

WELCOME TO ASTRO-1H, 2019

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The Topic for Astro-1 Honors 2019 Seminar will be:

A 3D rendered alien head with large, black, almond-shaped eyes and a smooth, greyish-white surface. The alien is positioned centrally, looking directly forward. The background is a deep space scene with a starry field and a colorful nebula in shades of orange, red, and blue. The text 'SETI' is overlaid in large, blue, sans-serif letters across the lower part of the alien's face and neck.

SETI

*The Search for **Extra-Terrestrial Intelligence***

A deep space photograph showing a vast field of stars of various colors (blue, white, yellow) against a dark background. On the right side, there is a prominent galaxy with a bright yellowish-white core and reddish-brown dust lanes.

Is anybody out there?

https://www.youtube.com/watch?time_continue=56&v=yd18oZqdmdo

HOAX!

No, NASA did NOT Intercept An Intergalactic Distress Call in 1998

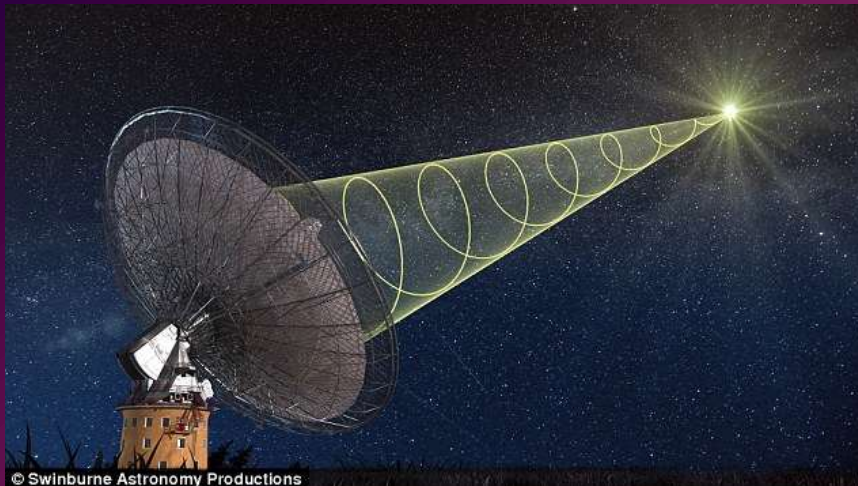
Andromeda,
our closest galactic
neighbor, 2.5 million
light years away.



NASA has not issued any press release about such an intergalactic distress call. Nor are there any credible news or media reports about such a message.

“Dr. Viktor Kulakov” is neither a noted Russian space scientist nor is he in charge of any United Nations research group. A “Viktor Kulakov” was a high-ranking military leader in the former Soviet Union, but he was not a space scientist. He died in May 2013.

Humans have been fascinate with the idea of alien civilizations and UFOs for hundreds of years.



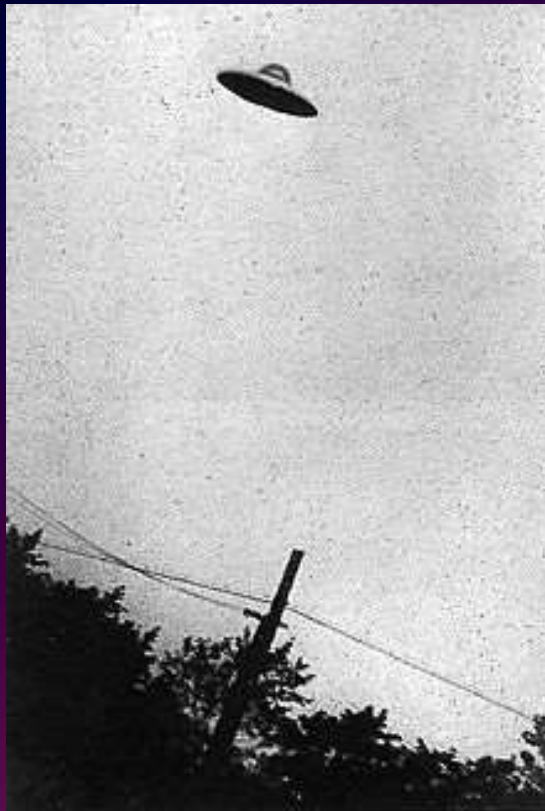
upper left: pure fiction

upper middle: view from the ground of the Falcon Heavy returning to Vandenberg

upper right: Pulsar

lower left: artist's drawing of Parkes Telescope in Australia, catching a fast radio burst from space

Historic fascination with communicating with aliens – claimed UFO sightings.



A photo of a purported UFO over Passaic, New Jersey in 1952



Roswell Daily Record, July 8, 1947, announcing the "capture" of a "flying saucer"

Earliest recorded purported sighting: Ancient Egypt, 1440 BC

Date	Name	City, State	Country	Description	Hynek Scale
ca. 1440 BC	Fiery disks	Lower Egypt	Ancient Egypt	According to the disputed Tulli Papyrus , the scribes of the pharaoh Thutmose III reported that "fiery disks" were encountered floating over the skies.	1

Most alleged sightings are not supported by hard evidence, and some are explained as air force trainings or large contrails from launches, for example: SpaceX





Falcon 9 SpaceX launch from Vandenberg Dec. 22, 2018

“UFOlogist” J. Alan Hynek studied UFO sightings; published book in 1972 *The UFO Experience: A Scientific Inquiry*

Hynek Scale: Close Encounters

Nocturnal Lights

Lights in the night sky

Daylight Discs

UFOs seen in the daytime, generally having discoidal or oval shapes

Radar-Visual

UFO reports that have radar confirmation. These seem to offer harder evidence that the objects are real, although radar propagation can often be unreliable.

Close Encounters of the First Kind

Visual sightings of an unidentified flying object, seemingly less than 500 feet away, that show an appreciable angular extension and considerable detail

Close Encounters of the Second Kind

A UFO event in which a physical effect is alleged. This can be interference in the functioning of a vehicle or electronic device; animals reacting; a physiological effect such as paralysis or heat and discomfort in the witness; or some physical trace like impressions in the ground, scorched or otherwise affected vegetation, or a chemical trace.[10]

Close Encounters of the Third Kind

UFO encounters in which an animated creature is present. These include humanoids, robots, and humans who seem to be occupants or pilots of a UFO.[11]

The extraterrestrial hypothesis (ETH) proposes that some unidentified flying objects (UFOs) are best explained as being physical spacecraft occupied by extraterrestrial life or non-human aliens, or non occupied alien probes from other planets visiting Earth.

NO ALIENS HAVE BEEN FOUND.

But that does not stop us from searching!



A message from deep space.
Who will be the first to go?
A journey to the heart of the universe.

CONTACT

What questions and associations does this topic bring up for you?

Discuss with neighbors, write on board.



Broad questions associated with searches for ETIs:

1. Are we alone in the galaxy?

The universe?

How can we know?



1. Are we alone in the galaxy? The universe? How can we know?

2. What is the likelihood that life developed elsewhere, contemporaneously with, or before or after, life on Earth?



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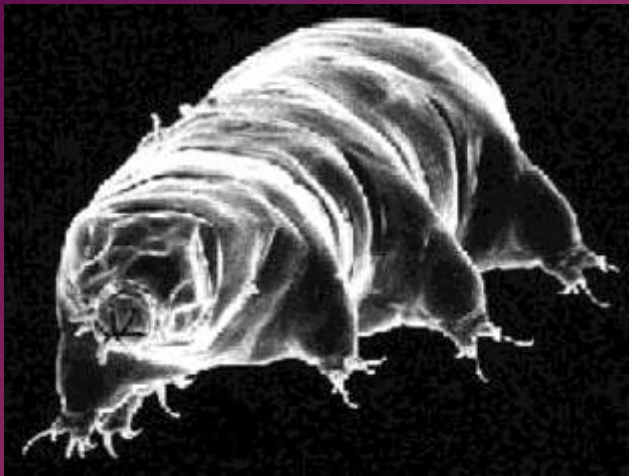
3. If we are not alone, where are the others, and why have we not detected any signals from them?



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3. If we are not alone, where are the others, and why have we not seen (optically) or heard (via radio waves) or detected (via microwaves) any signals from them?
4. Is water the only basis for life? Or just the most likely? Could there be other life forms based on carbon or silicon? If so, how could we communicate with them?



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- 6. Should we be spending money and time looking for ETs?**



Politics, Space Science Research and Space Exploration

115TH CONGRESS 2D SESSION

H. R.

A BILL

To authorize the programs of the National Aeronautics and Space Administration for fiscal years 2018 and 2019...

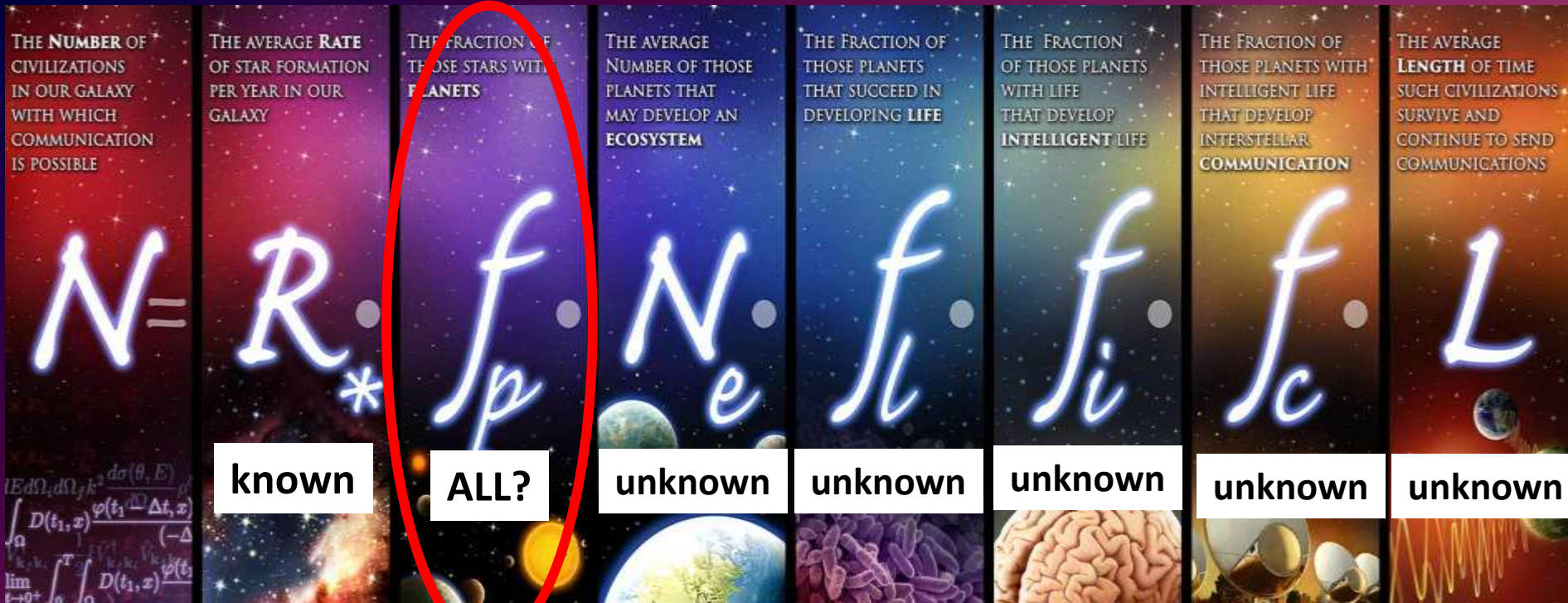
Subtitle B—Astronomy and
Astrophysics

SEC. 311. SEARCH FOR THE ORIGIN, EVOLUTION, DISTRIBUTION, AND FUTURE OF LIFE IN THE UNIVERSE.

AUTHORIZED FUNDING.—Subject to the availability of appropriations, the Administrator shall make available at **least \$10,000,000 for each of fiscal years 2018 and 2019 for the search for technosignatures.**

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2. What is the likelihood that life developed elsewhere?

hypothetical prediction: The Drake Equation



Dr. Frank Drake

Professor of Astronomy, Cornell University
 Director, National Astronomy and Ionosphere Center at Arecibo, Puerto Rico

Where would intelligent life most likely arise? Around stars not too different from our Sun: Single, of mass 0.4 to 1.4 times the Sun's mass, and inhabiting a calm galactic neighborhood for three or more billions of years.

Stellar Influences on the Emergence of Intelligent Life, Martin Cohen, 1981

<https://history.nasa.gov/CP-2156/contents.htm>

Searching for Habitable Worlds

KEPLER-20e
DECEMBER 2011



KEPLER-22b
DECEMBER 2011



KEPLER-452b
JULY 2015



KEPLER-186f
APRIL 2014



ARTISTIC CONCEPT

**Kepler and K2 Missions
found thousands of planets
orbiting other stars
in our galactic
neighborhood –
actually more planets
than stars!**

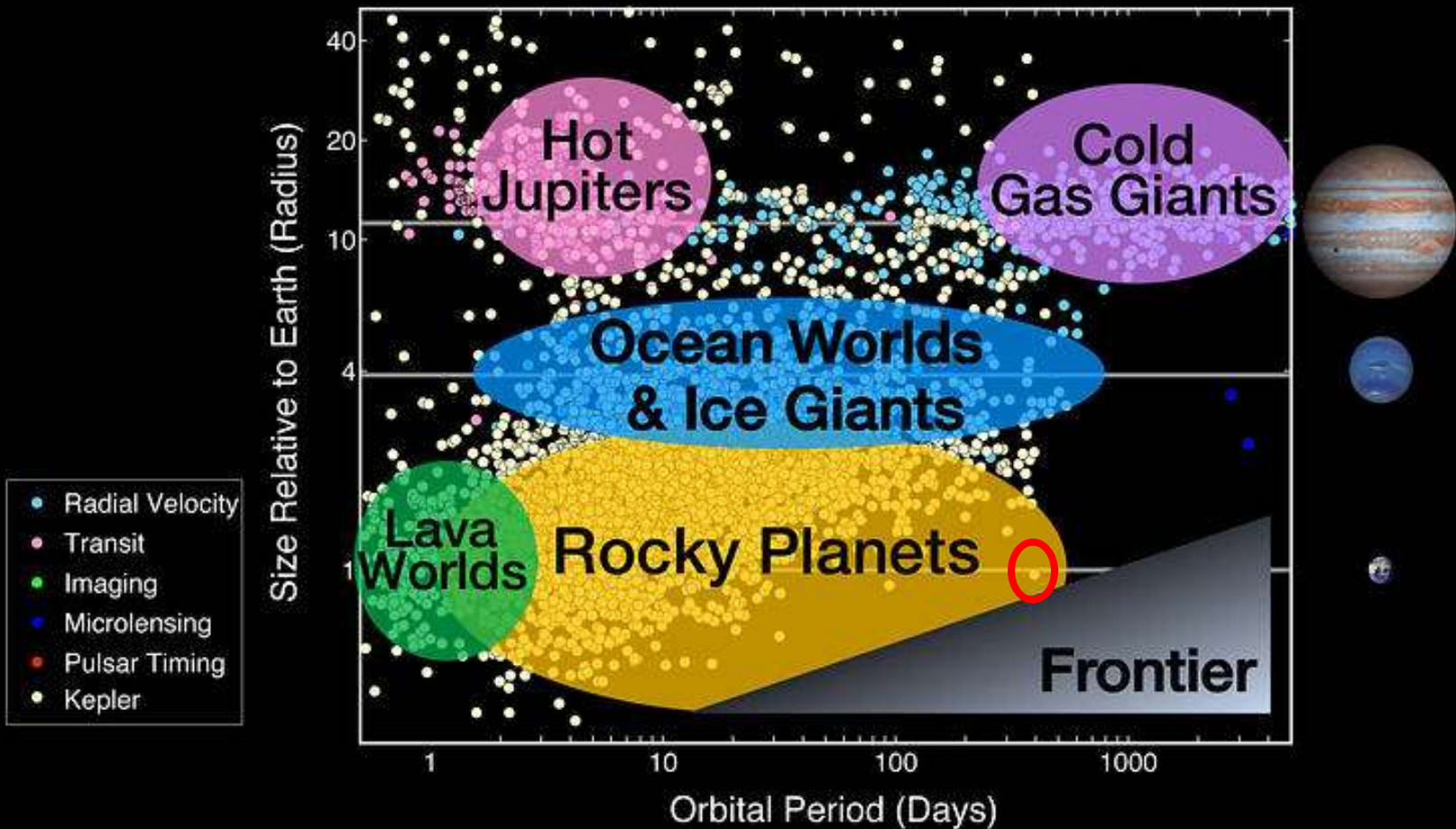
Region of our galaxy imaged
by Kepler and K2 Missions,
looking for exoplanets



[https://www.youtube.com/watch?
time_continue=2&v=3yij1rJOefM](https://www.youtube.com/watch?time_continue=2&v=3yij1rJOefM)

Types of planets discovered by Kepler and K2 compared to Earth, Neptune, and Jupiter

Exoplanet Populations



HABITABLE ZONE: the range of orbits around a star within which a planetary surface can support liquid water given sufficient atmospheric pressure

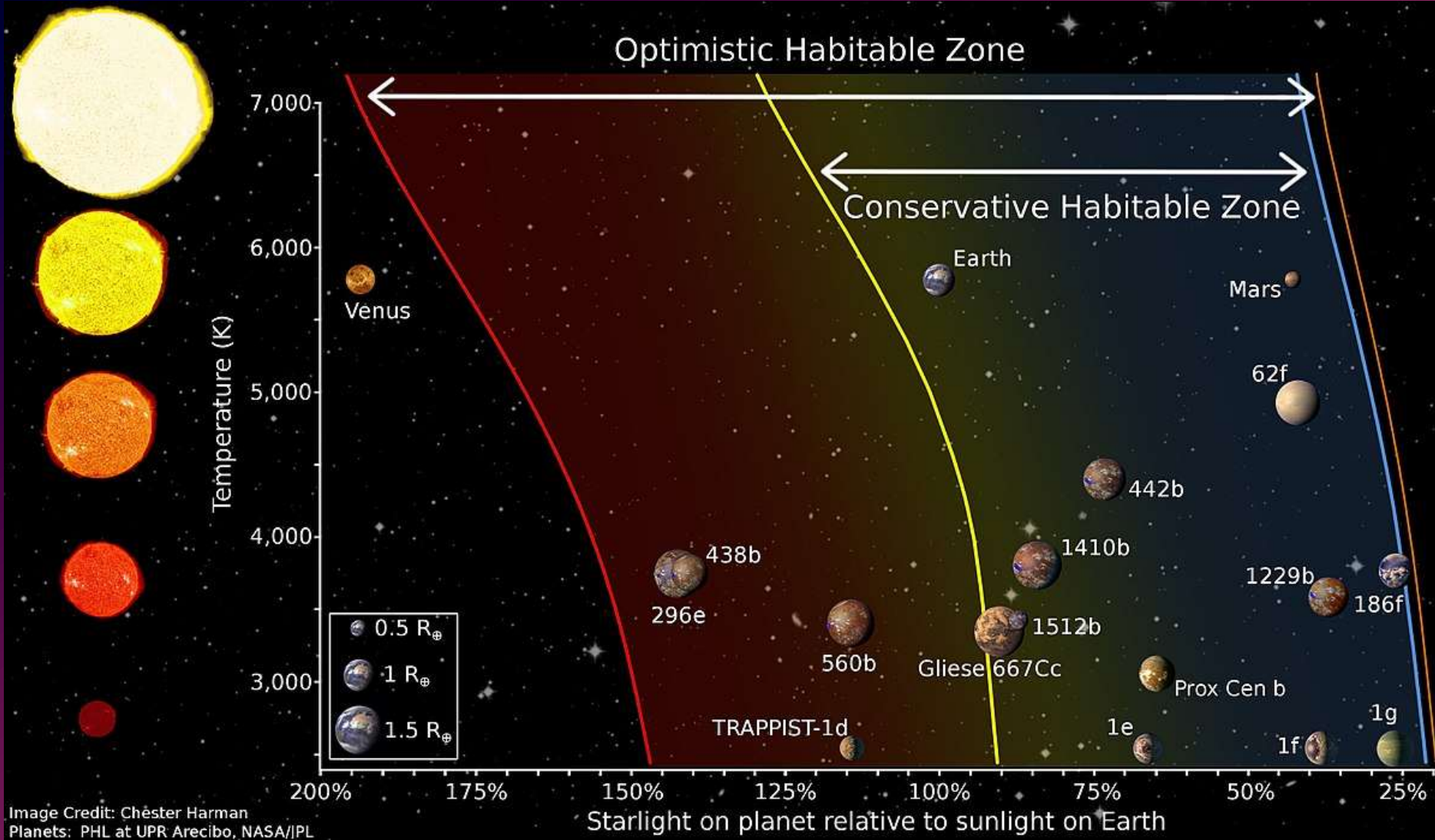


Image Credit: Chester Harman
Planets: PHL at UPR Arcibo, NASA/IPL

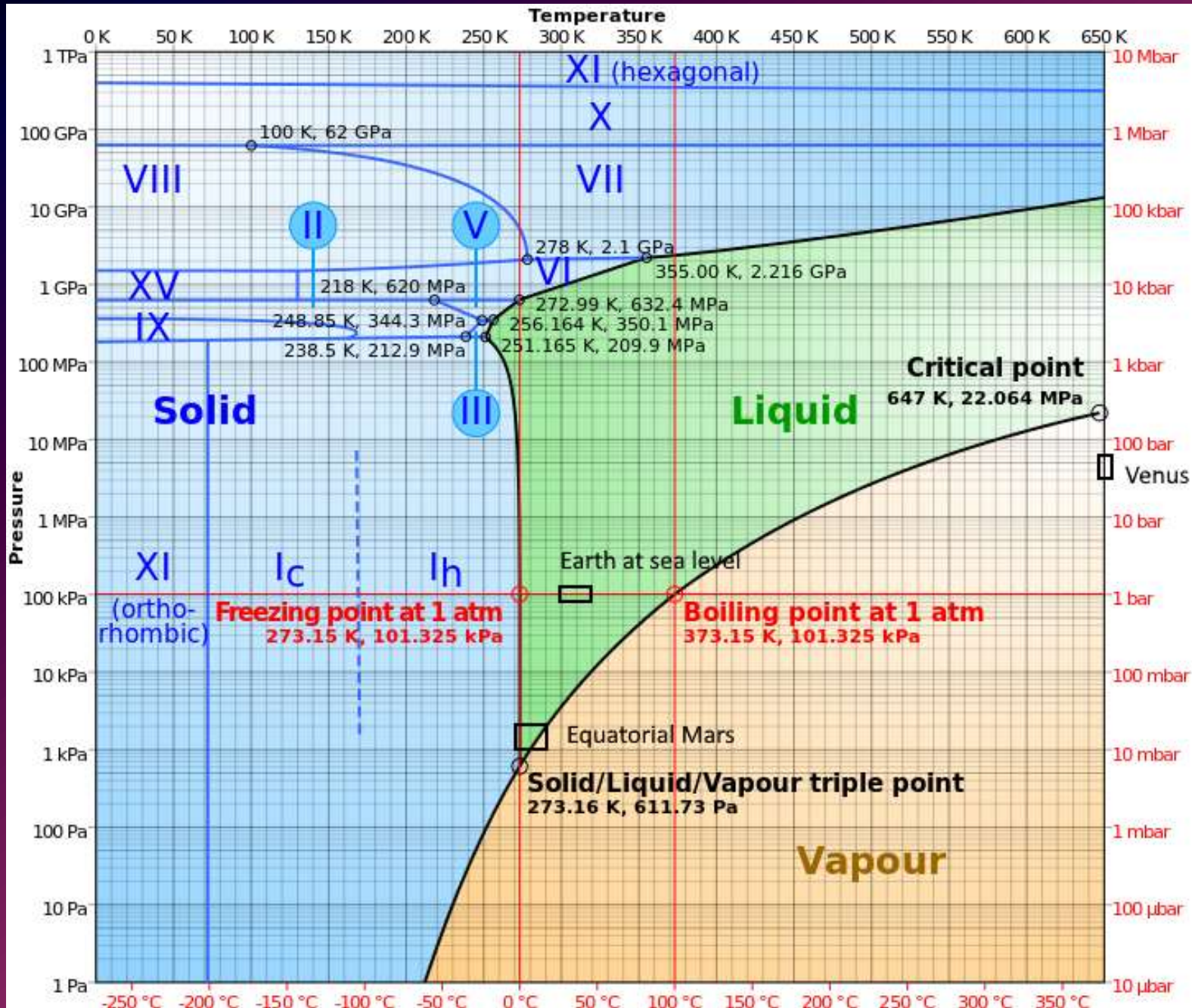
Why do we define the habitable zone as the region where the planet can maintain liquid water on it's surface?

Because basically all life forms on Earth are water based.

Hypothetical silicon-based life form

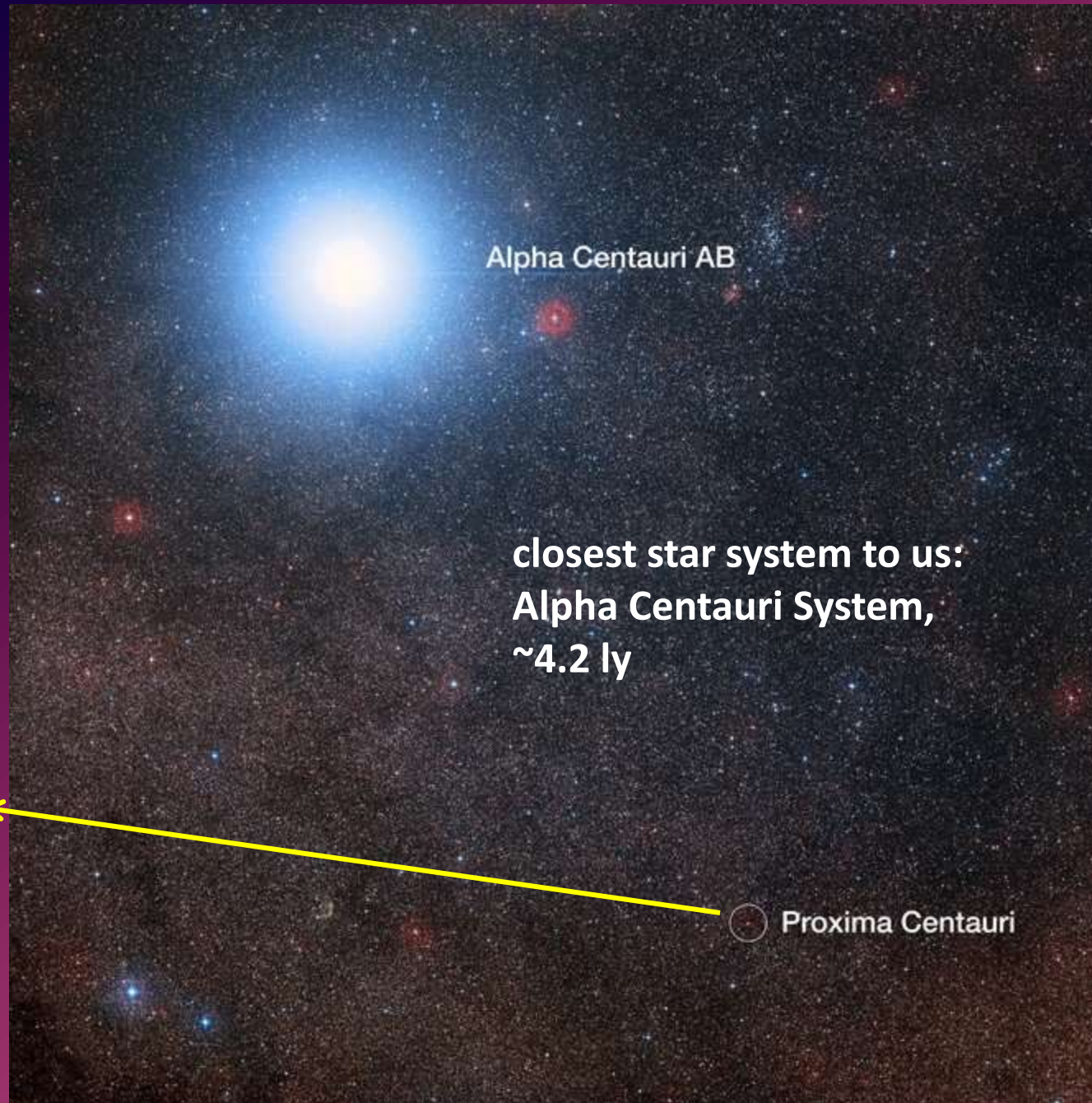


PHASE DIAGRAM FOR WATER



Proxima Centauri: Red dwarf star in long period orbit around Alpha Centauri.

Proxima b orbits Proxima Centauri in its habitable zone, but is Proxima b habitable?



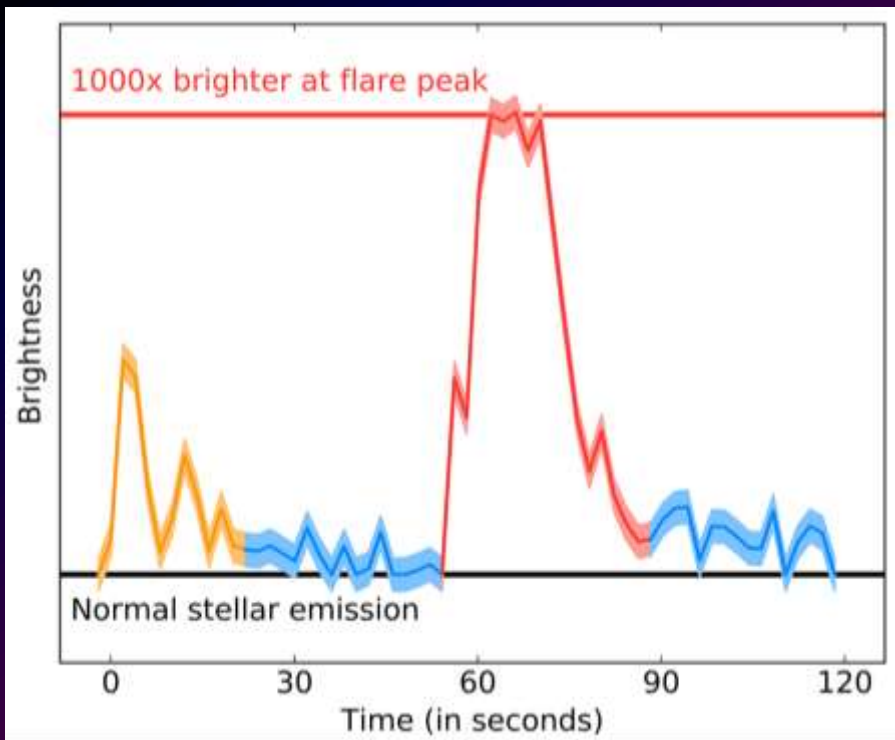
Alpha Centauri AB

closest star system to us:
Alpha Centauri System,
~4.2 ly

Proxima Centauri



Proxima Centauri b



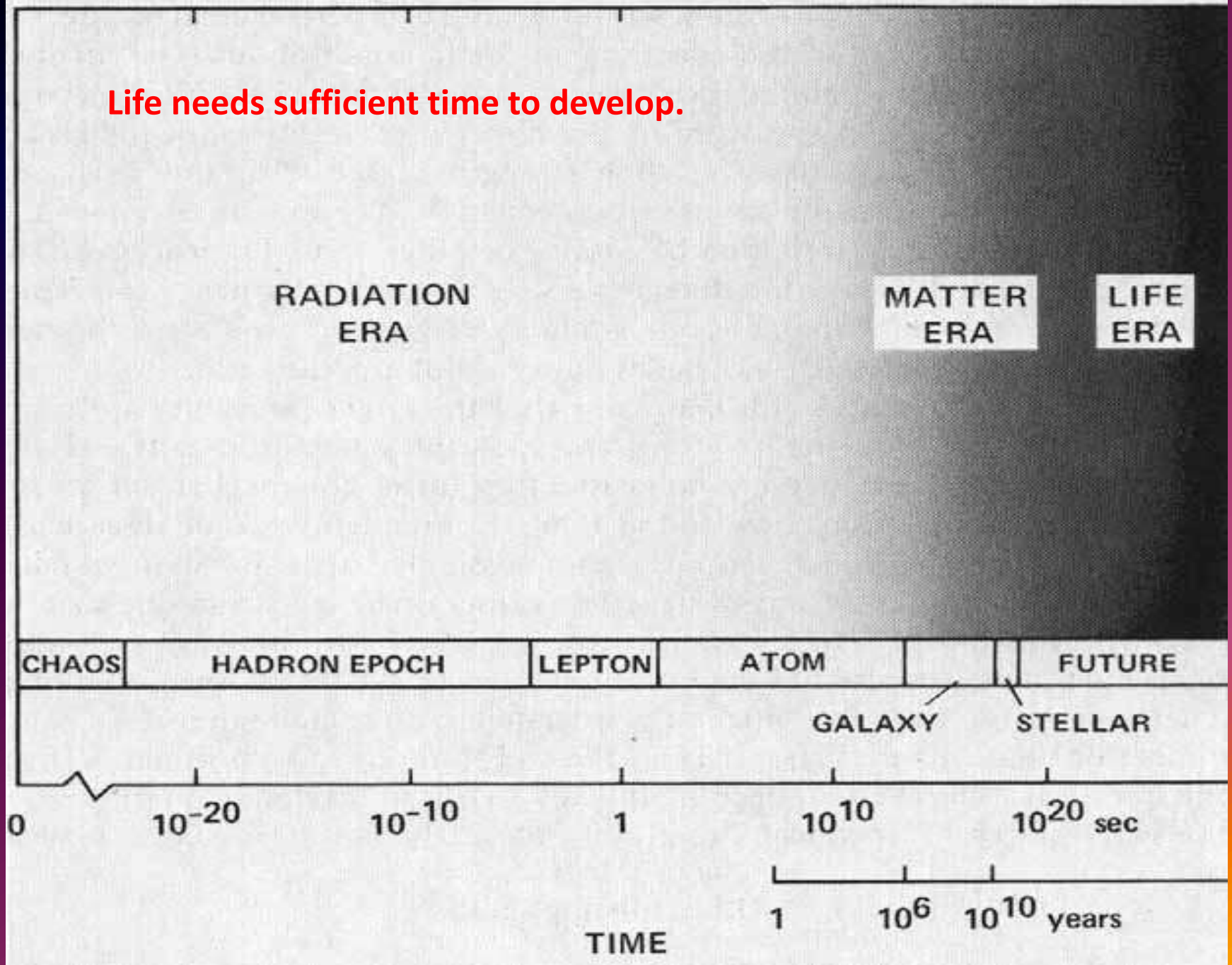
Observed: light curve for Proxima Centauri in March, 2017

Artist's rendition of what this flare could have looked like



Red dwarf stars, the most common types of stars in the galaxy and the oldest, often have unpredictable flares, and hence any planets orbiting them are not likely to have evolved life.

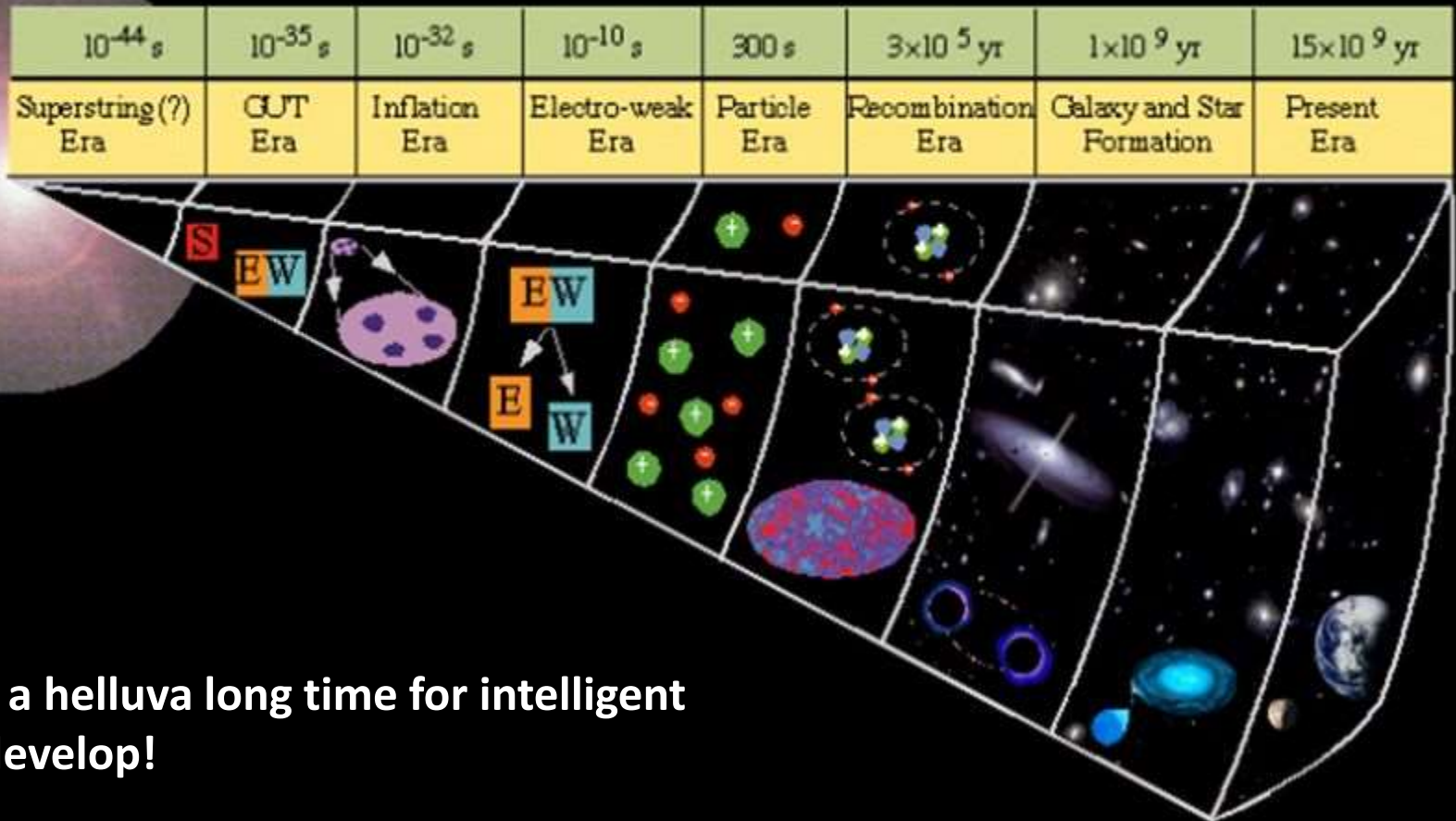
Life needs sufficient time to develop.



Cosmic Timeline

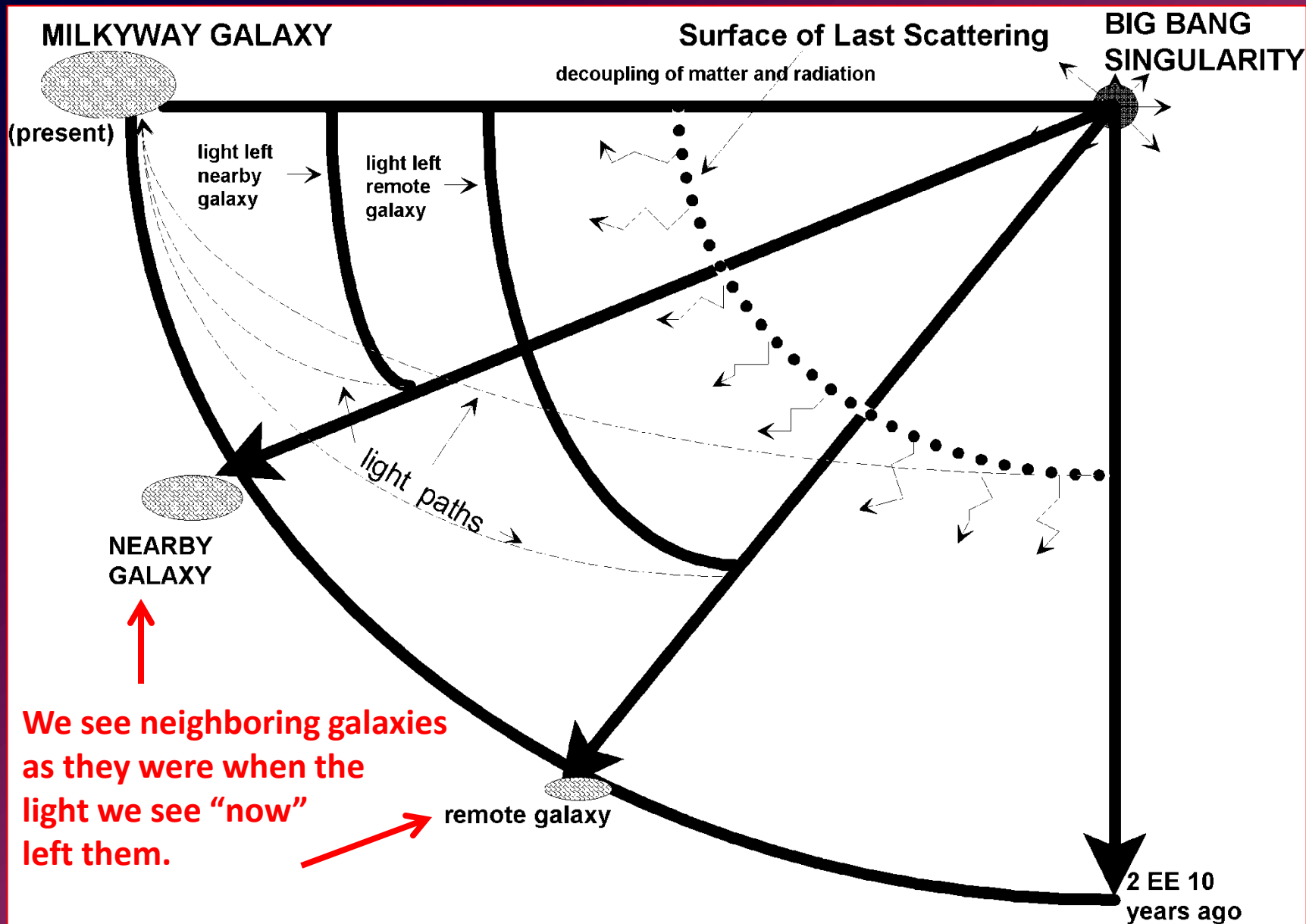
Big Bang

Time →

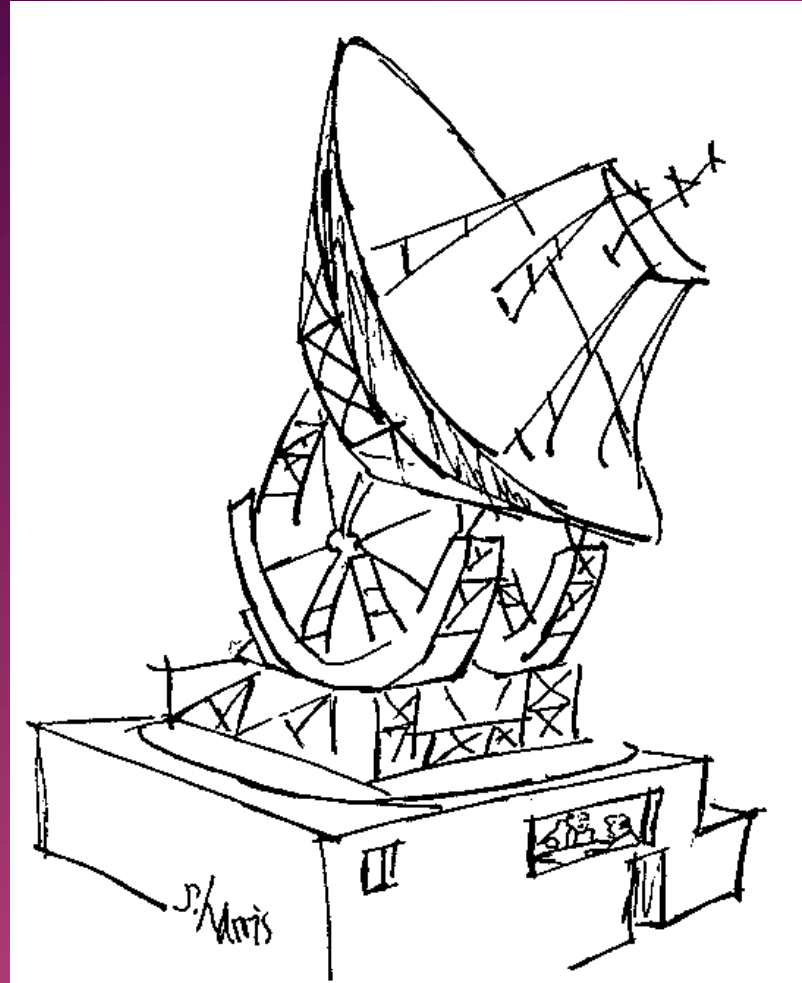


It takes a helluva long time for intelligent life to develop!

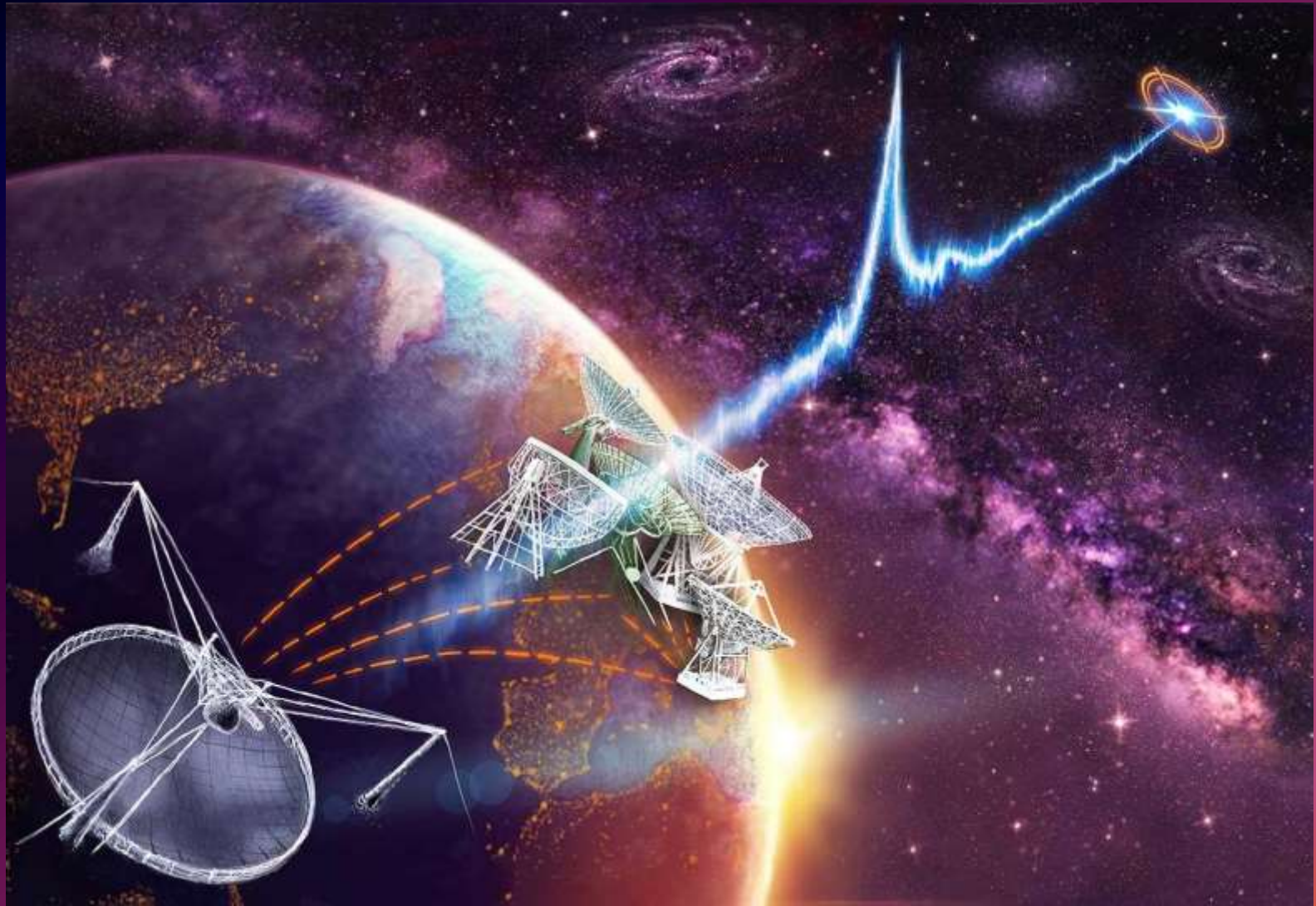
Looking out in space = looking back in time. In an expanding universe the distance between galaxies increases over time.



Thus if intelligent life has developed in other galaxies parallel with us, we can never communicate with them as they “are now” unless they or we can travel to each other’s galaxy.



“As I understand it, they want an immediate answer. Only trouble is, the message was sent out 3 million years ago.”



Thus far, every unusual signal from space that was at first suspected to be from alien civilizations has turned out to be from a newly discovered astrophysical phenomenon – pulsars, quasars, and fast radio bursts.

How do you think Earth civilization would change if we actually found a signal from an intelligent extra terrestrial civilization?

