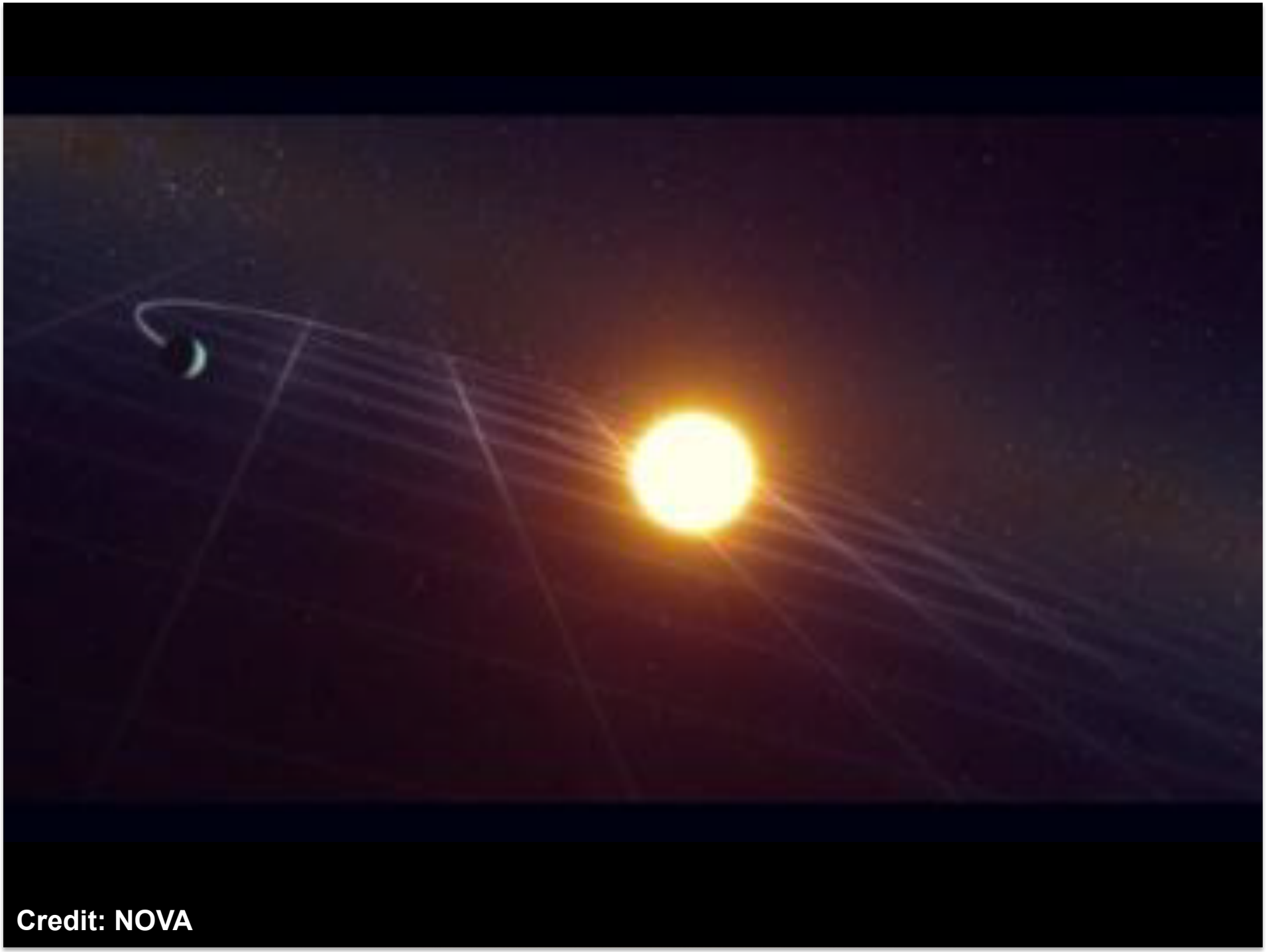
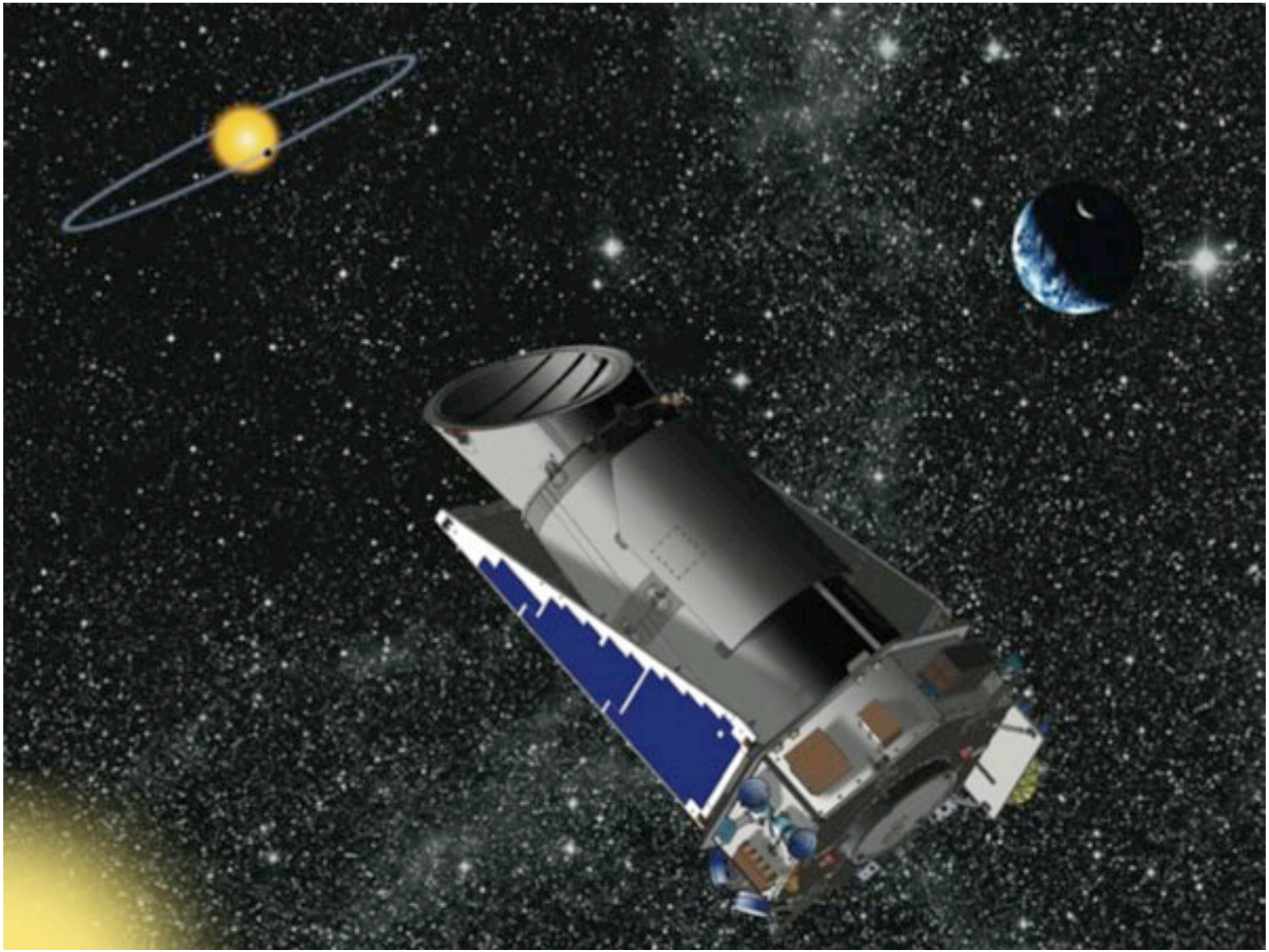
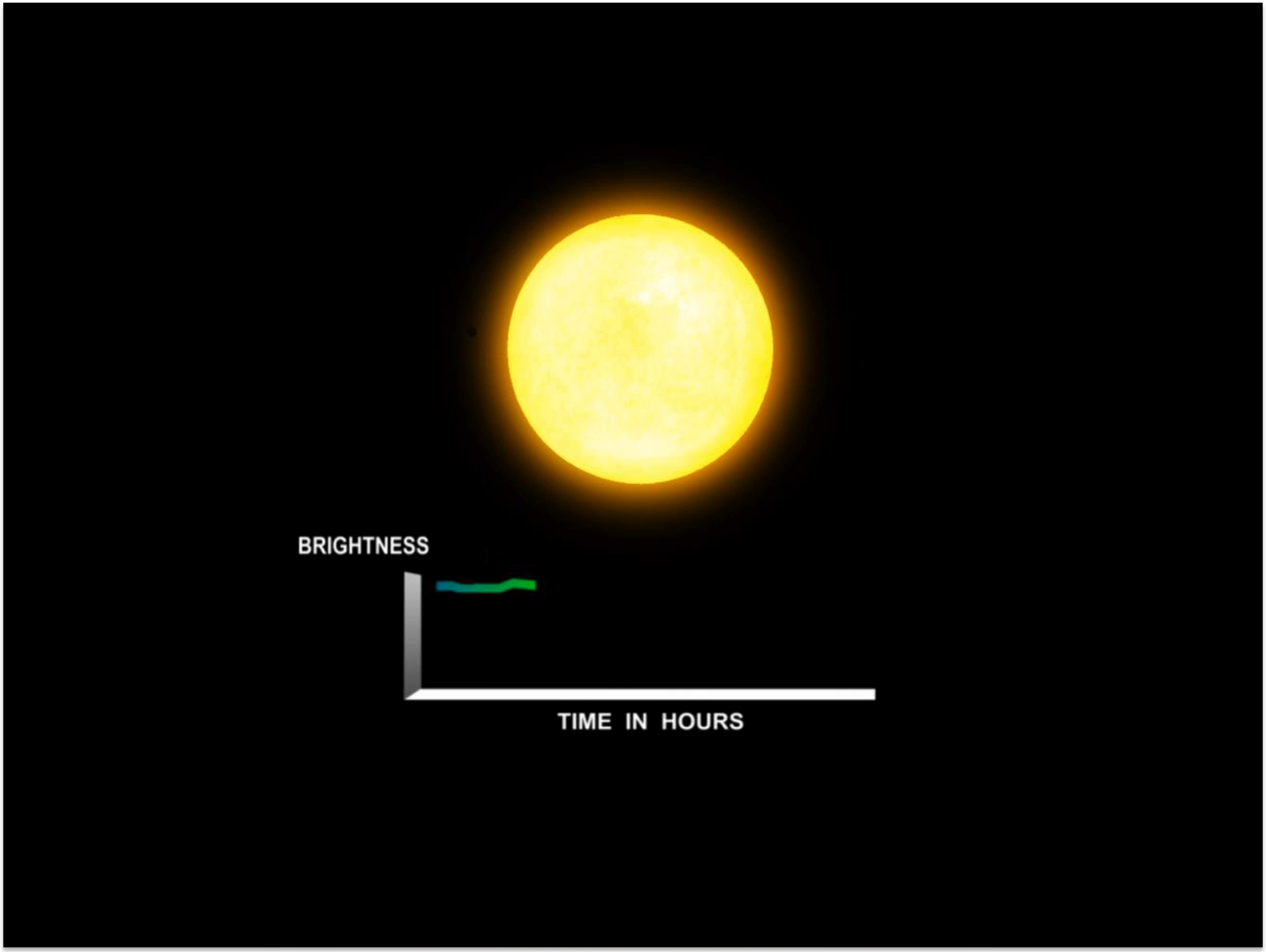
← Here.

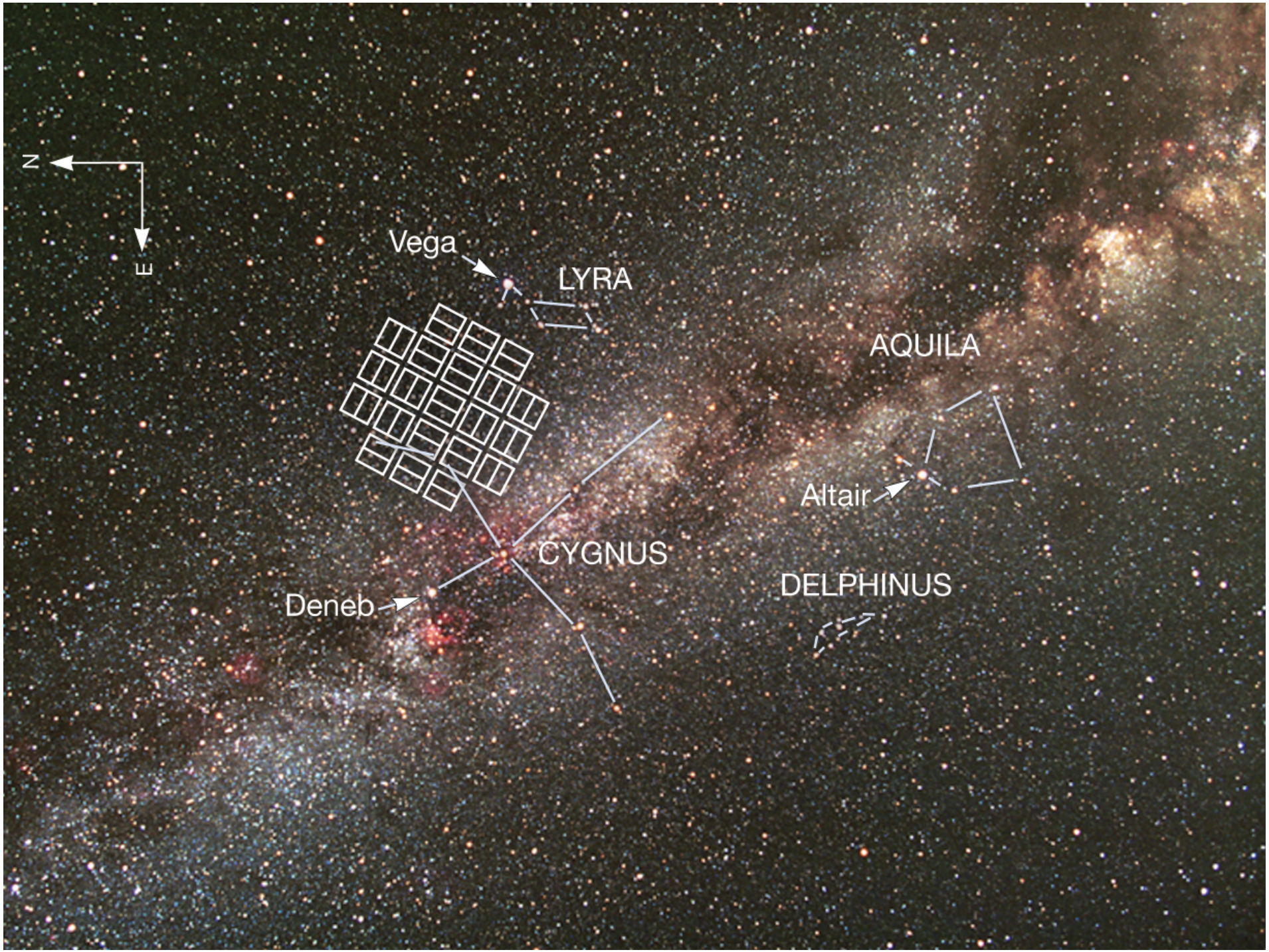


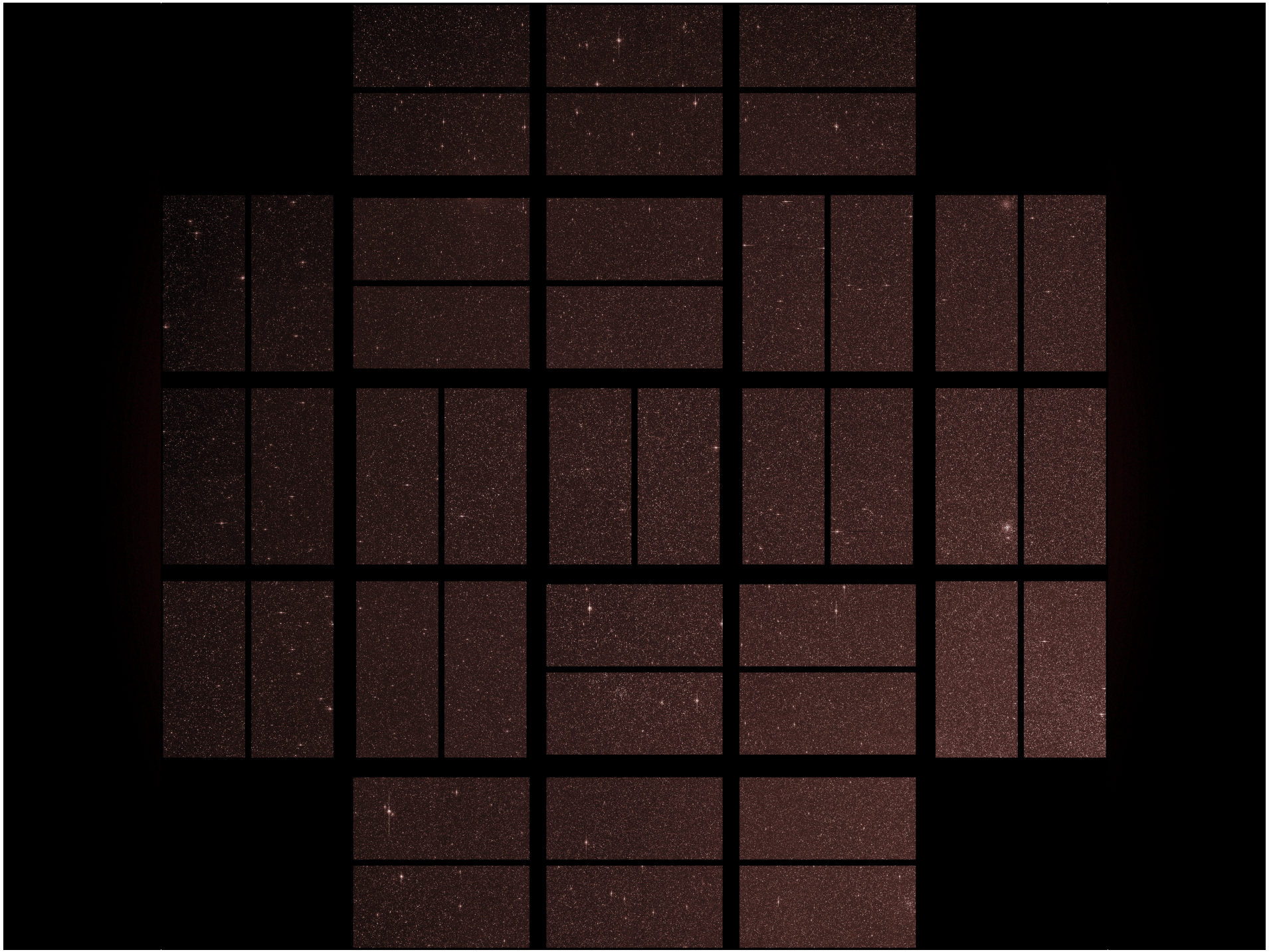


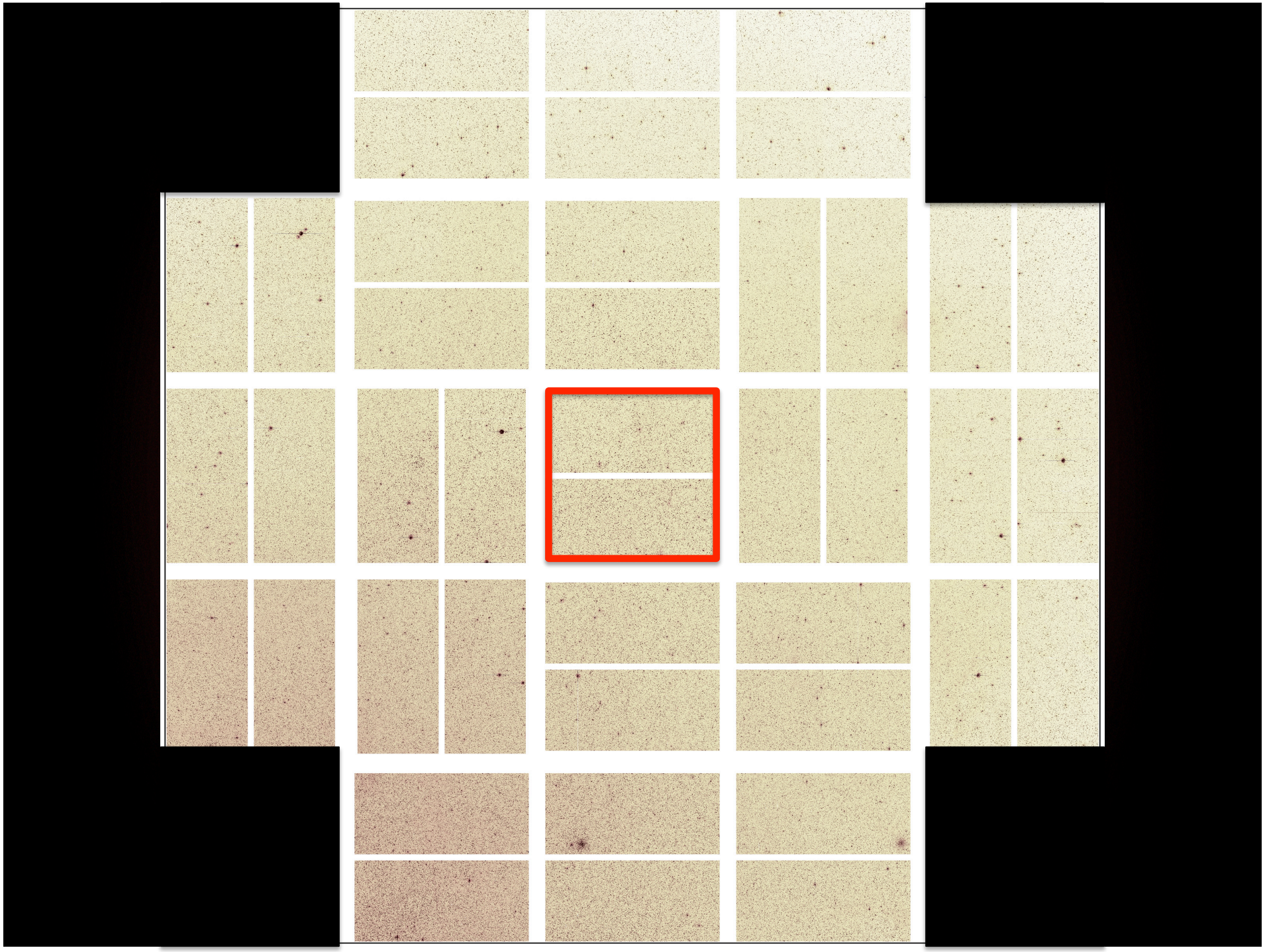
Credit: NOVA

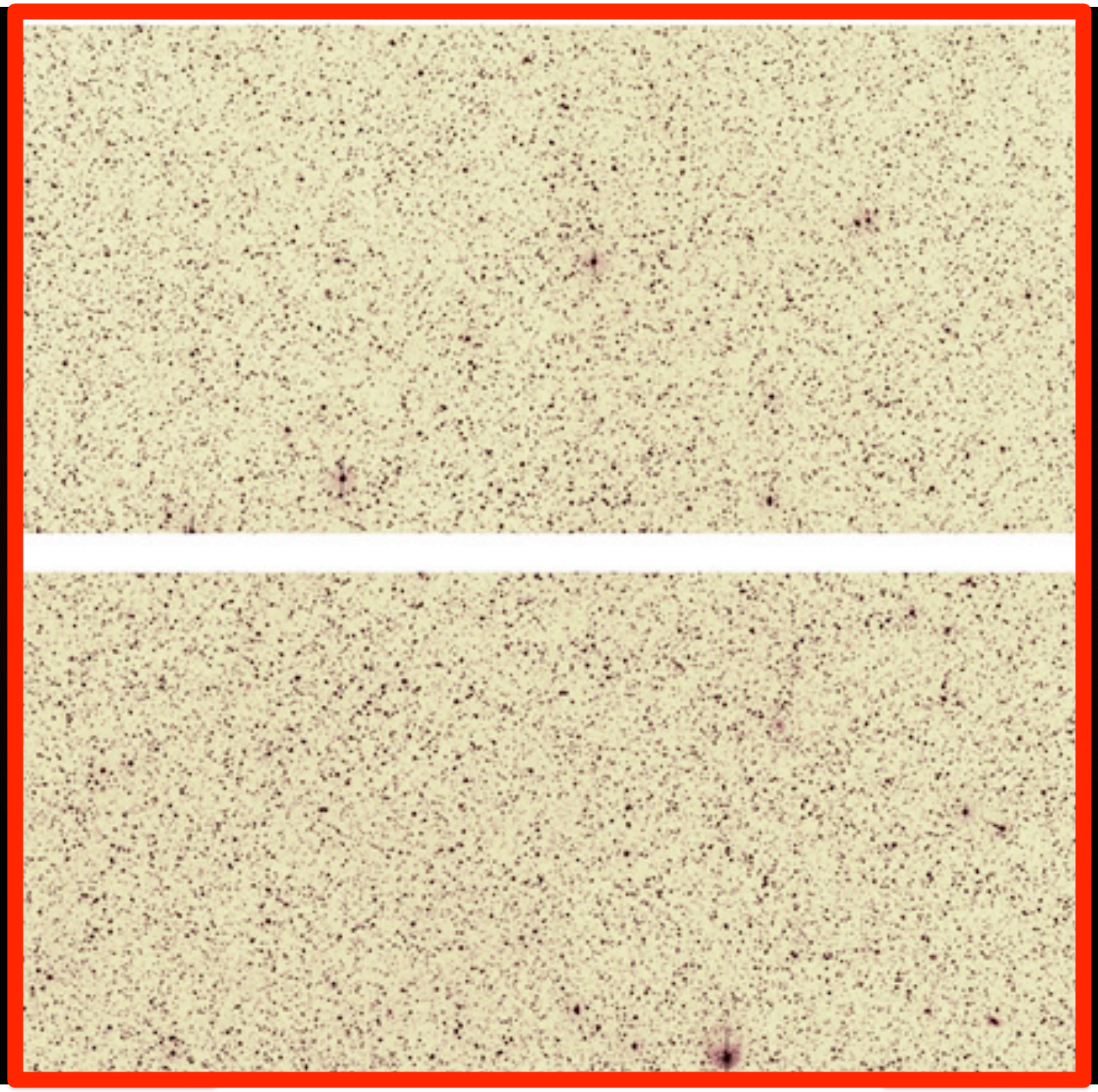


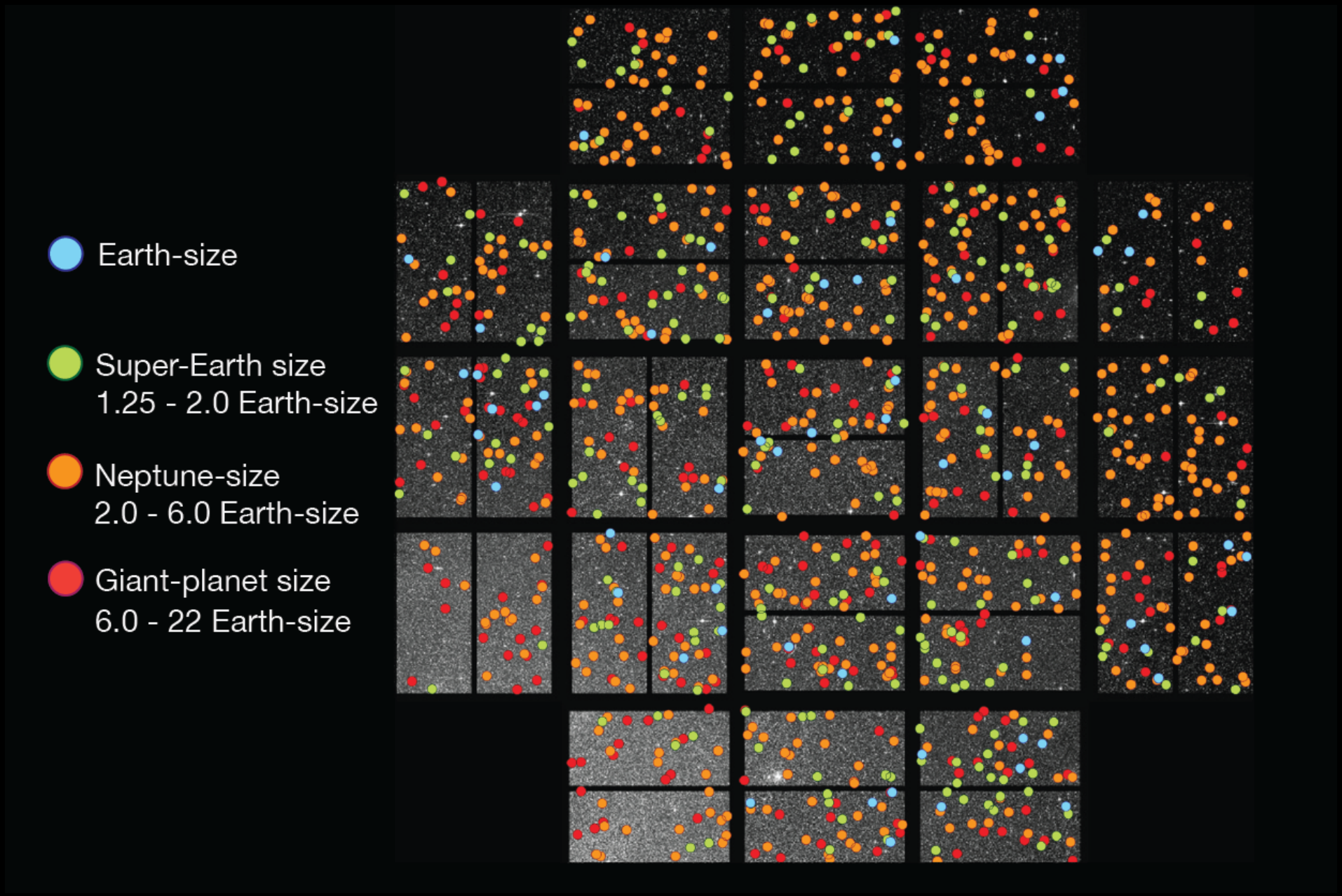

BRIGHTNESS
TIME IN HOURS


N
E
Vega
LYRA
AQUILA
Altair
CYGNUS
DELPHINUS
Deneb

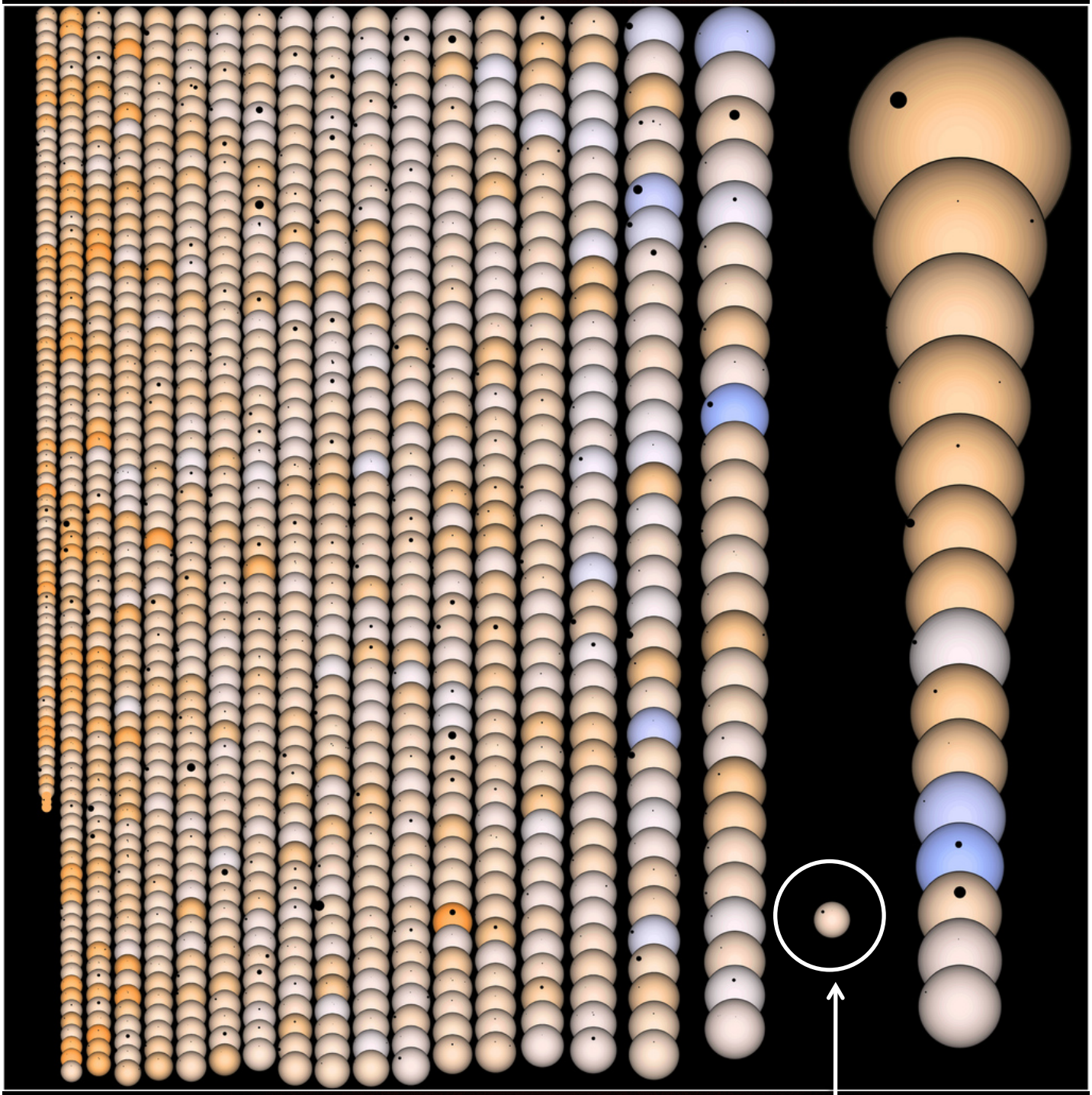




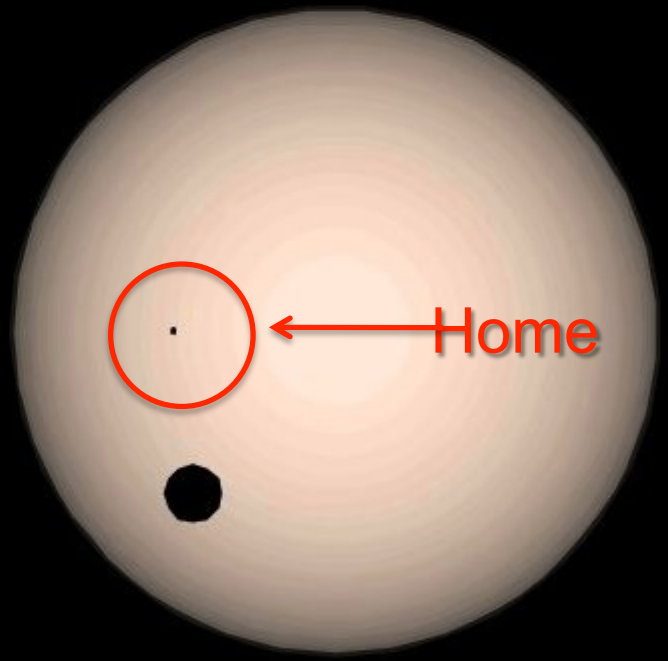



Earth-size
Super-Earth size
1.25 - 2.0 Earth-size
Neptune-size
2.0 - 6.0 Earth-size
Giant-planet size
6.0 - 22 Earth-size

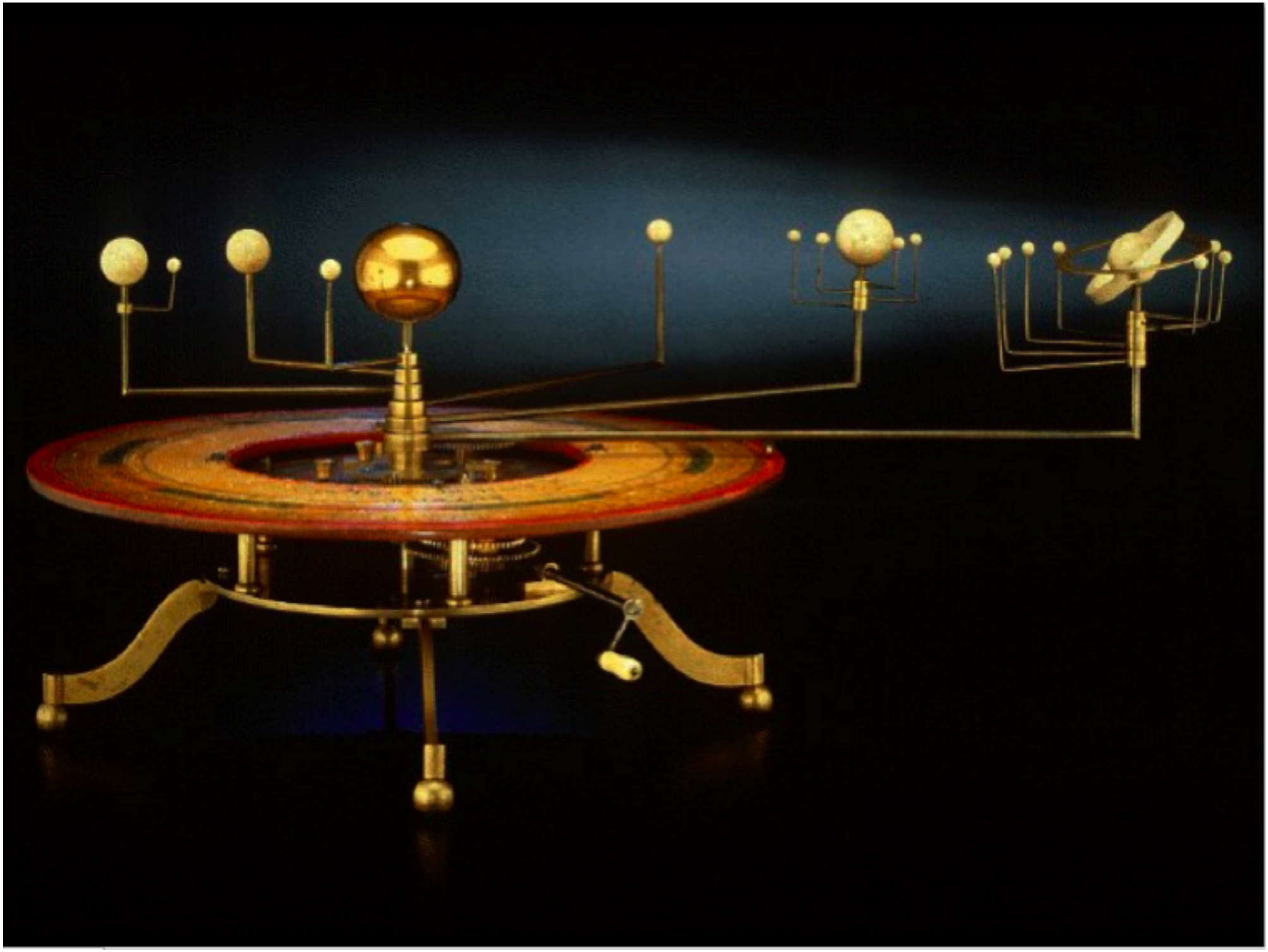
http://apod.nasa.gov/apod/ap110329.html



Jason Rowe



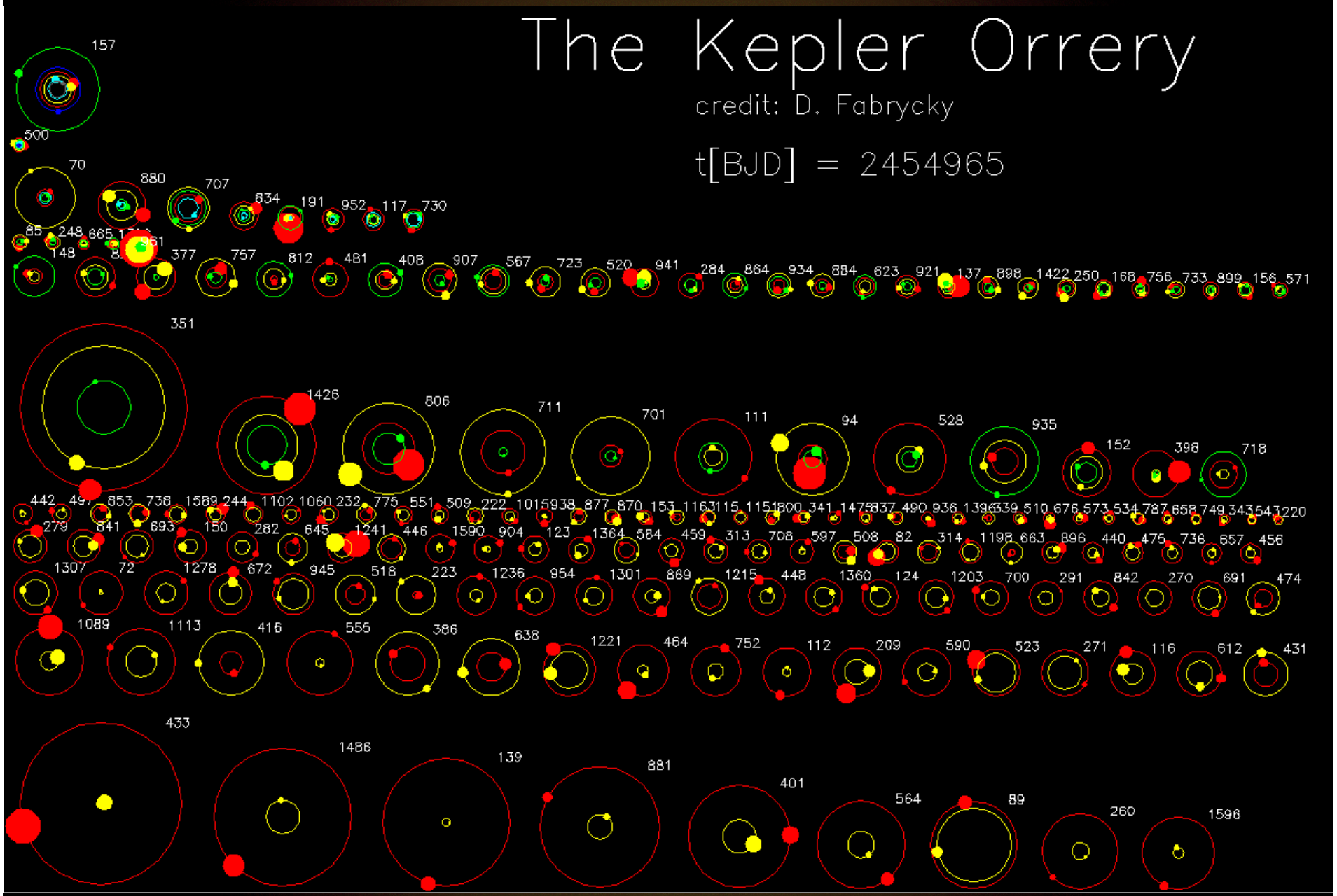
54 of 1235 in star's Habitable Zone

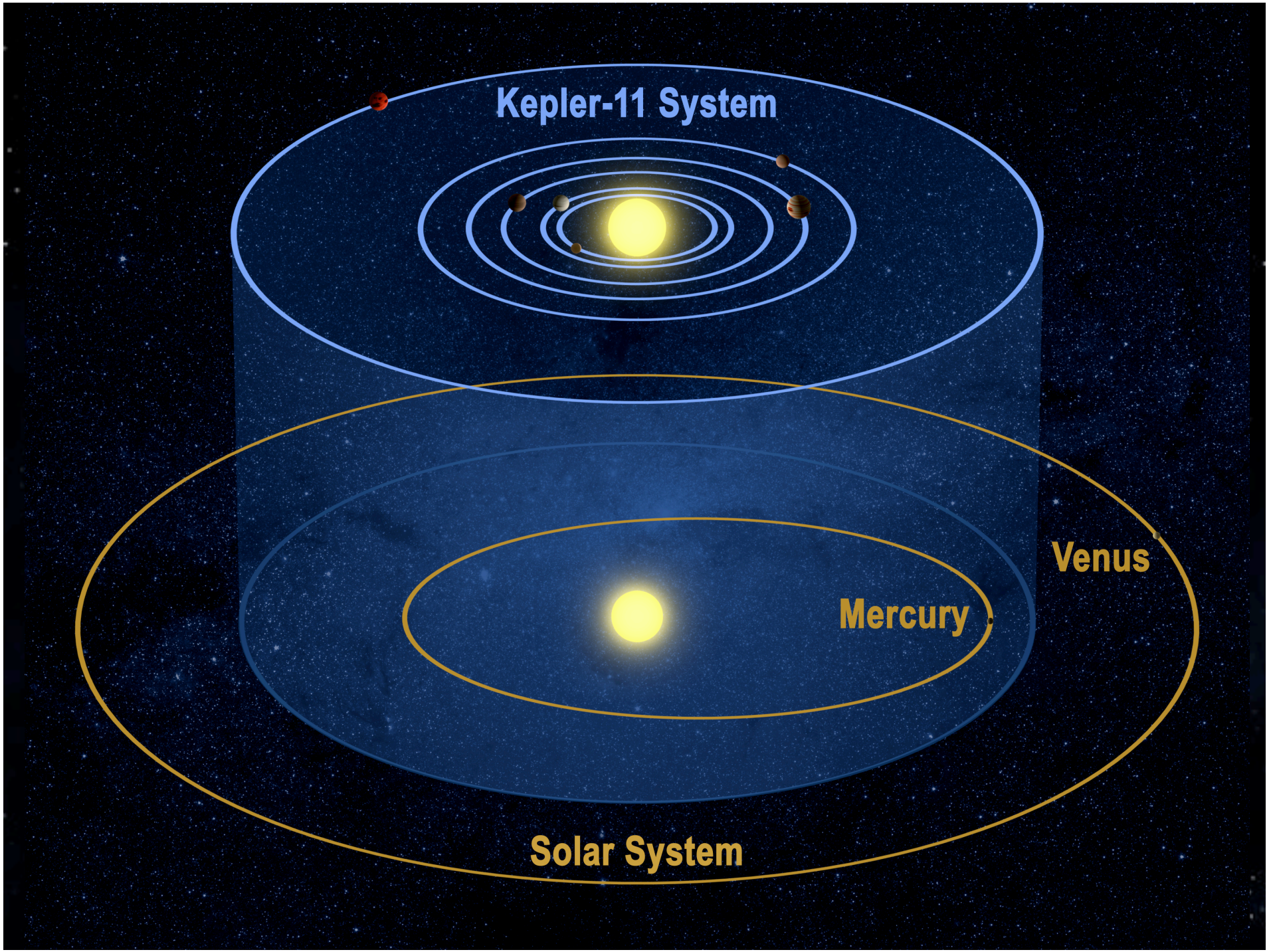


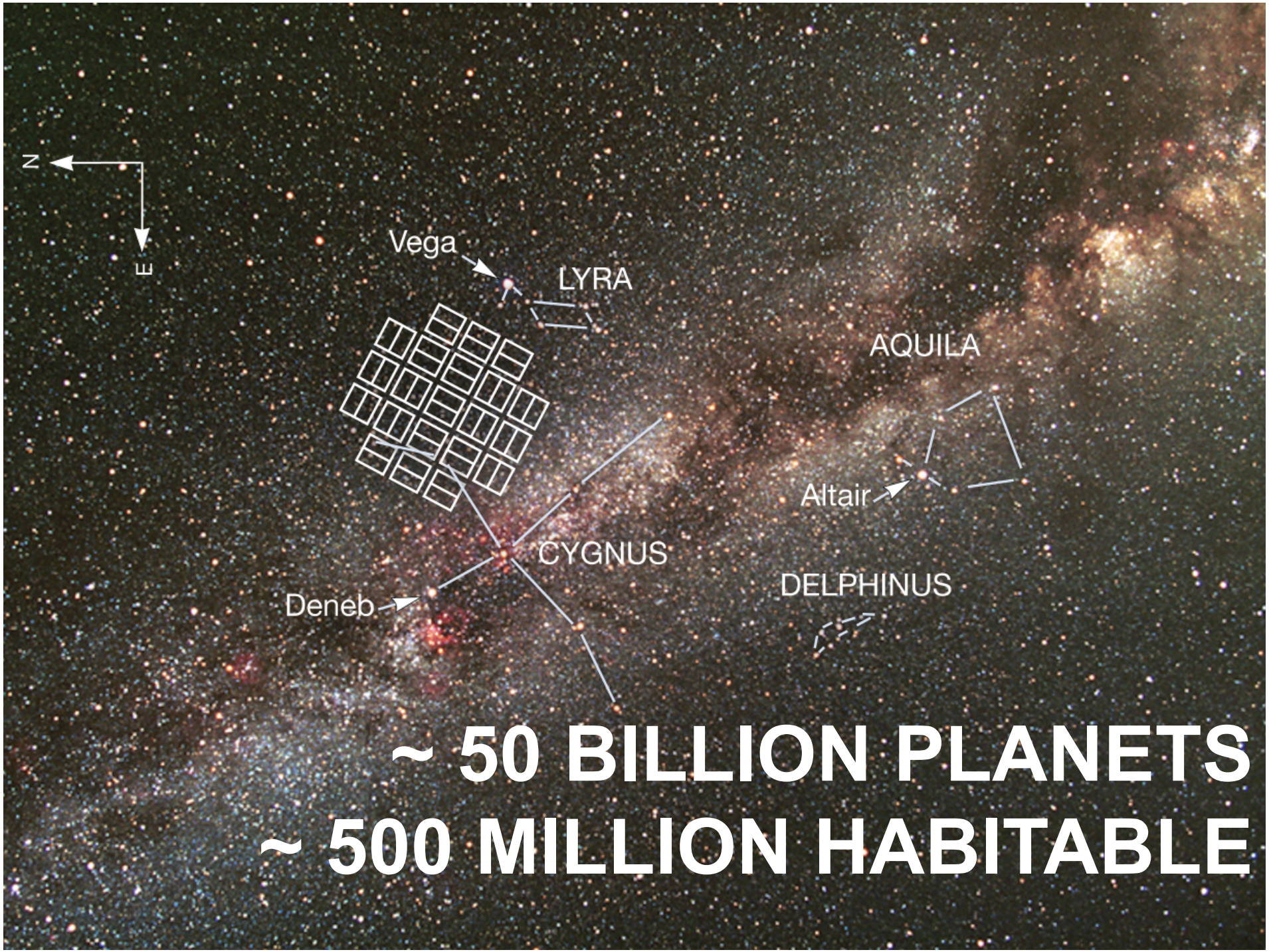
The Kepler Orrery

credit: D. Fabrycky

t[BJD] = 2454965




Kepler-11 System
Venus
Mercury
Solar System

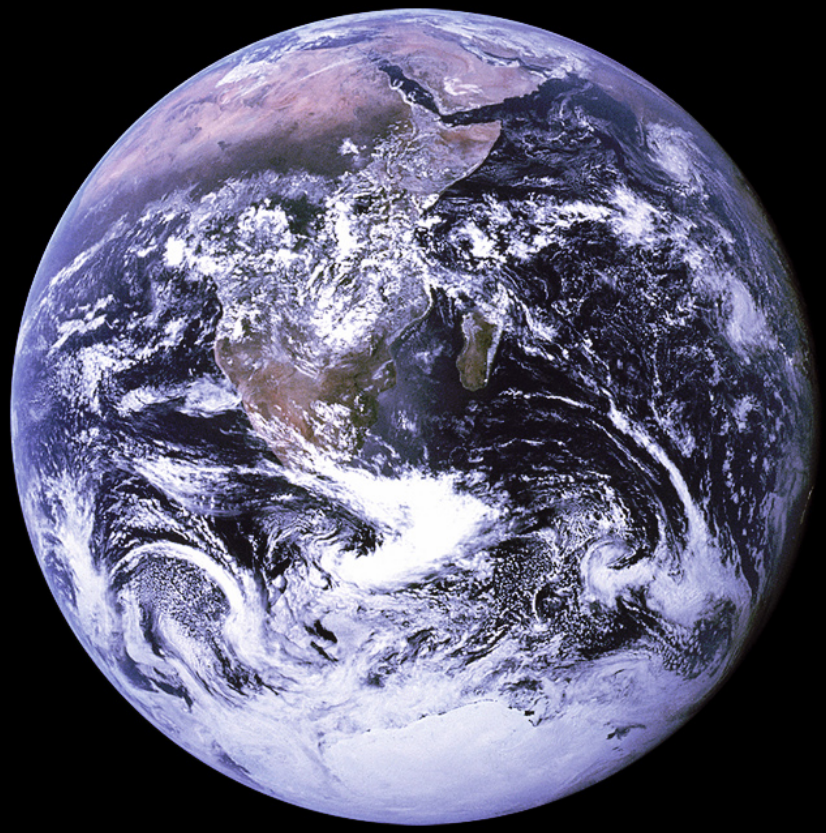

N
E
Vega
LYRA
AQUILA
Altair
CYGNUS
DELPHINUS
Deneb
~ 50 BILLION PLANETS
~ 500 MILLION HABITABLE

ARE WE ALONE?

Are there any fish in the ocean?

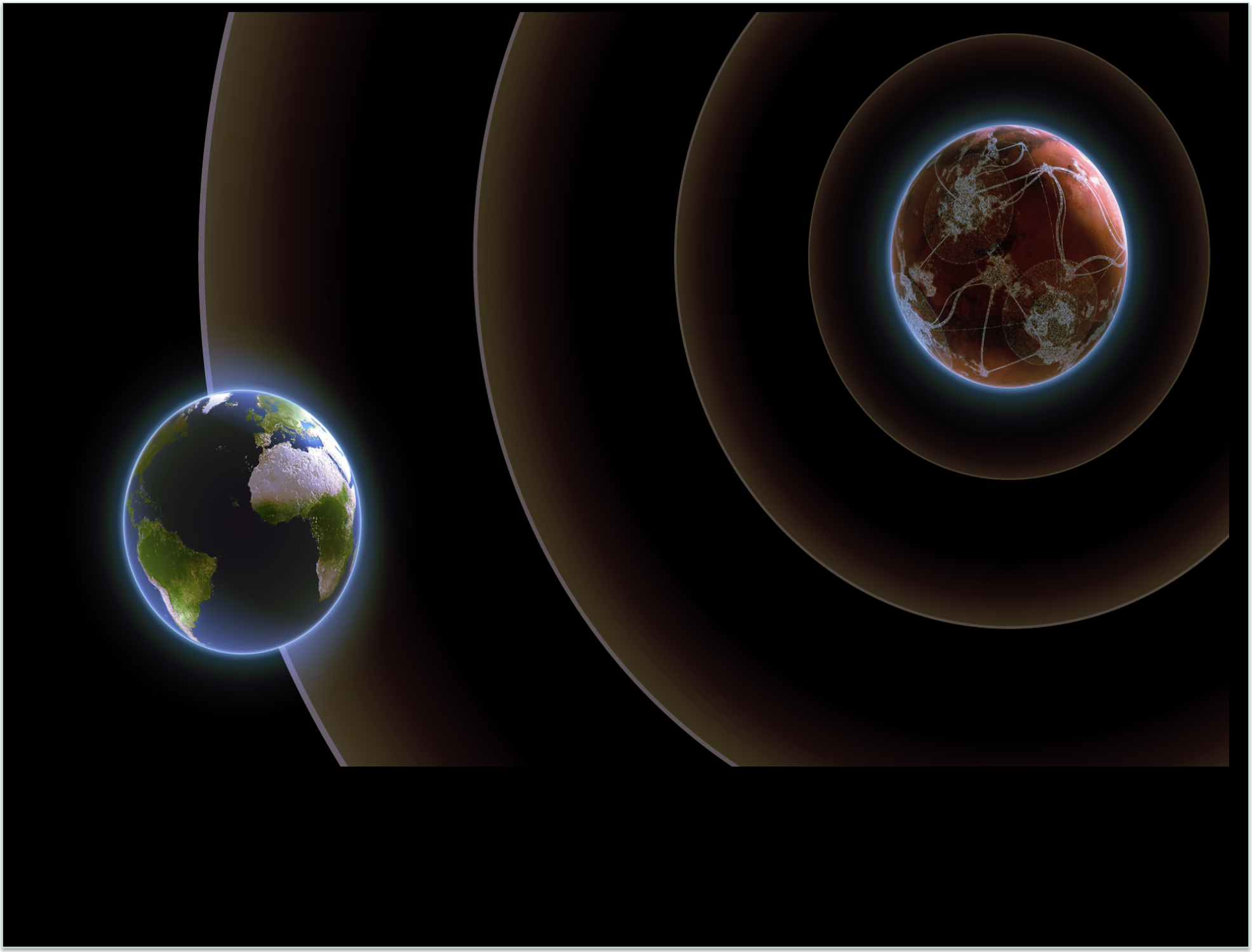
Credit: KQED QUEST

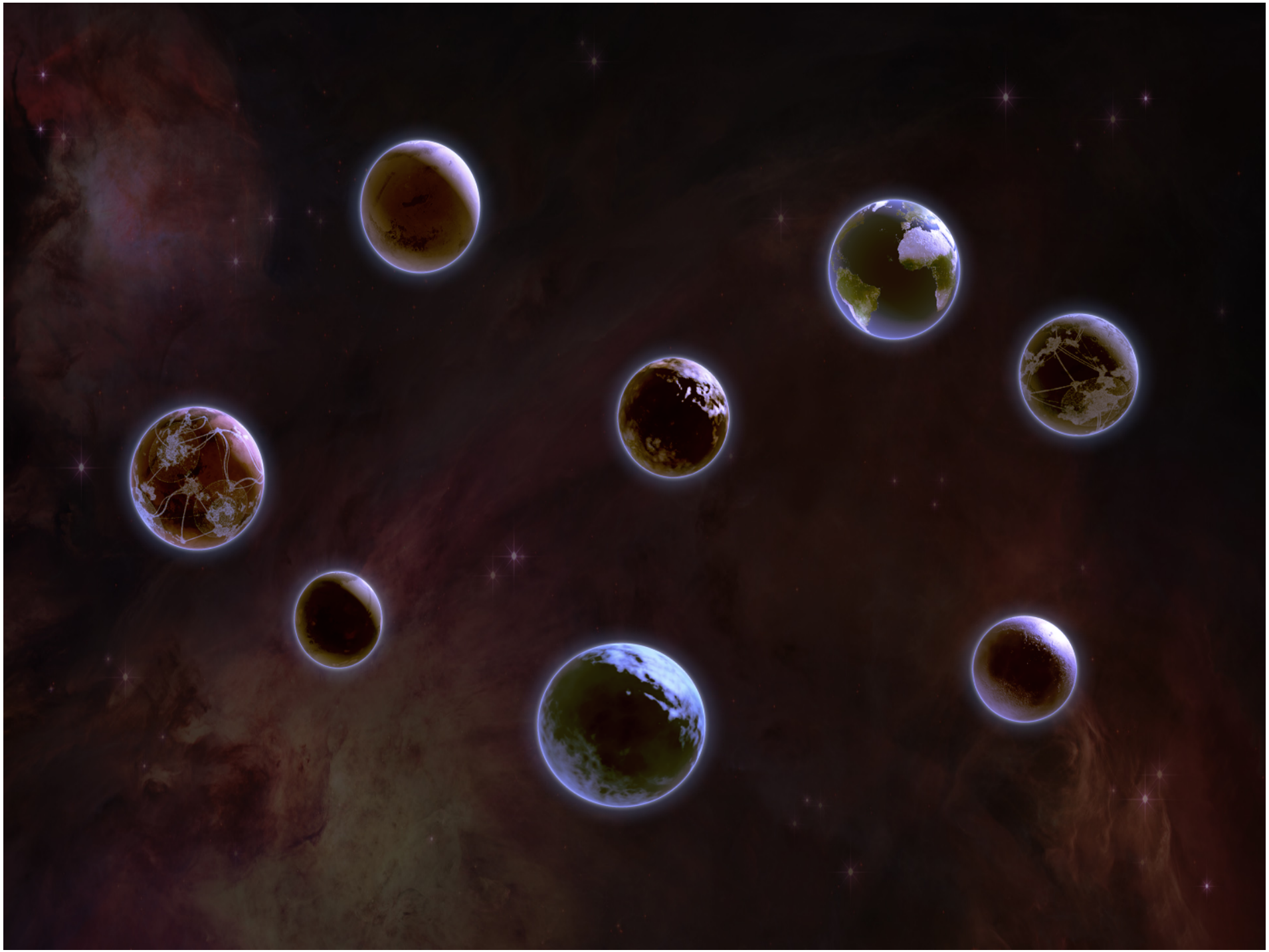
50 YEARS OF SETI TO DATE



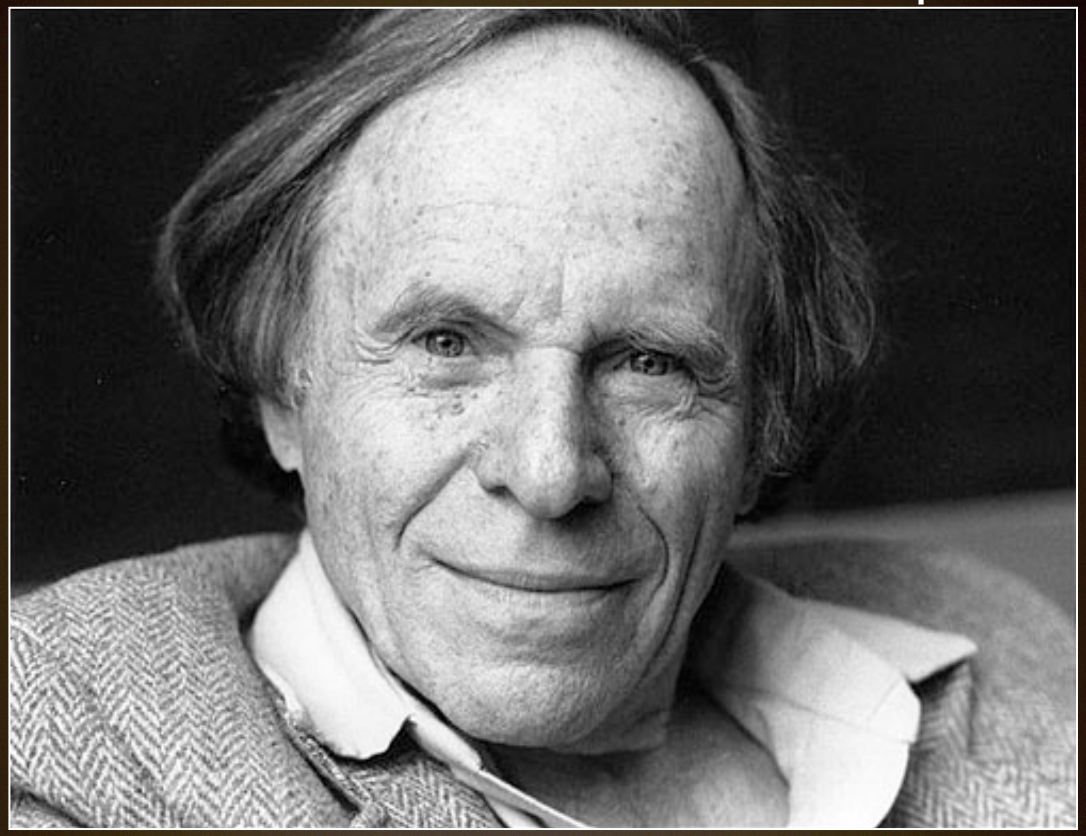
ASTROBIOLOGY: A SEARCH FOR BIOSIGNATURES

SETI: A SEARCH FOR TECHNOSIGNATURES



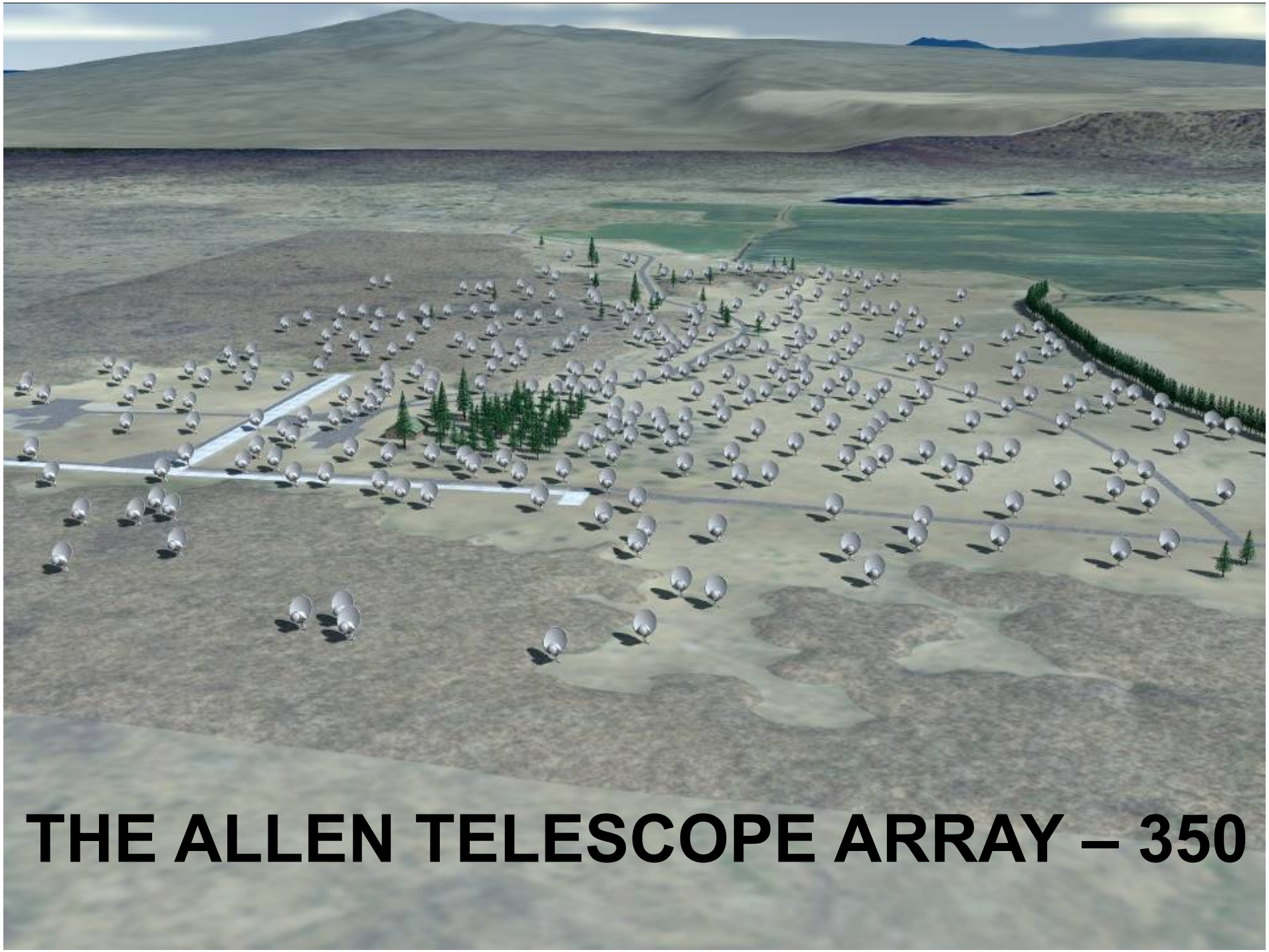


Prof. Philip Morrison



SETI IS THE ARCHEOLOGY OF OUR FUTURE

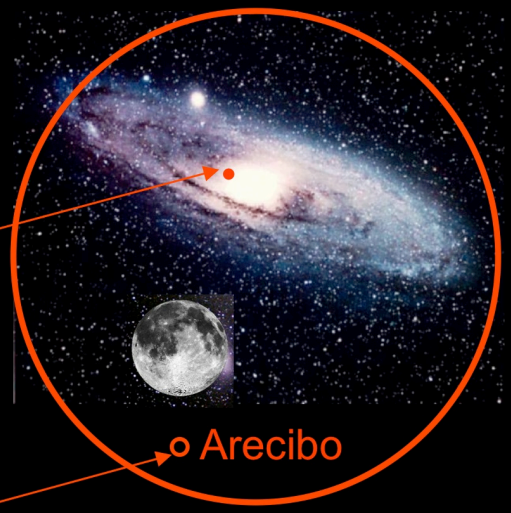
The ATA-42


THE ALLEN TELESCOPE ARRAY – 350

Large N – Small D Array

Improved sensitivity from more more dishes; larger collecting area

Small dish array images a large area of sky



Array FoV set by D of dish, and spatial resolution set by maximum baseline

$\Delta\theta \sim \lambda/d$

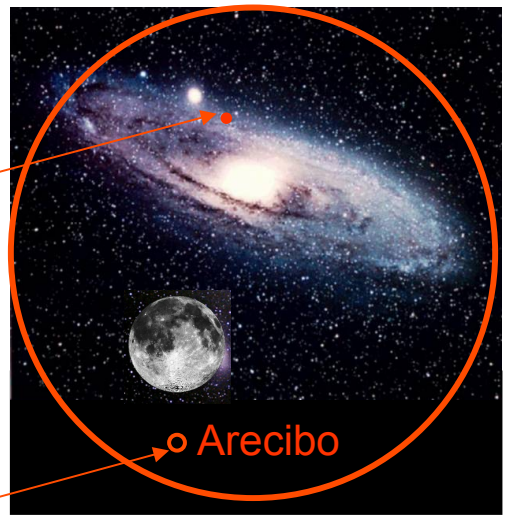
Single dish - FoV and spatial resolution set by D

d

Large N – Small D Array

Improved sensitivity from more dishes; larger collecting area

Small dish array images a large area of sky

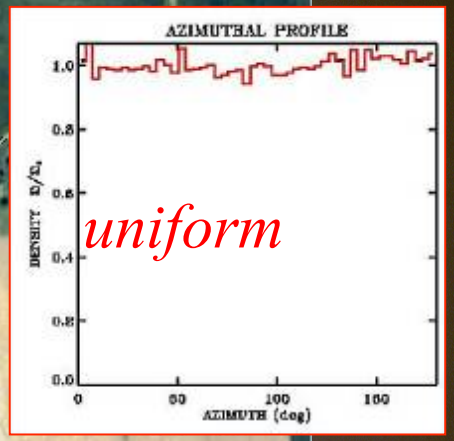


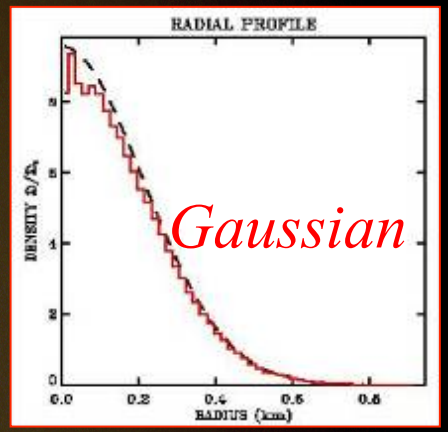
Array FoV set by D of dish, and spatial resolution set by maximum baseline

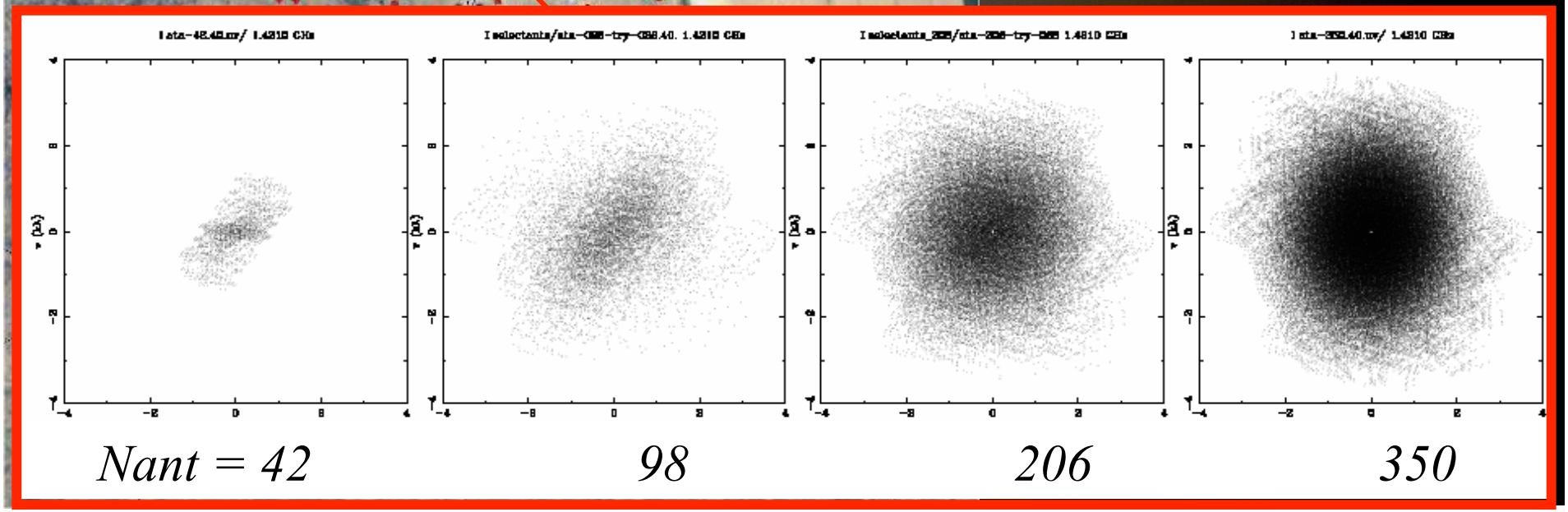
$\Delta\theta \sim \lambda/d$

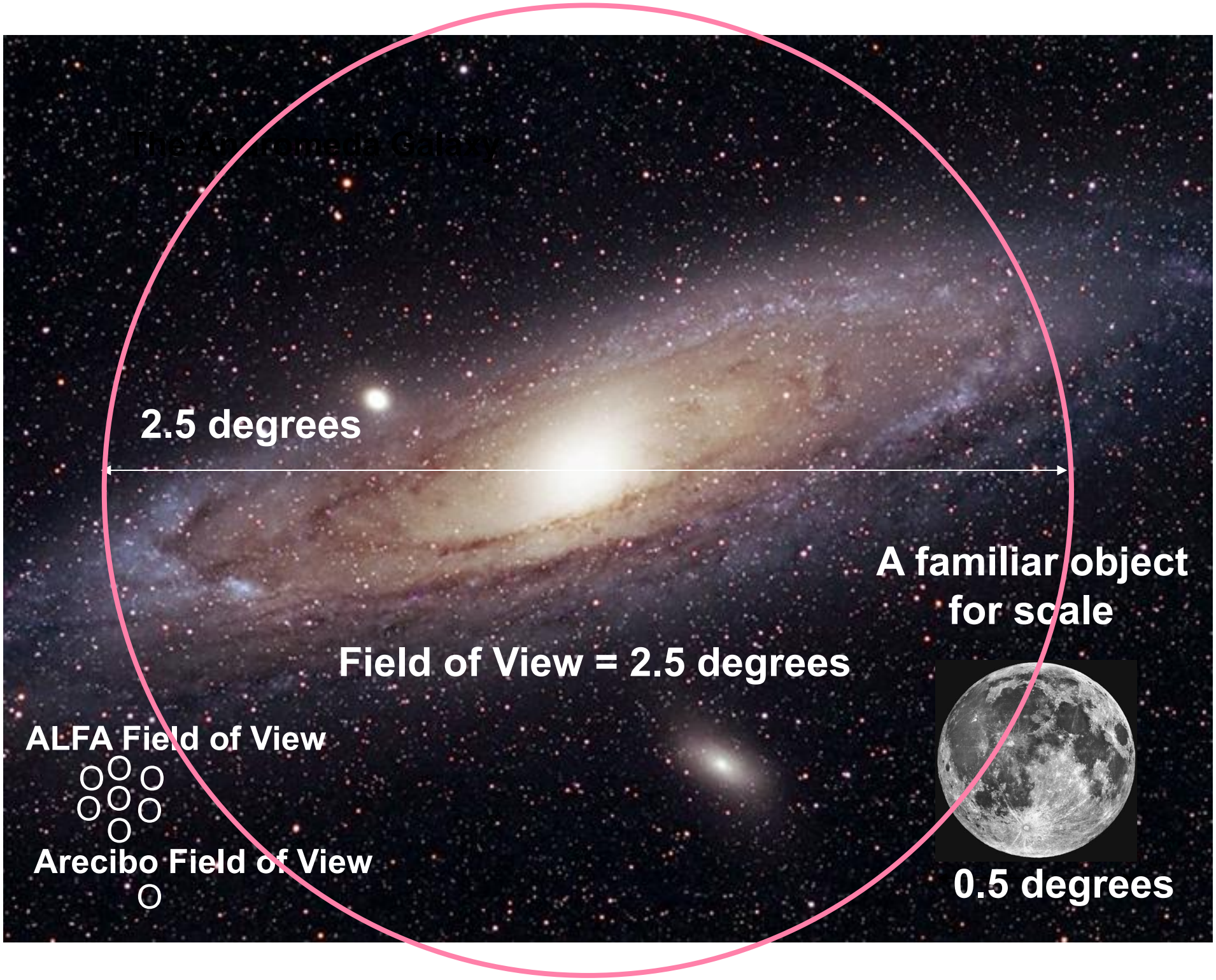
Single dish - FoV and spatial resolution set by D

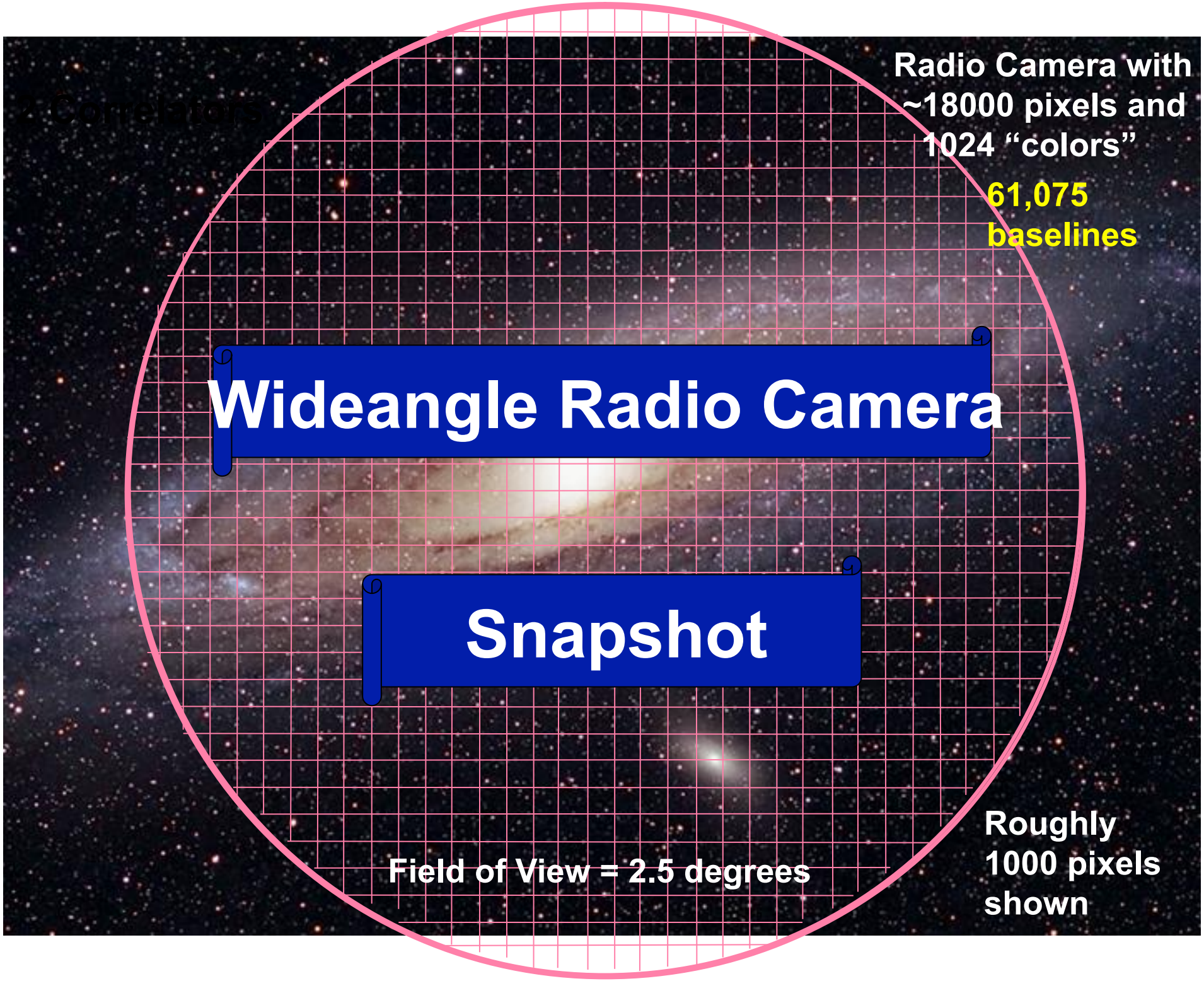
Antenna Configuration Only <u>Looks</u> Random

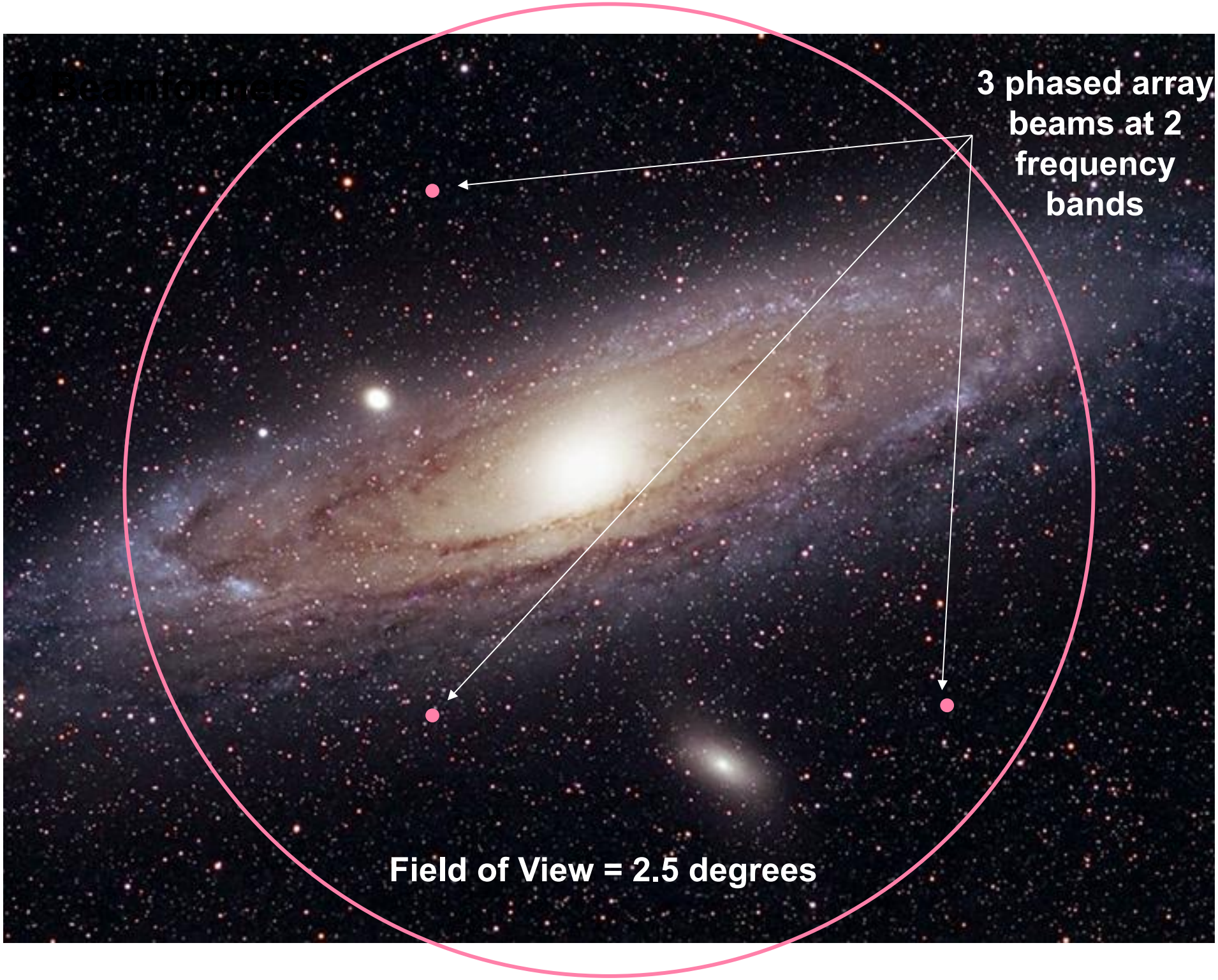




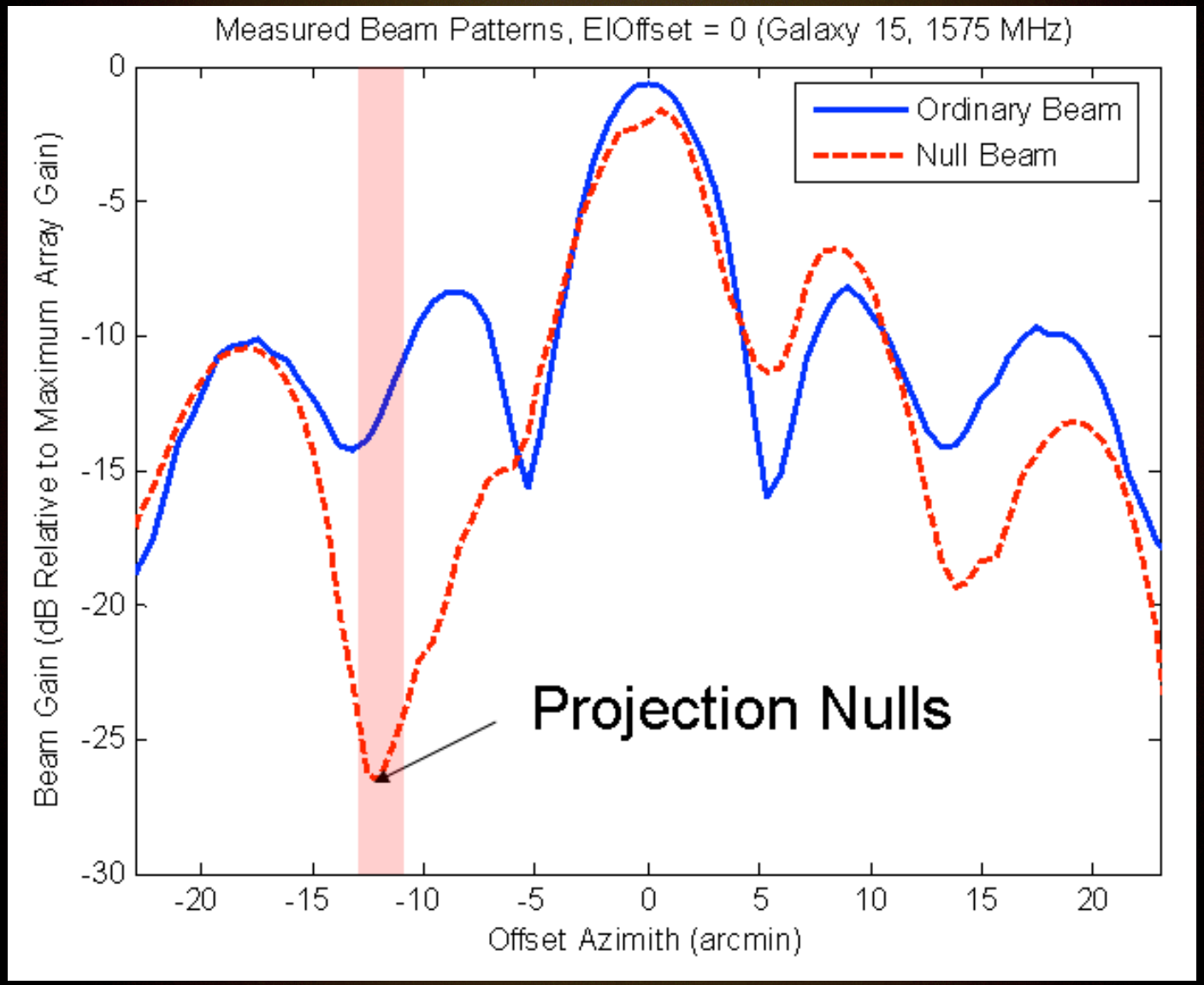



The Andromeda Galaxy
2.5 degrees
A familiar object for scale
Field of View = 2.5 degrees
ALFA Field of View
Arecibo Field of View
0.5 degrees

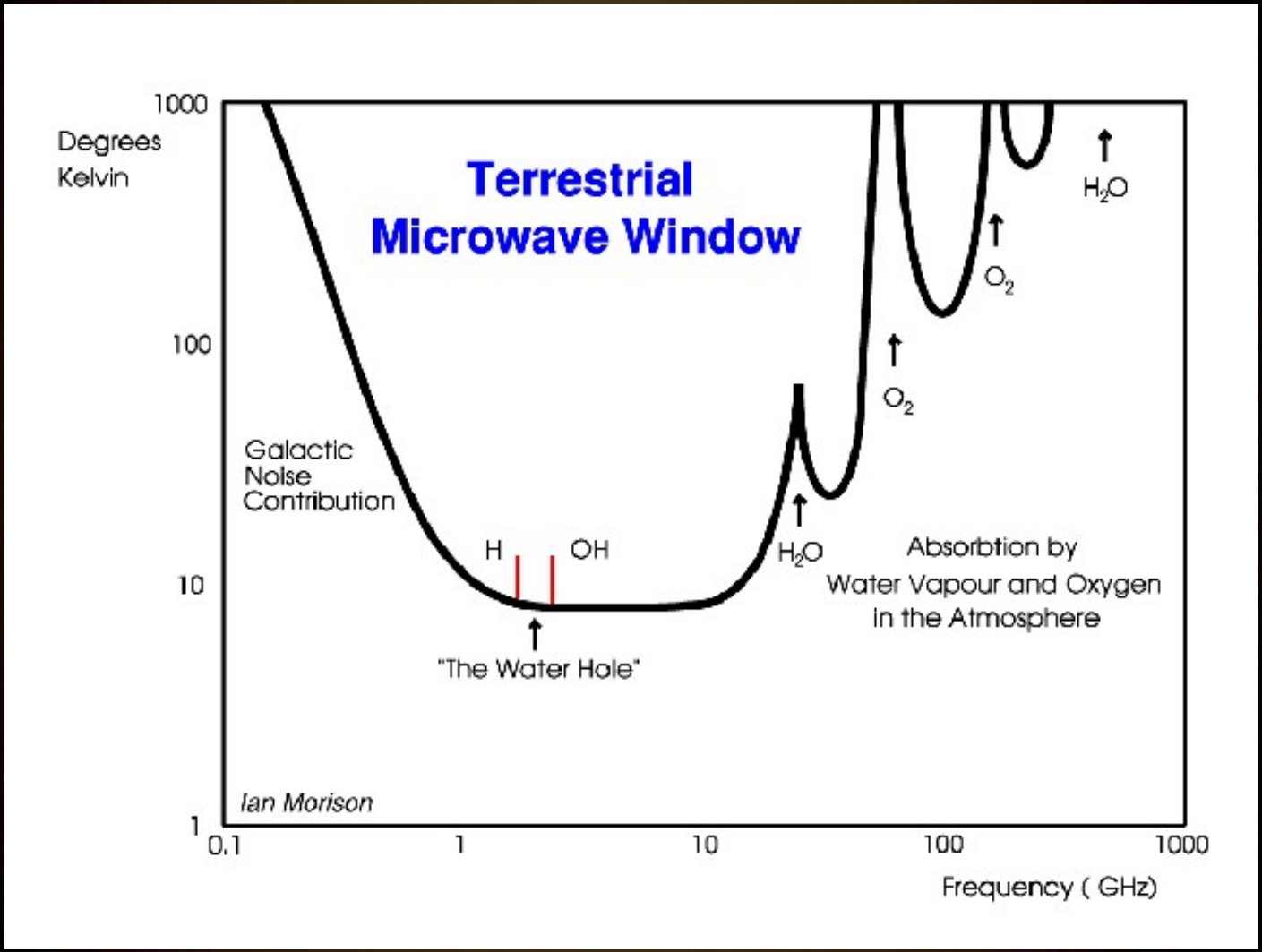

Correlators
Radio Camera with
~18000 pixels and
1024 “colors”
61,075
baselines
Wideangle Radio Camera
Snapshot
Field of View = 2.5 degrees
Roughly
1000 pixels
shown


3 phased array beams at 2 frequency bands
Field of View = 2.5 degrees

Beam Plus Offset Null



Terrestrial Microwave Window



9 billion frequency channels

Moore's Law at Work in SETI on the ATA

SonATA 1.0

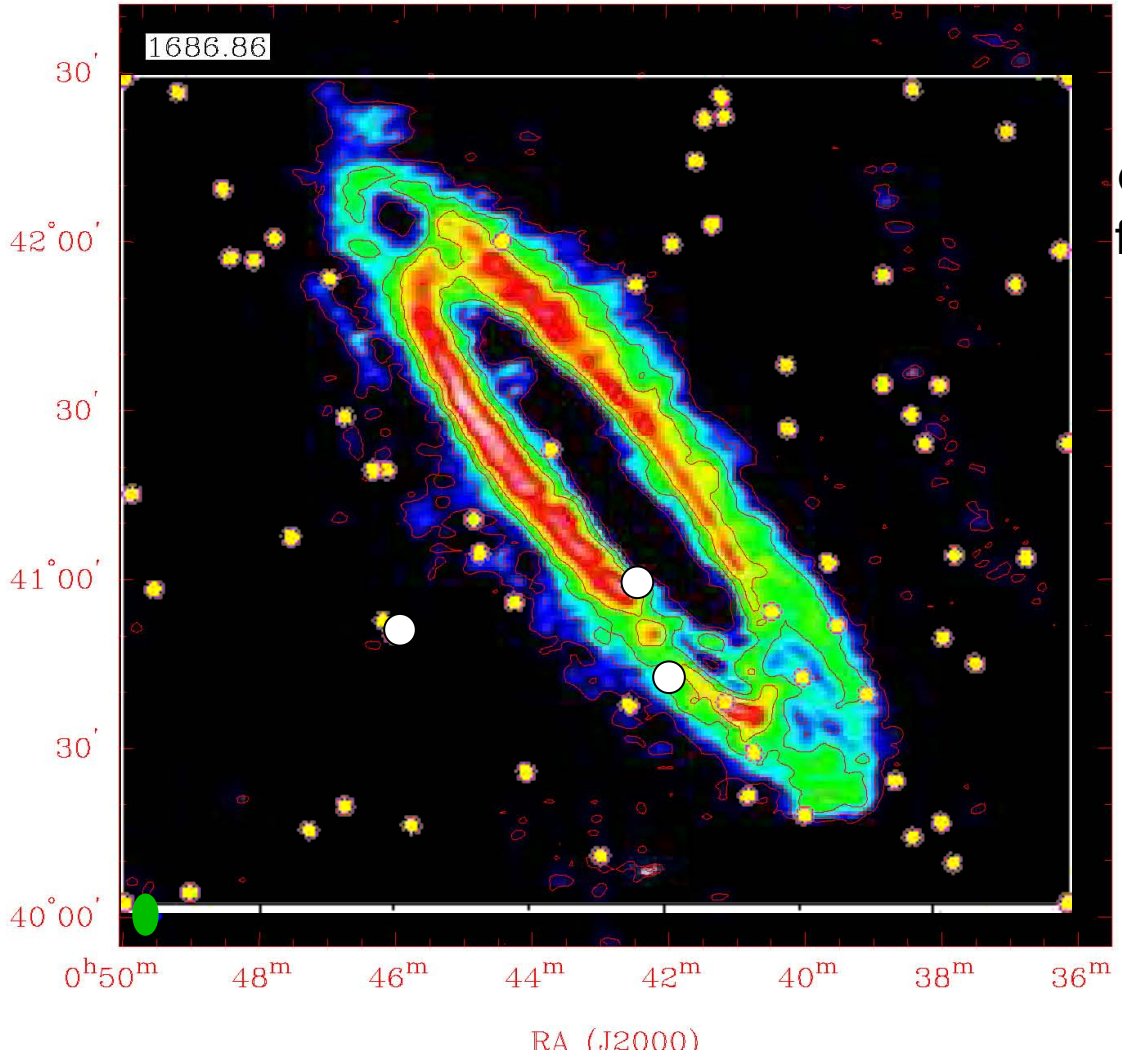
Prelude: Until December 1, 2010

Mostly empty!

Soon, 3 Racks of Dell servers ↔ 20 racks of Prelude
(Second Law of Thermodynamics also at work!)

M31

Commensal Targeted Search

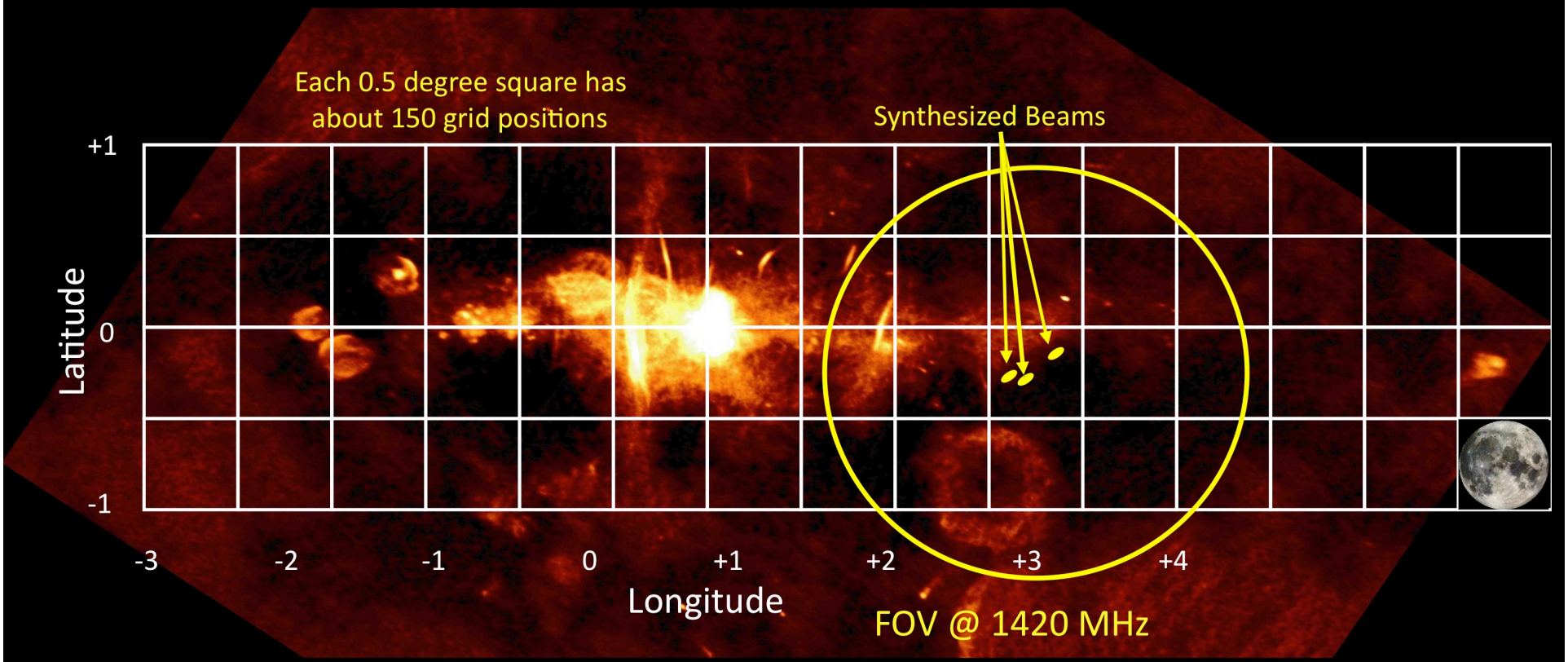


O Target stars selected from HabCat (13256 stars)

Target stars selected from Tycho (~250,000 stars)

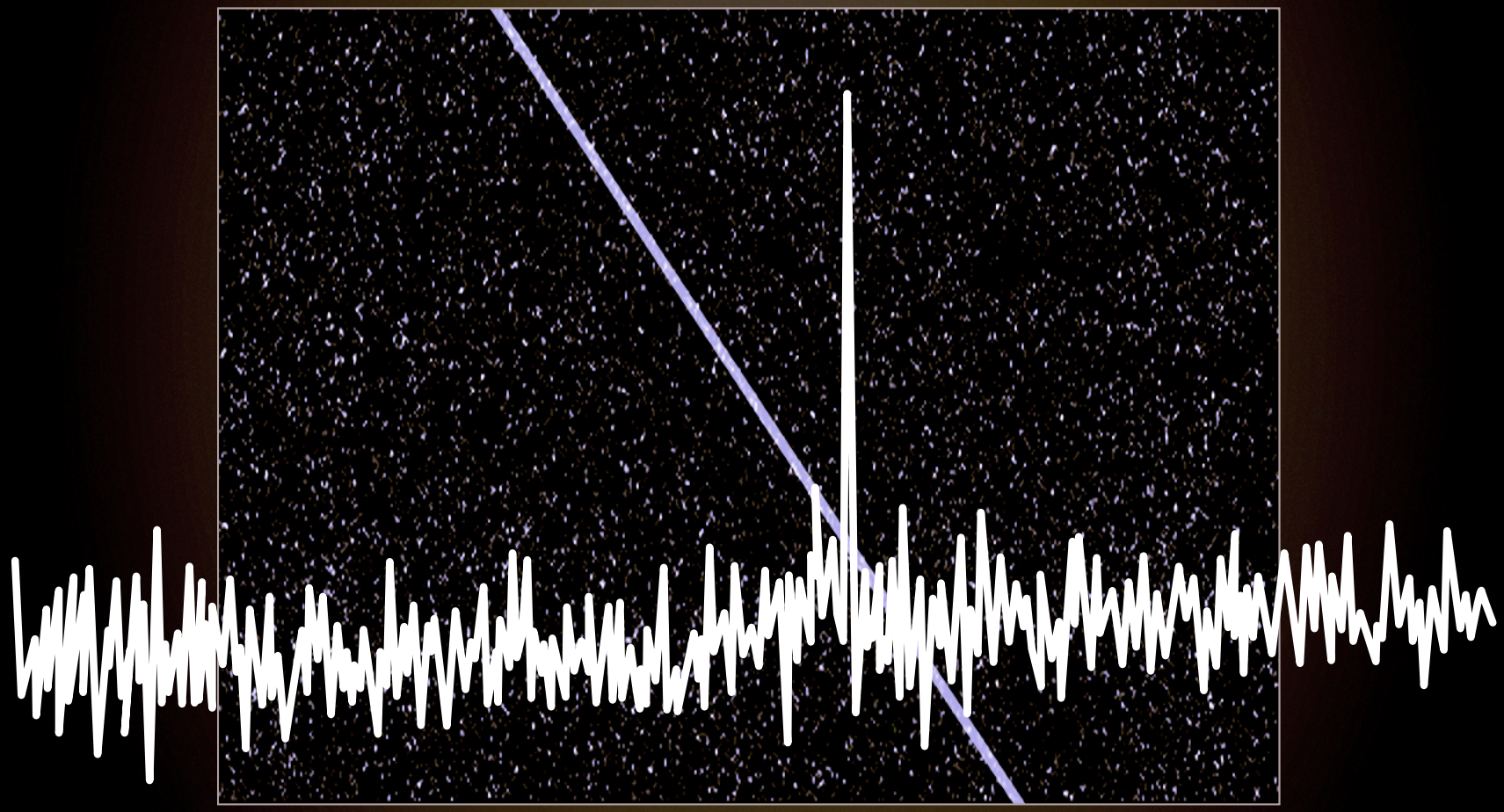
3 dual-pol summed array beams at 1 or 2 frequencies to be placed on target stars

Galactic Center Survey



4-10 Billion stars within 20 square degrees

VOYAGER 1 SIGNAL: 106 AU AWAY



2009 TED PRIZE WISH

TECHNOLOGY ENTERTAINMENT DESIGN

I wish that you would empower Earthlings everywhere to become active participants in the ultimate search for cosmic company.

NAUTICA
PENN STATE
PSUCCESS
UAMS

SETI@home
The Search for Extraterrestrial Intelligence

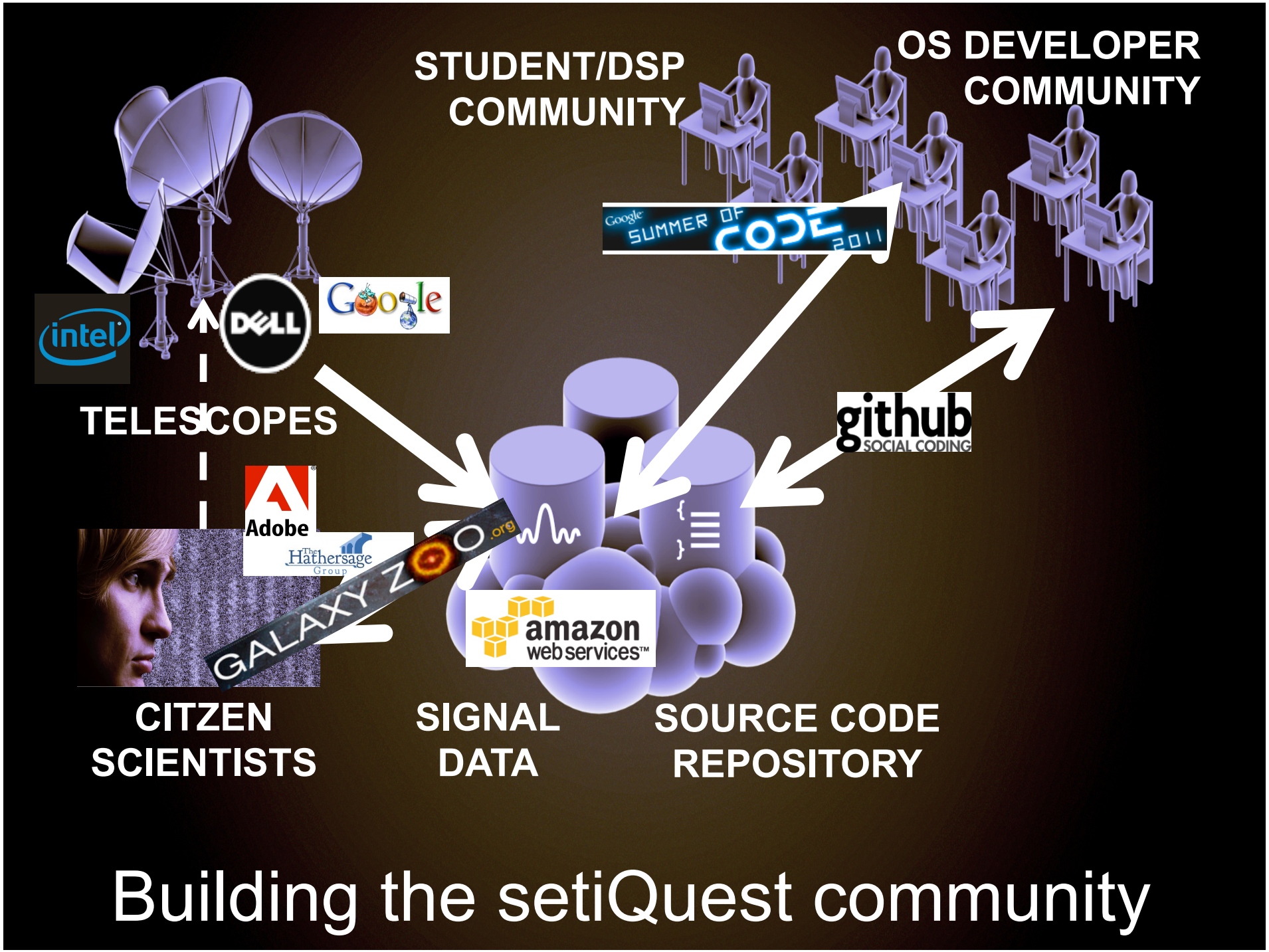
One million earthlings
Bounded by optimism
Leave their PC's on

Dan Seidner

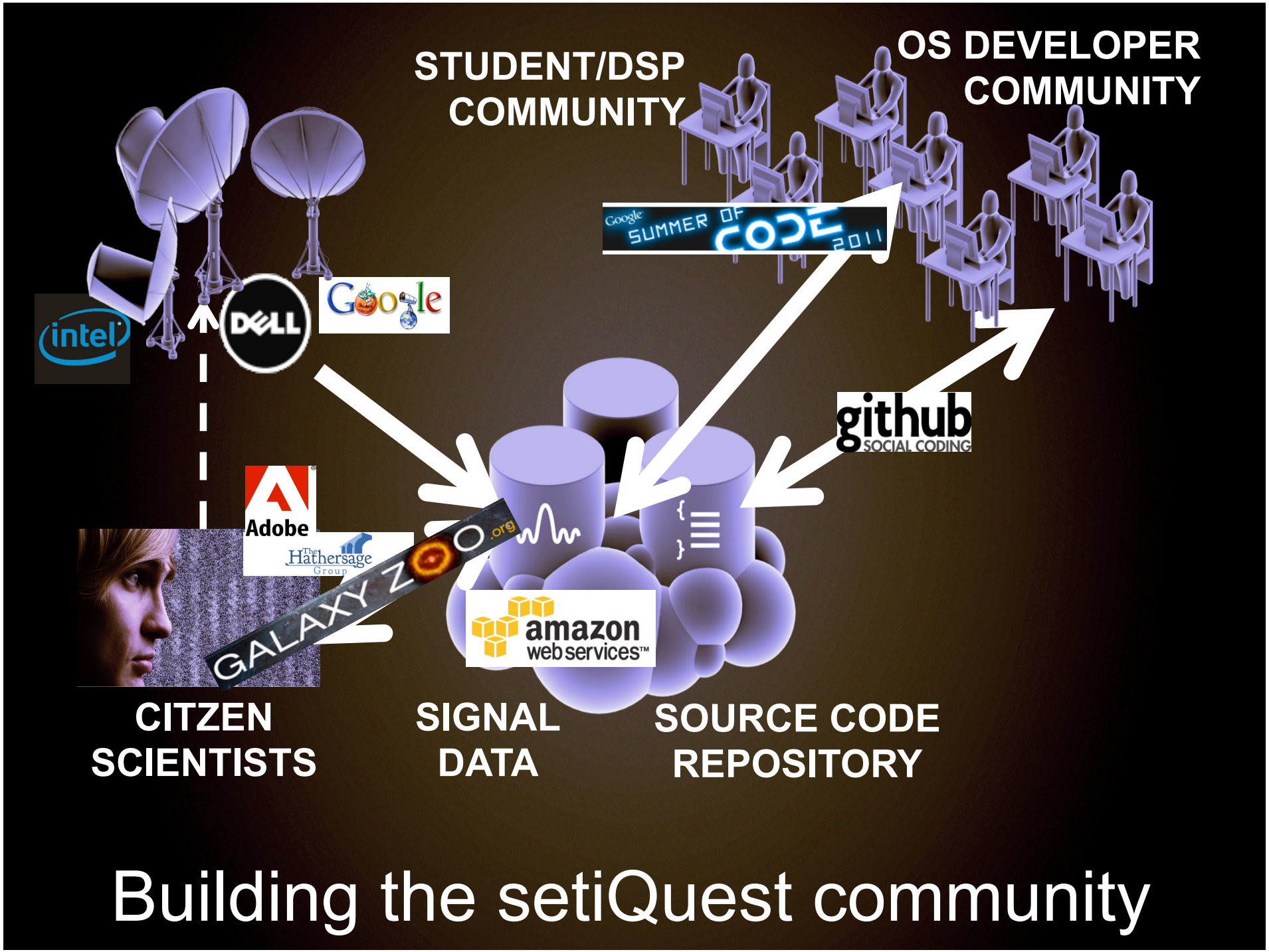
"The number of people in the world <u>actively</u> involved in SETI could fit in a phone booth!"

Alan Stern

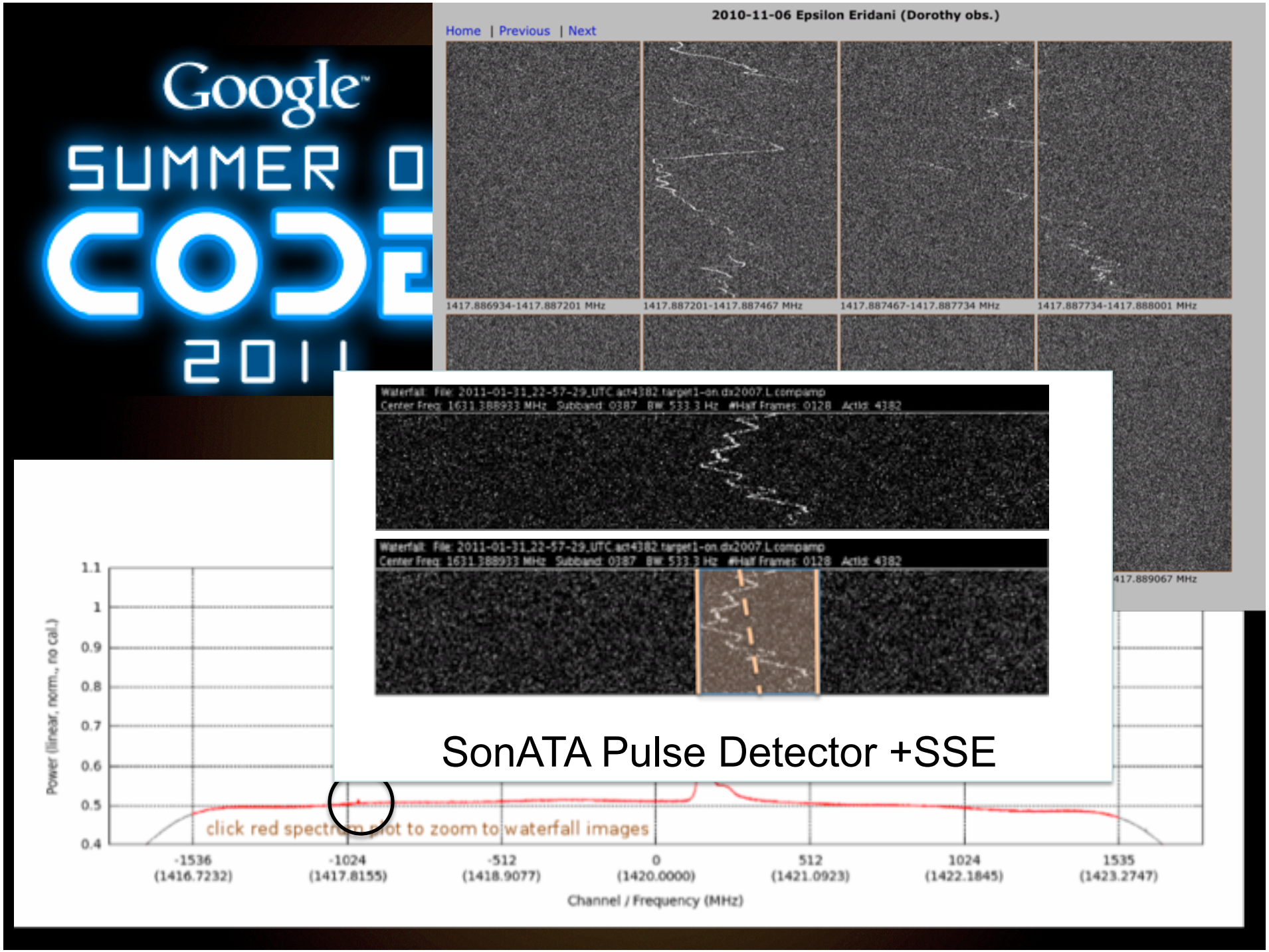
setiquest: Actively Engaging the World



Building the setiQuest community



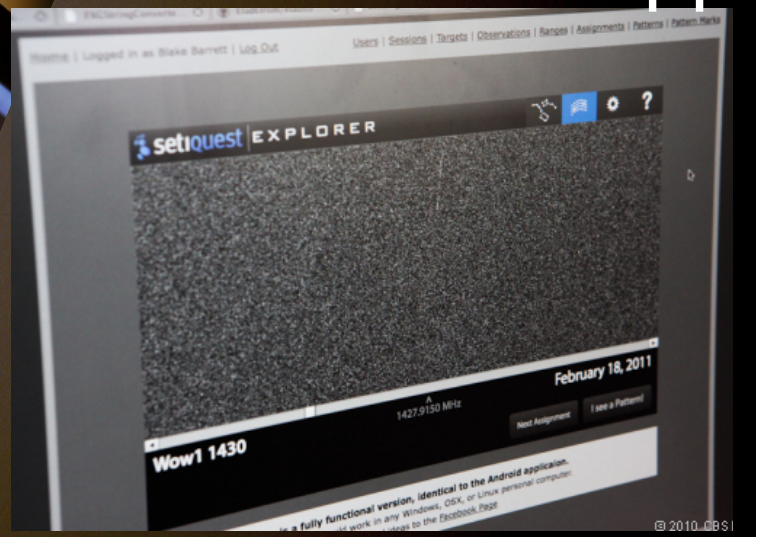
Building the setiQuest community



SonATA Pulse Detector +SSE

setiquest Explorer

browser app



Android mobile app

Francis Potter & Hathersage Group

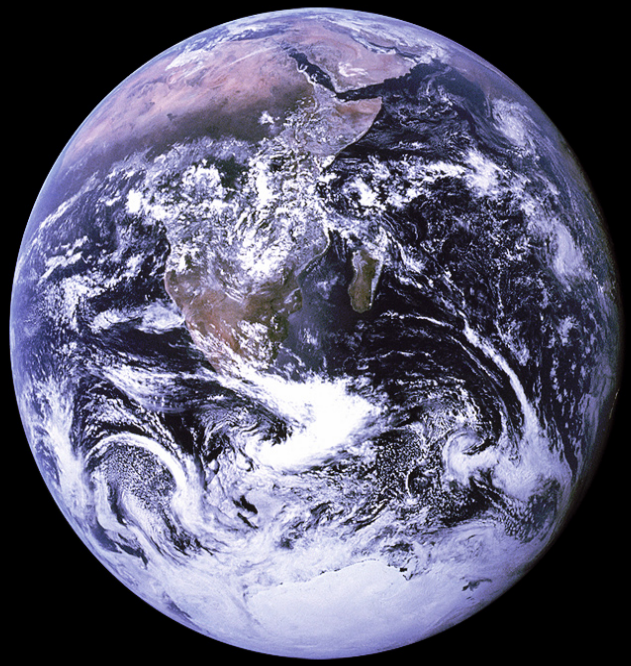
- We now know where to point our array
- We have just launched a two-year exploration of the Kepler worlds and plan to involve Earthlings in the search
- We are successfully building tools to engage the world & improve the search

Oops!

- We now know where to point our array
- We have just launched a two-year exploration of the Kepler worlds and plan to involve Earthlings in the search
- We are successfully building tools to engage the world & improve the search
- But the US/CA/UC funding situation put the array into hibernation on April 15

Oops!

- We now know where to point our array
- We have just launched a two-year exploration of the Kepler worlds and plan to involve Earthlings in the search
- We are successfully building tools to engage the world & improve the search
- But the US/CA/UC funding situation put the array into hibernation on April 15
- We need your support SETI.org



JOIN US
www.setiQuest.org