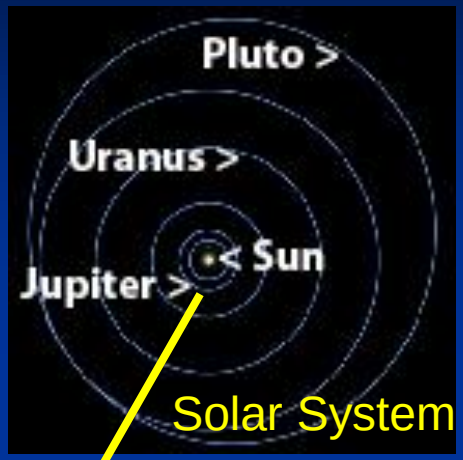
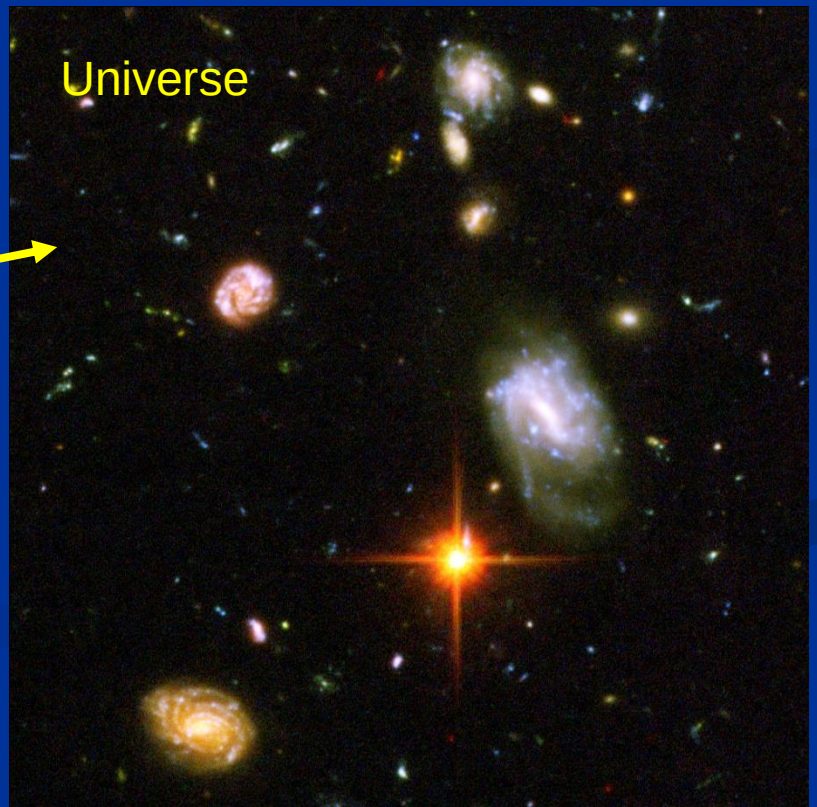
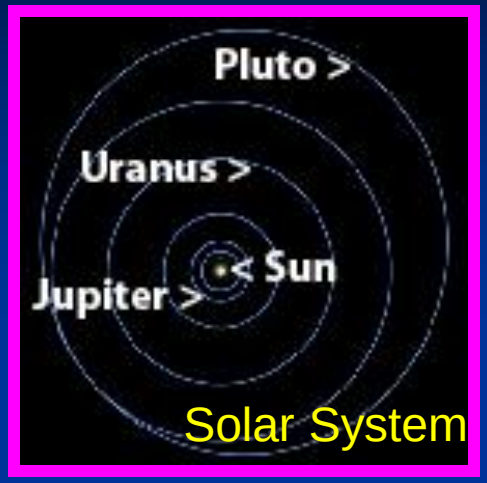

Astronomical!
The Size of the Universe

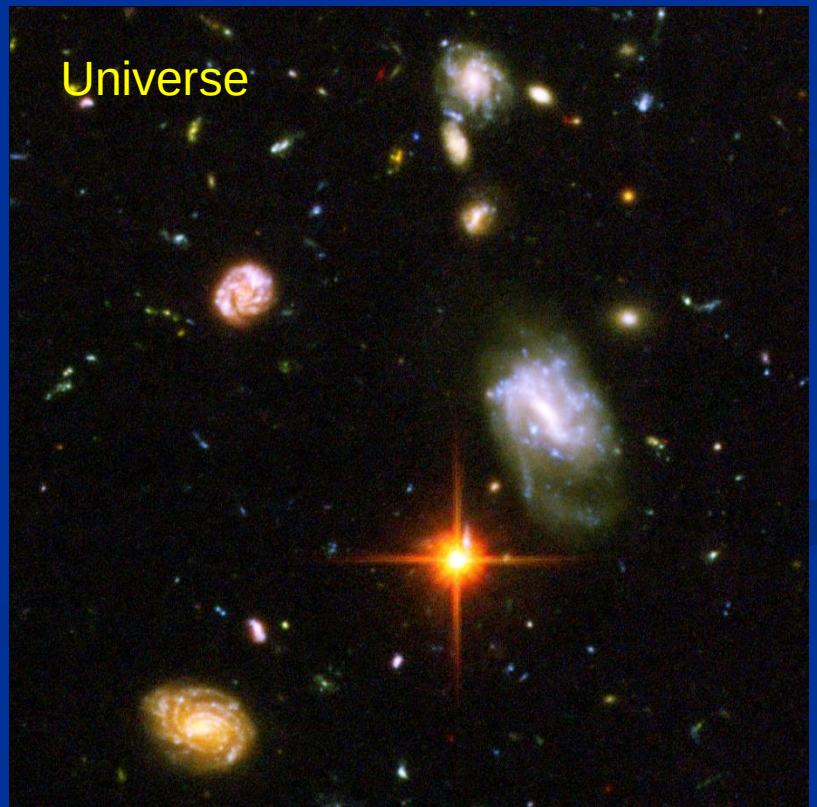
What's the Difference?



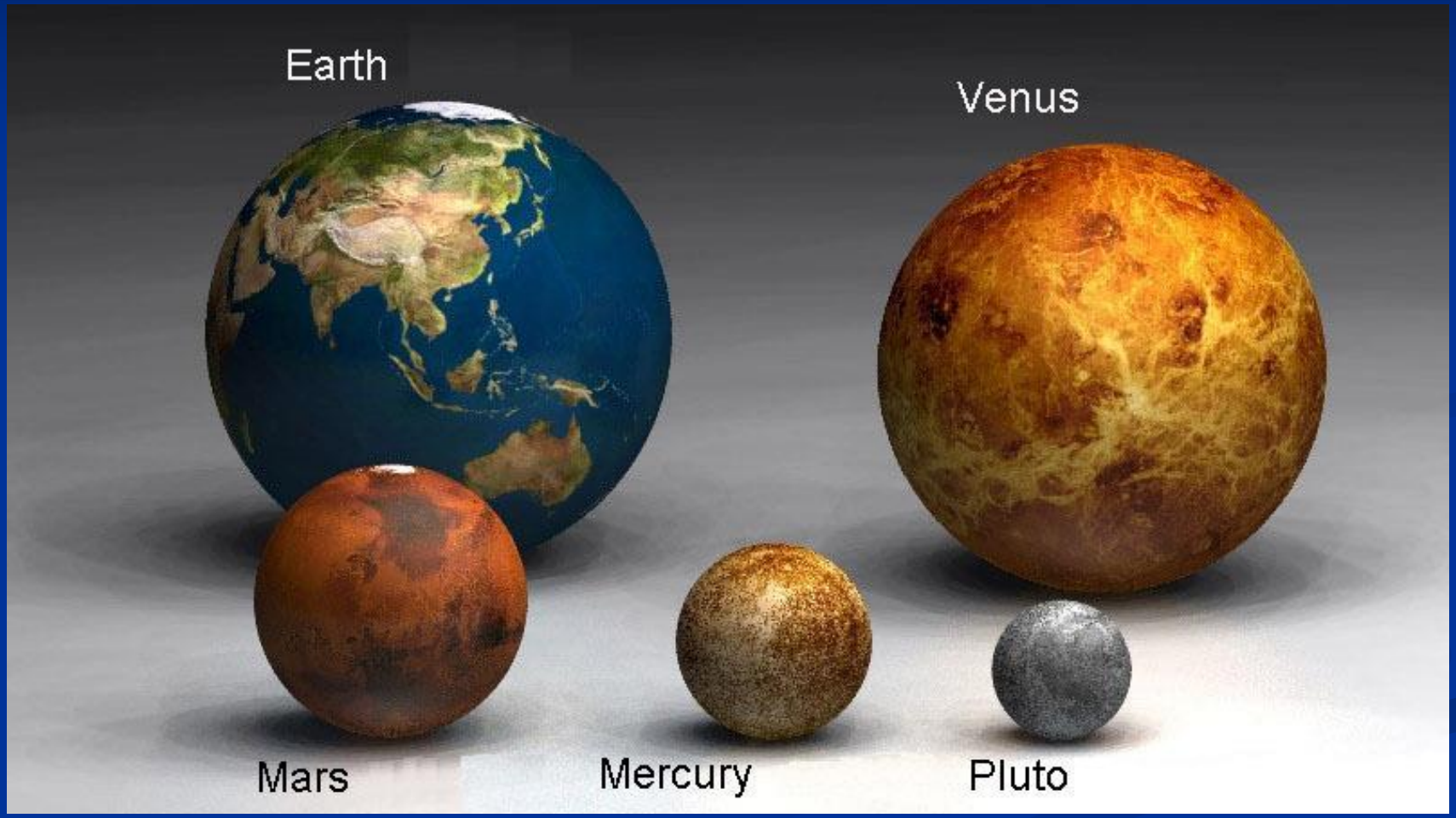


The Solar System





The Size of the Planets



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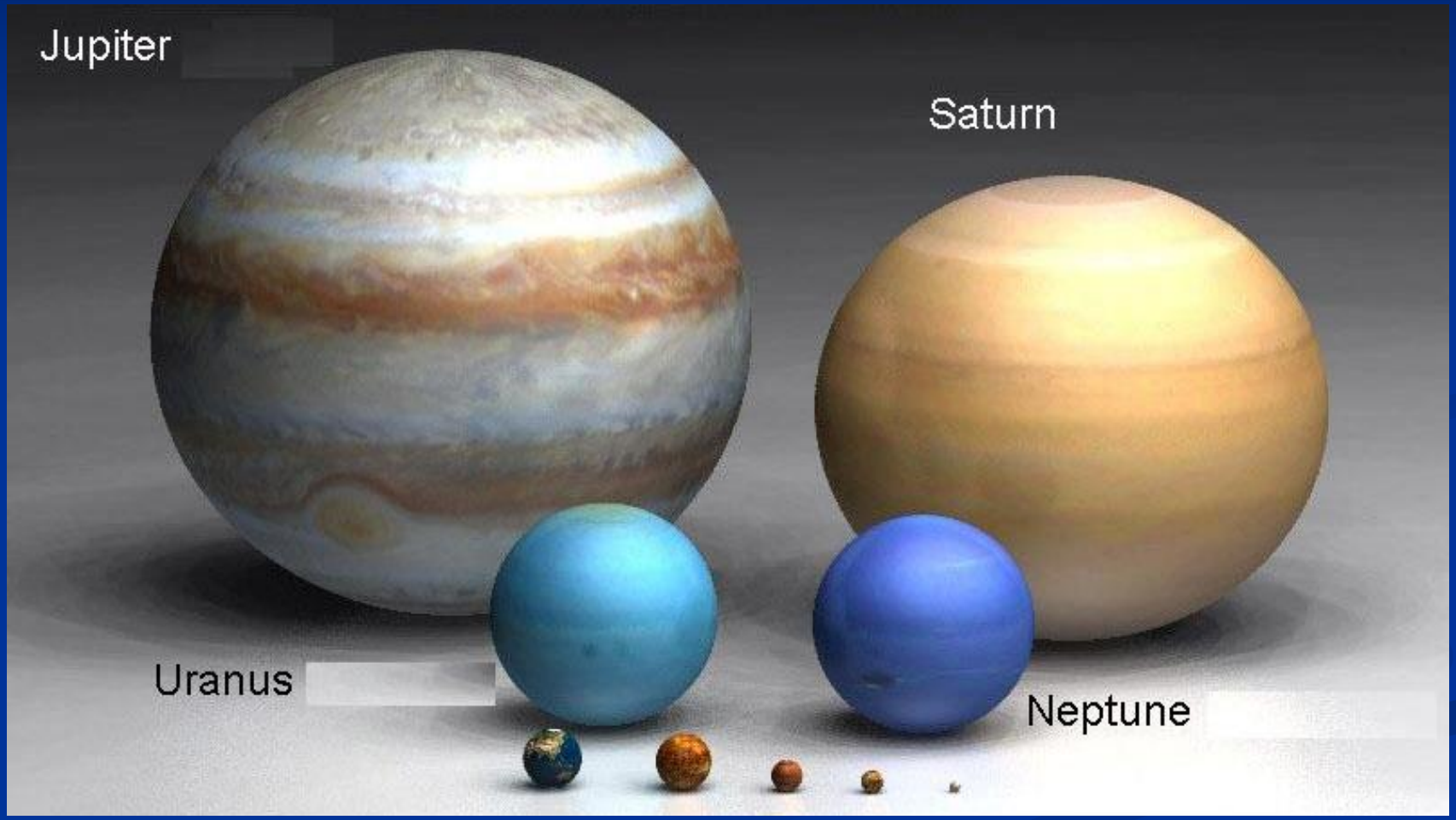

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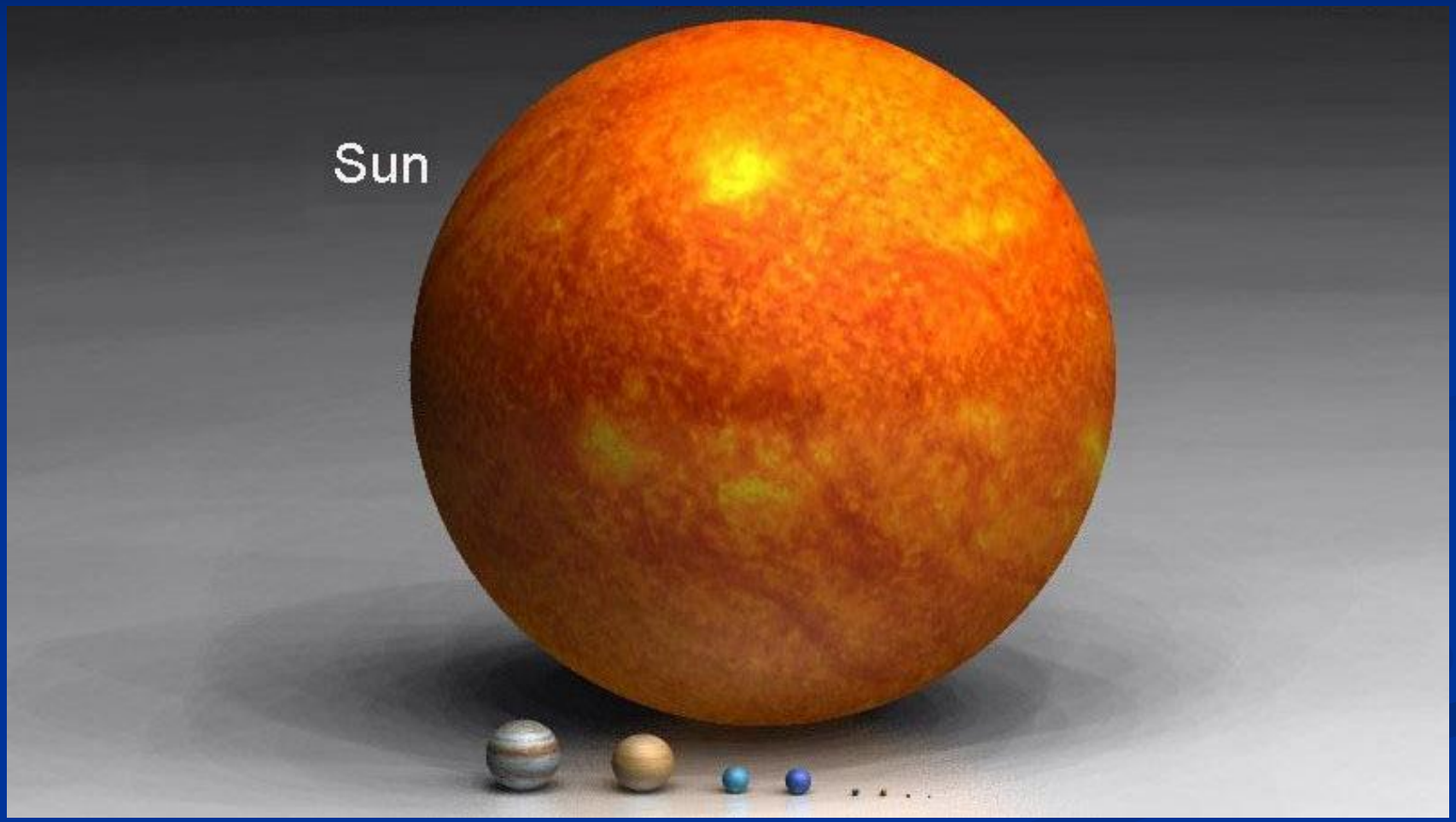


Astronomical Term

Astronomical Unit (AU)

- Mean distance from the Earth to the Sun
- 92,955,807 Miles
- Handy for measuring distances in the Solar System.
- 121 Feet on on the model

Distances in AU

- Planets

Mercury:	0.387 AU
Venus:	0.723 AU
Earth:	1.000 AU
Mars:	1.524 AU
Jupiter:	5.203 AU
Saturn:	9.582 AU
Uranus:	19.201 AU
Neptune:	30.07 AU

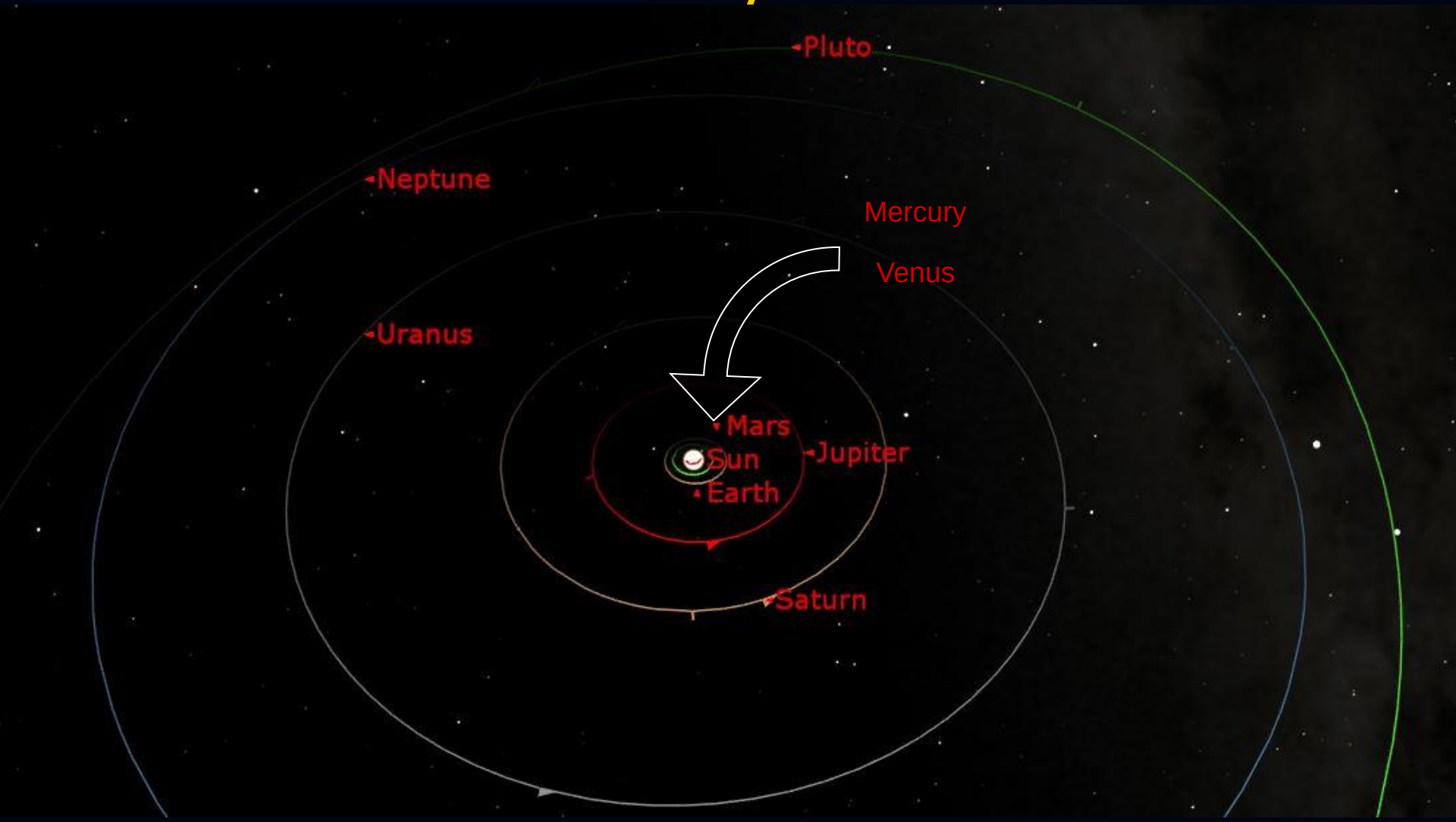
- Other

Ceres:	2.77 AU
Pluto:	39.53 AU
Eris:	67.958 AU
Sedna:	85 AU

A Boeing 747 Cruising at 550 MPH.

- To travel from San Francisco to New York takes about 6 Hours.
- To travel all of the way around the Earth takes less than 2 days.
- To get from Earth to the Sun would take 18 Years!
- To get from the Sun to Pluto would take 700 Years!
- To get to the nearest star would take 4,718,913 years

Solar System

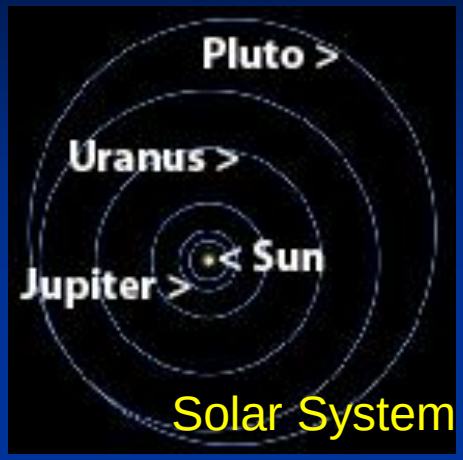


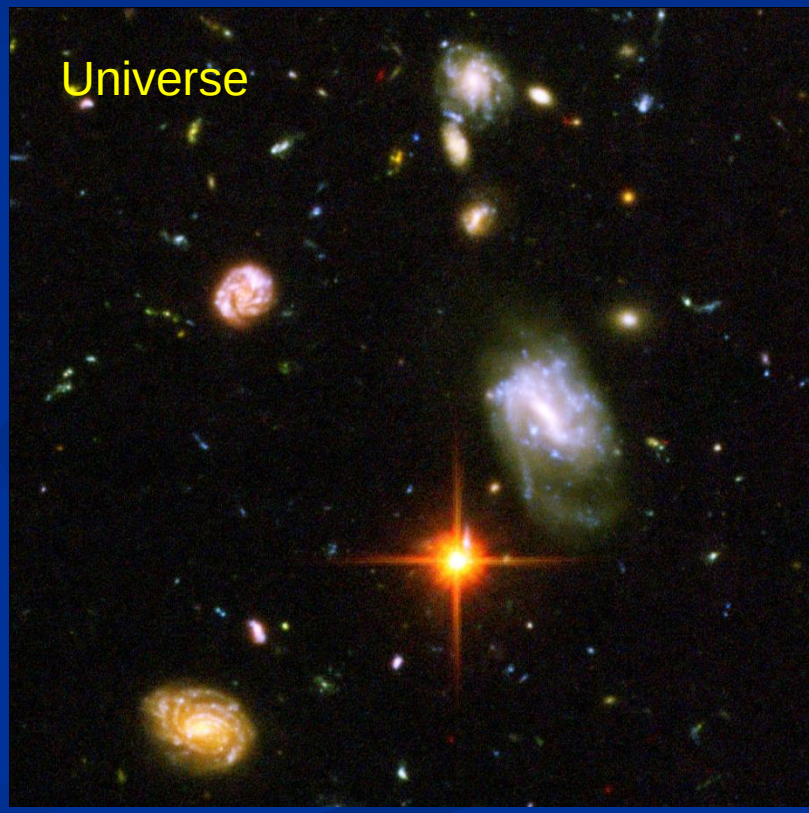
How Big is One Billion?

- A Rich Uncle leaves you One Billion Dollars
- He puts it in a trust that will pay you $10,000 per day.
- How long will it take to receive one billion dollars?

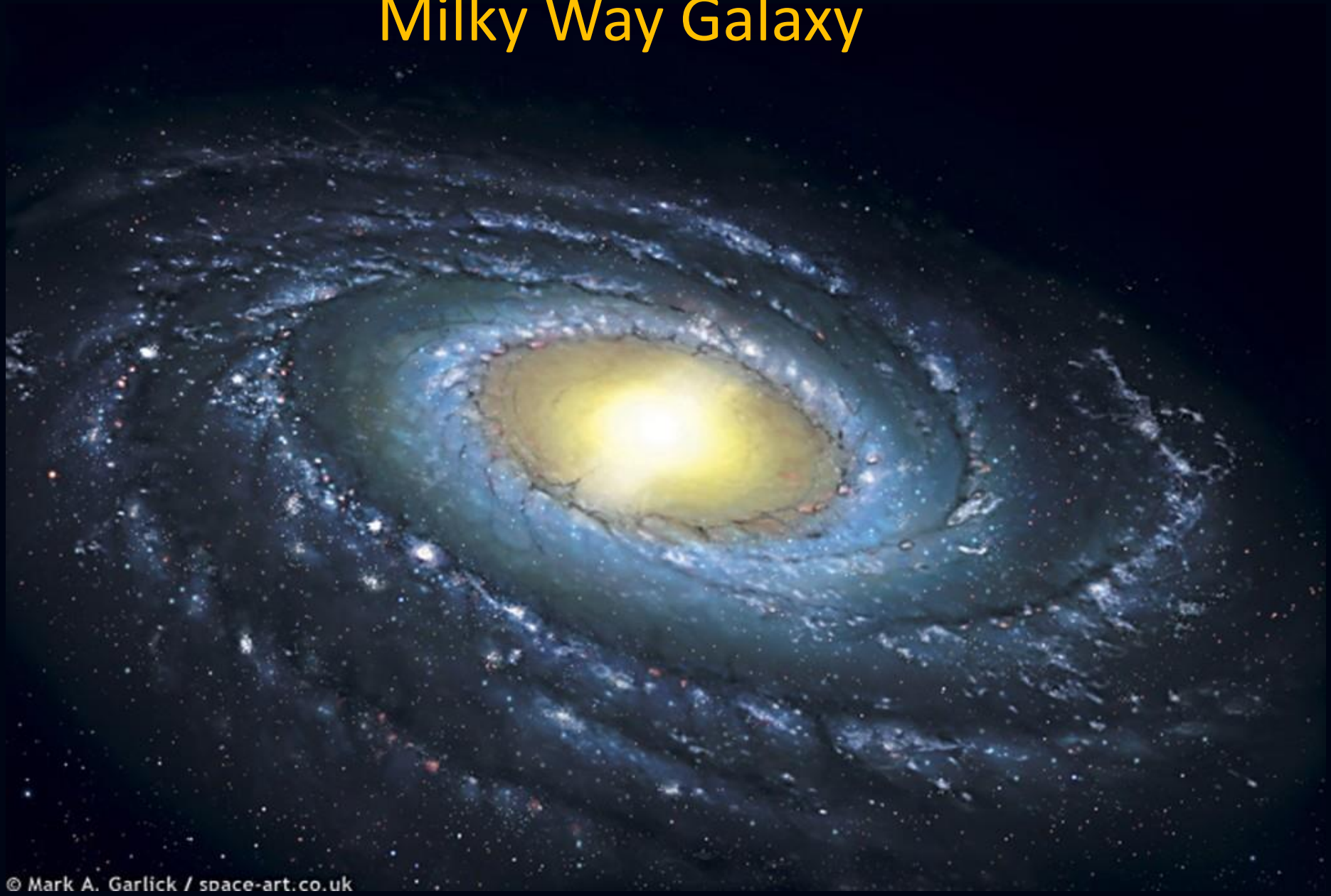
IT WOULD TAKE 278 YEARS AND 288 DAYS!

The Galaxy





Milky Way Galaxy

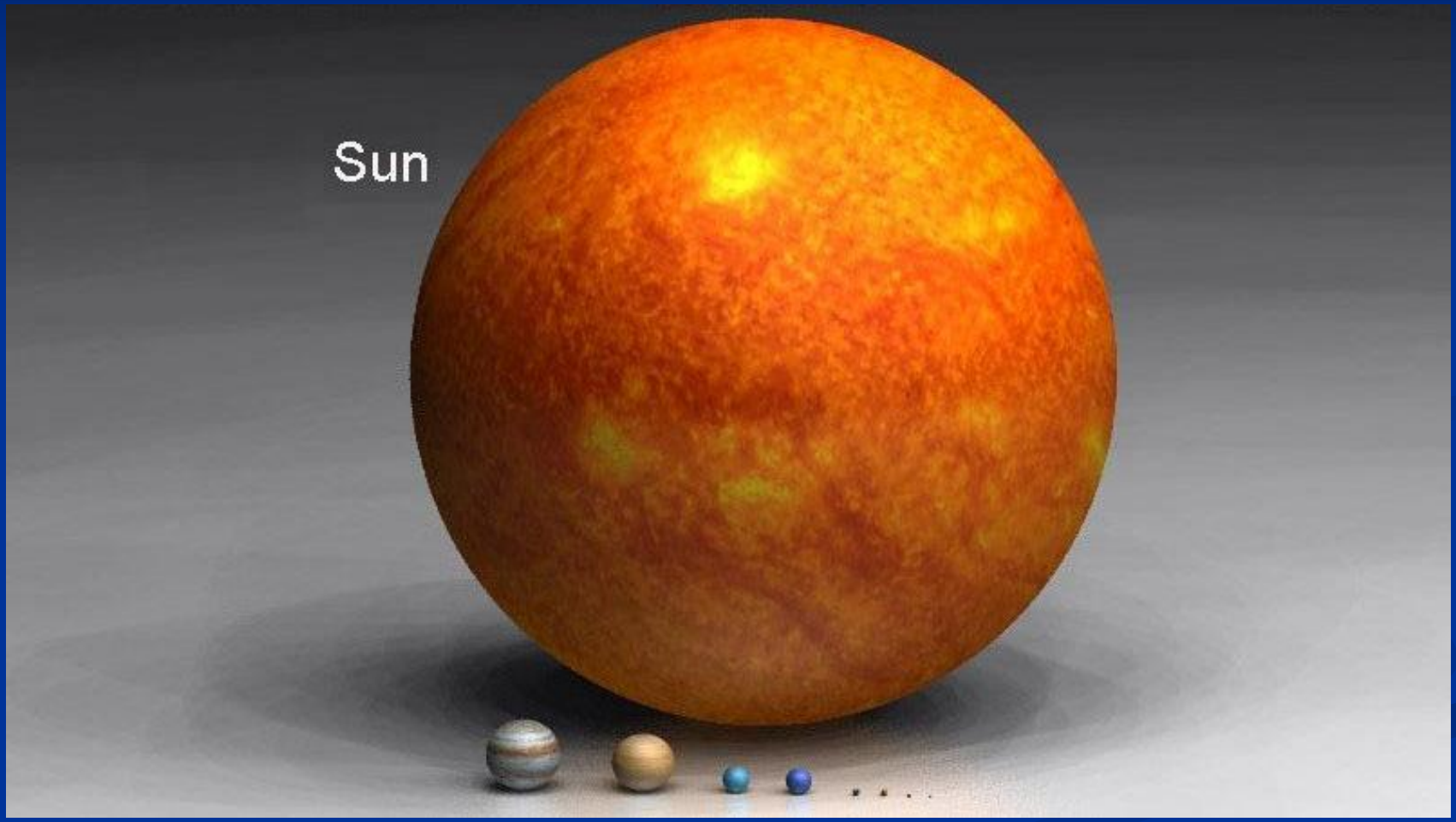


Astronomical Term

Light Year.

- It is a distance measure, not a time measure
- A light year is the distance light travels in one year.
- Light travels at 186,000 Miles Per Second and can go around the world more than 7 times in one second.
- Equal to 63,240 AU.

The Size of the Sun



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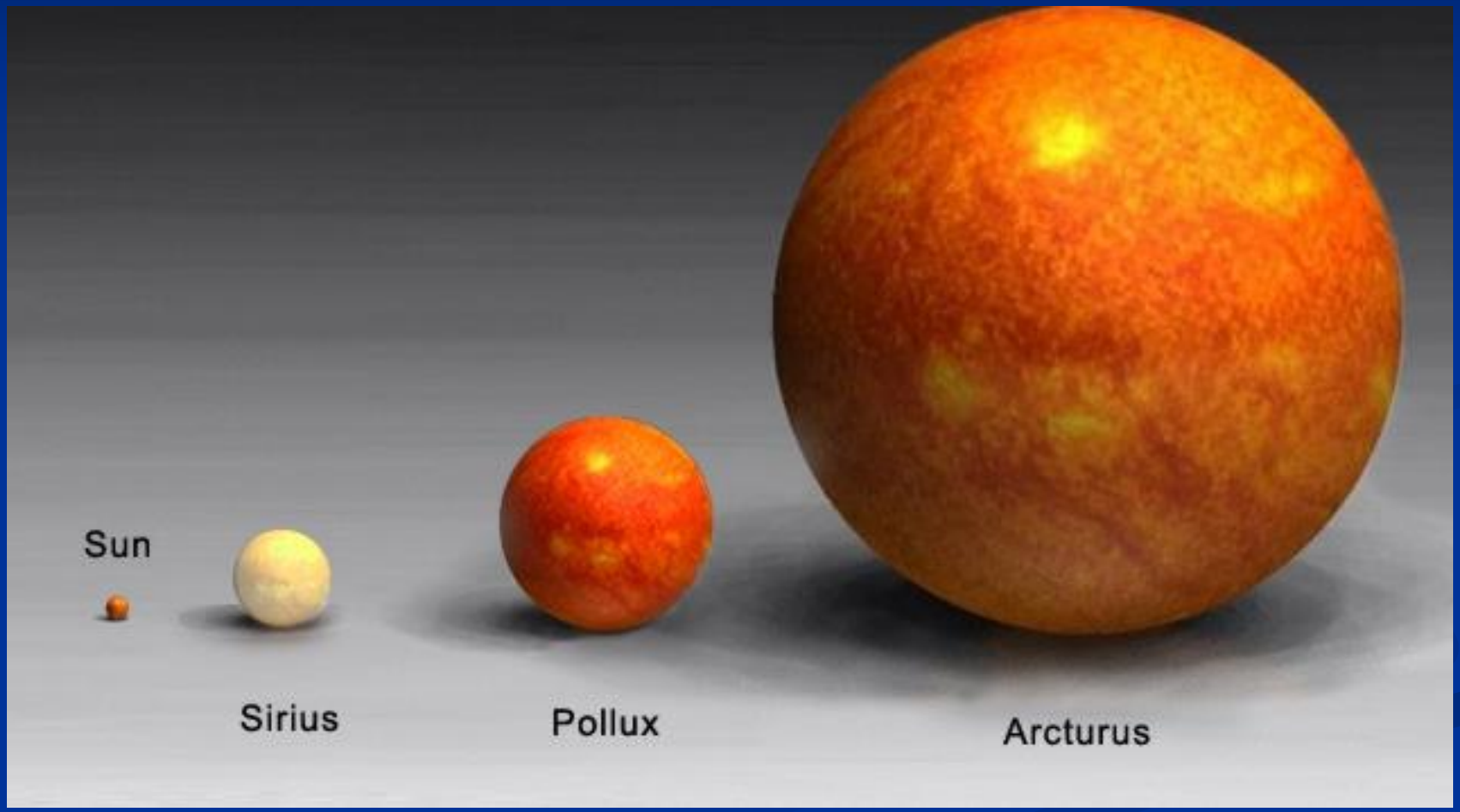

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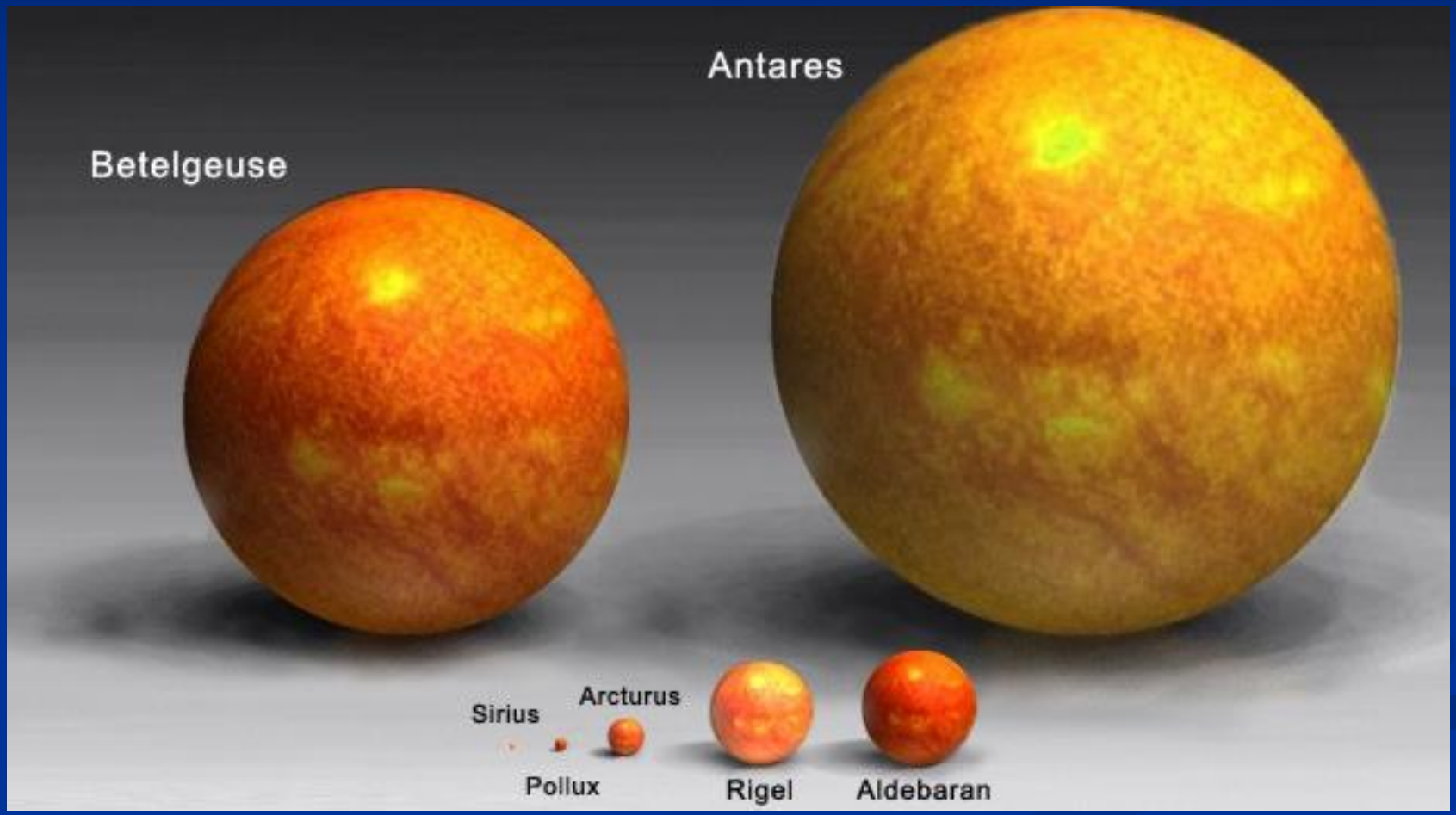
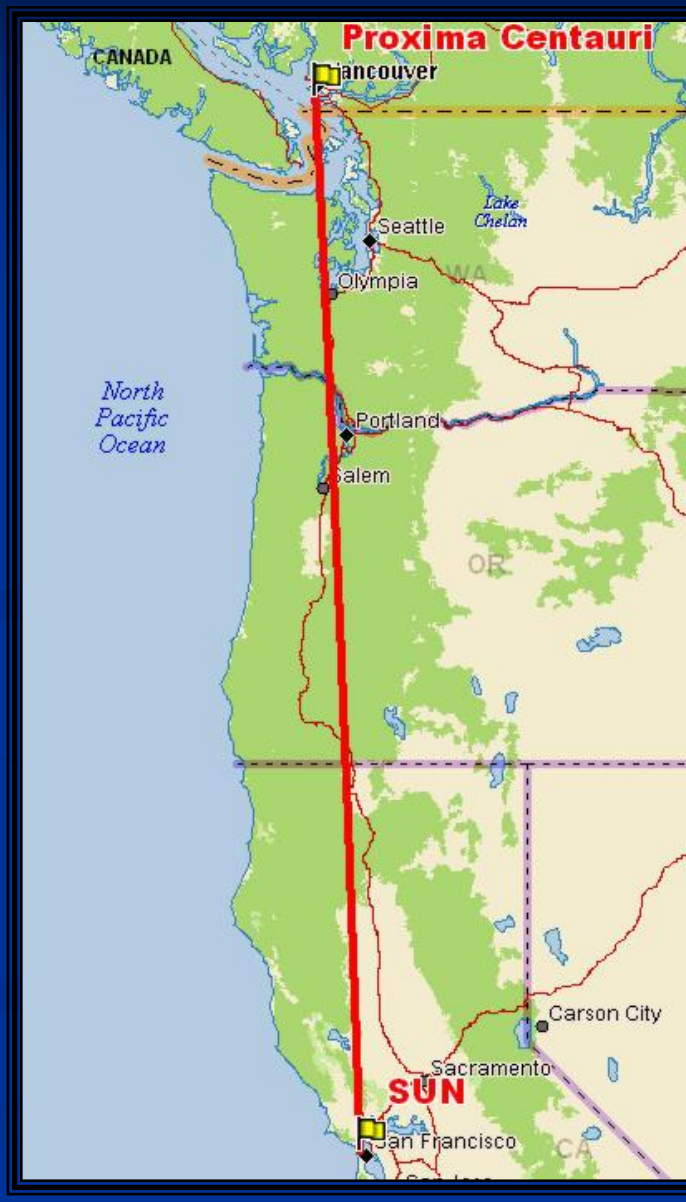


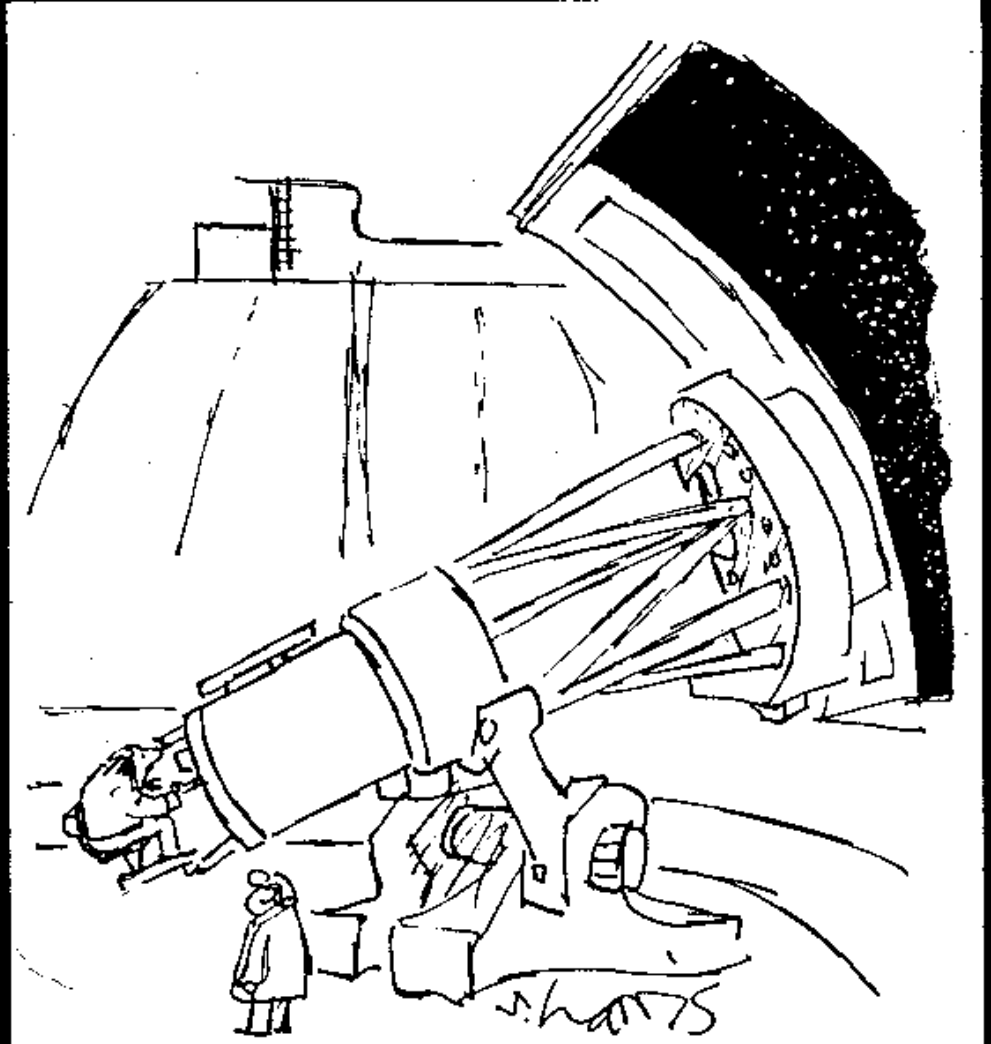
The Distance Between Suns

Shrinking the sun to the size of a golf ball.

The distance to the nearest star (Proxima Centauri) would be 770 miles.




How Many Stars in our Galaxy?
400 BILLION Stars!!!
400,000,000,000



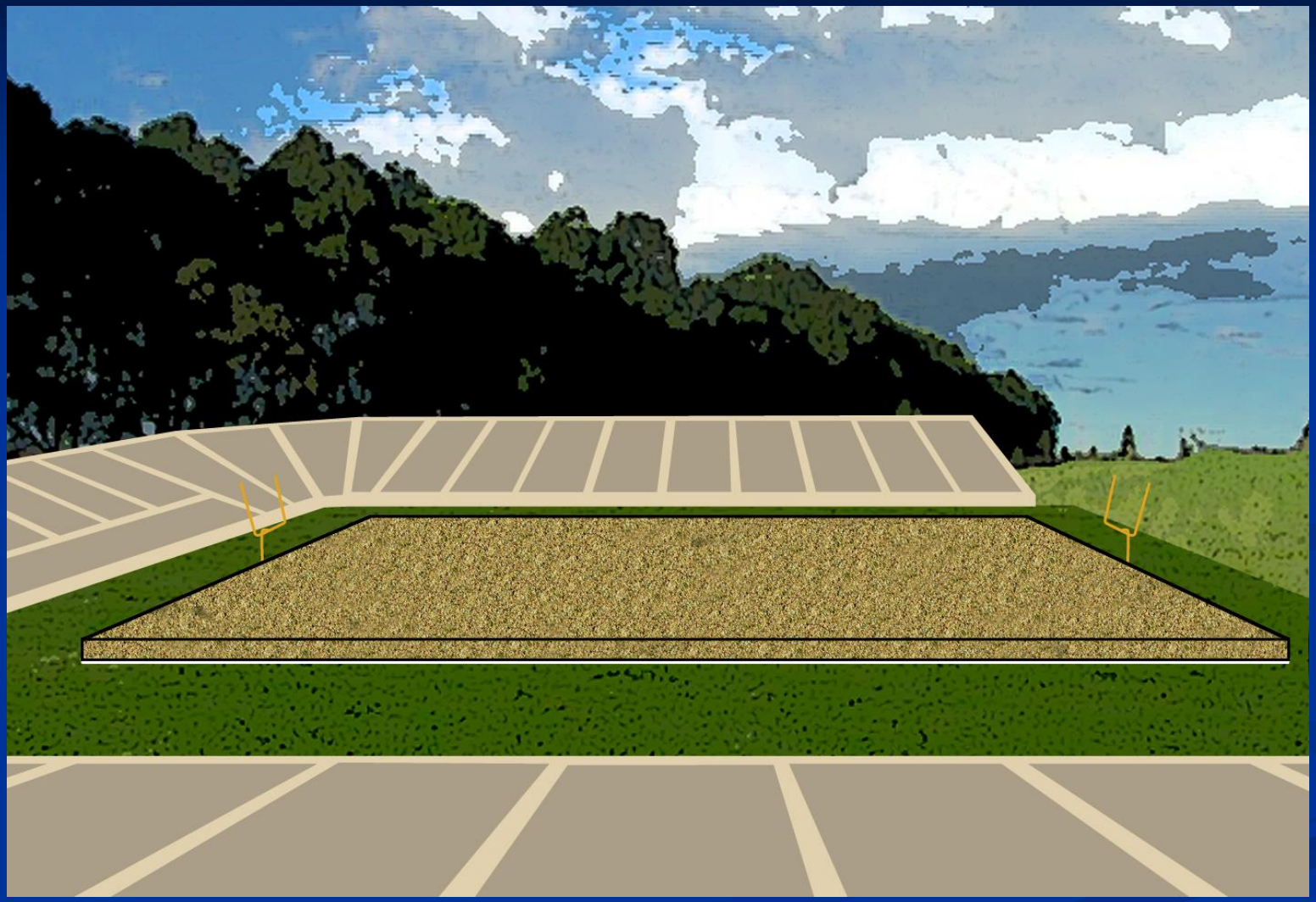
"Let's see, now ... picking up where we left off ... one billion, sixty-two million, thirty thousand, four hundred and thirteen ... one billion, sixty-two million, thirty thousand, four hundred and fourteen ... "

How Many Stars in our Galaxy?

- **Take a Football Field**
- **Build a 8 foot wall all around it**
- **Fill the field with birdseed**

How Many Stars in our Galaxy?

400 BILLION Seeds



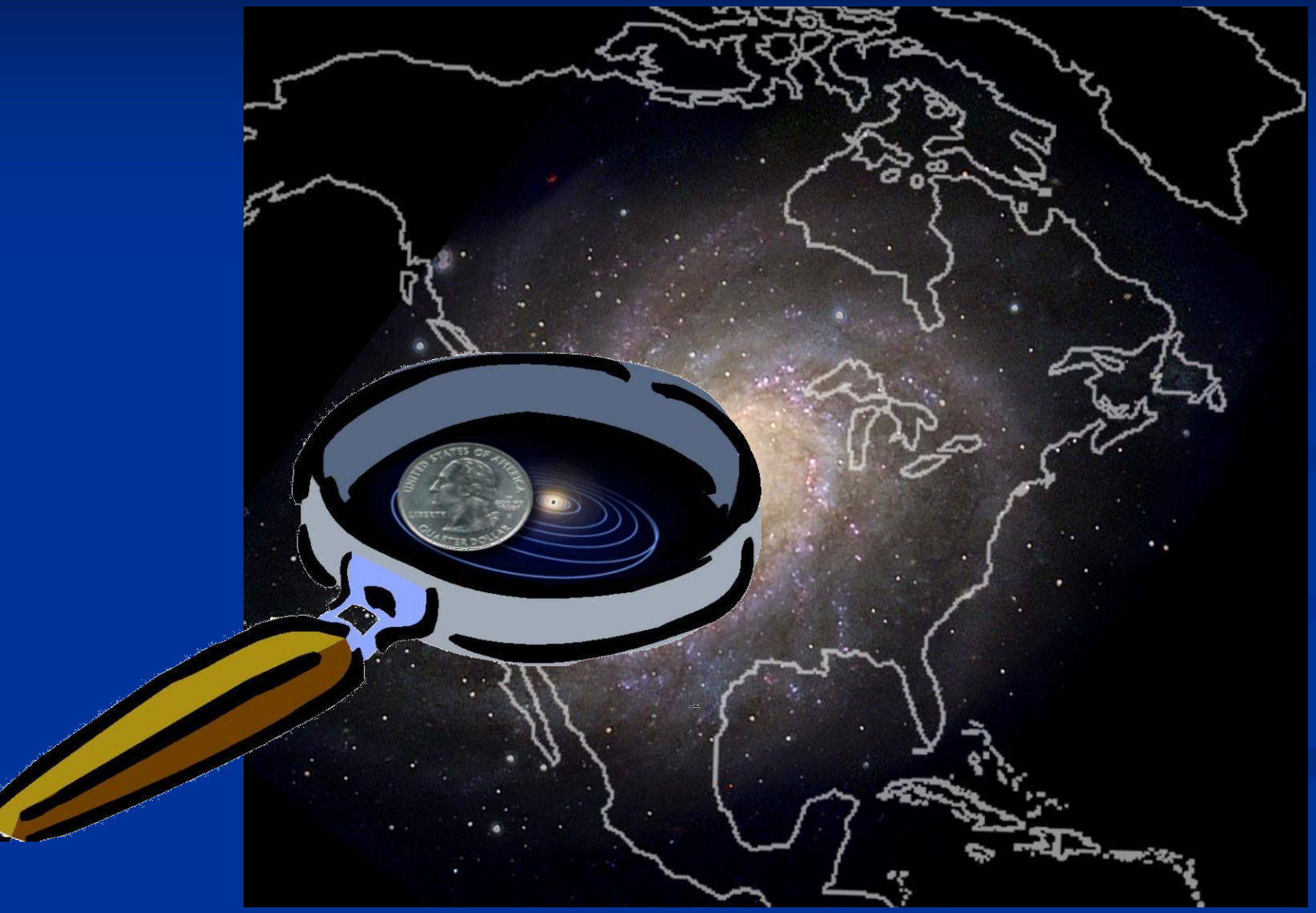
400 BILLION Stars

The Size of the Galaxy

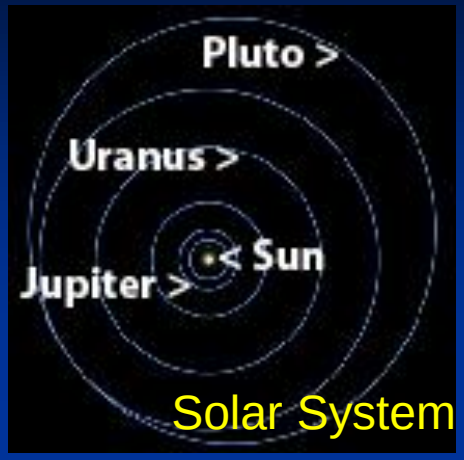
Imagine the Solar System so small that that distance from the sun to Pluto is the diameter of a quarter.

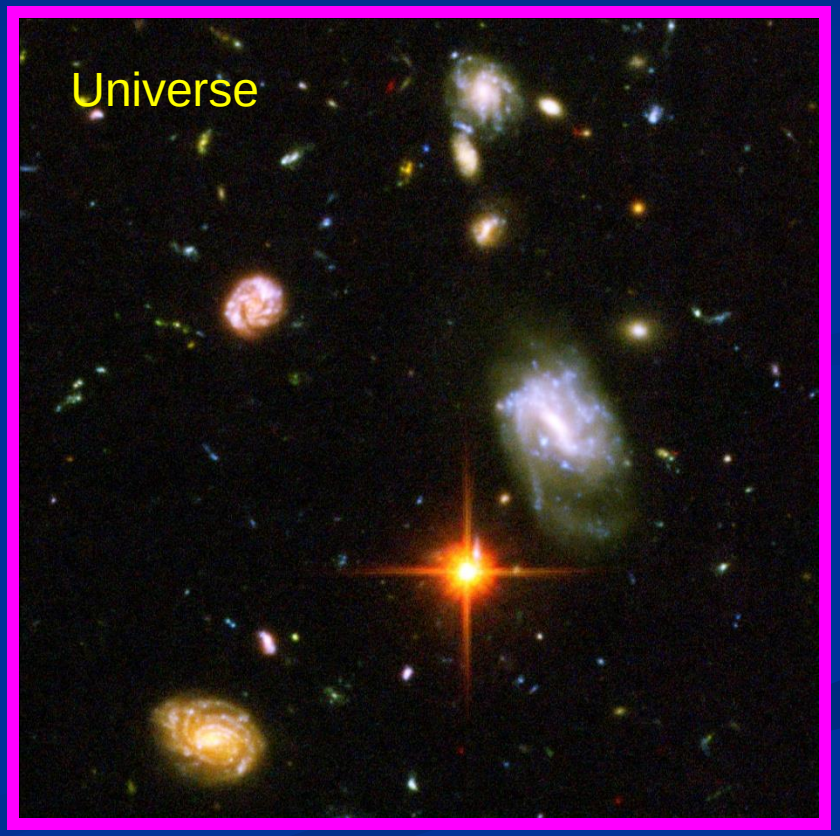
THEN…

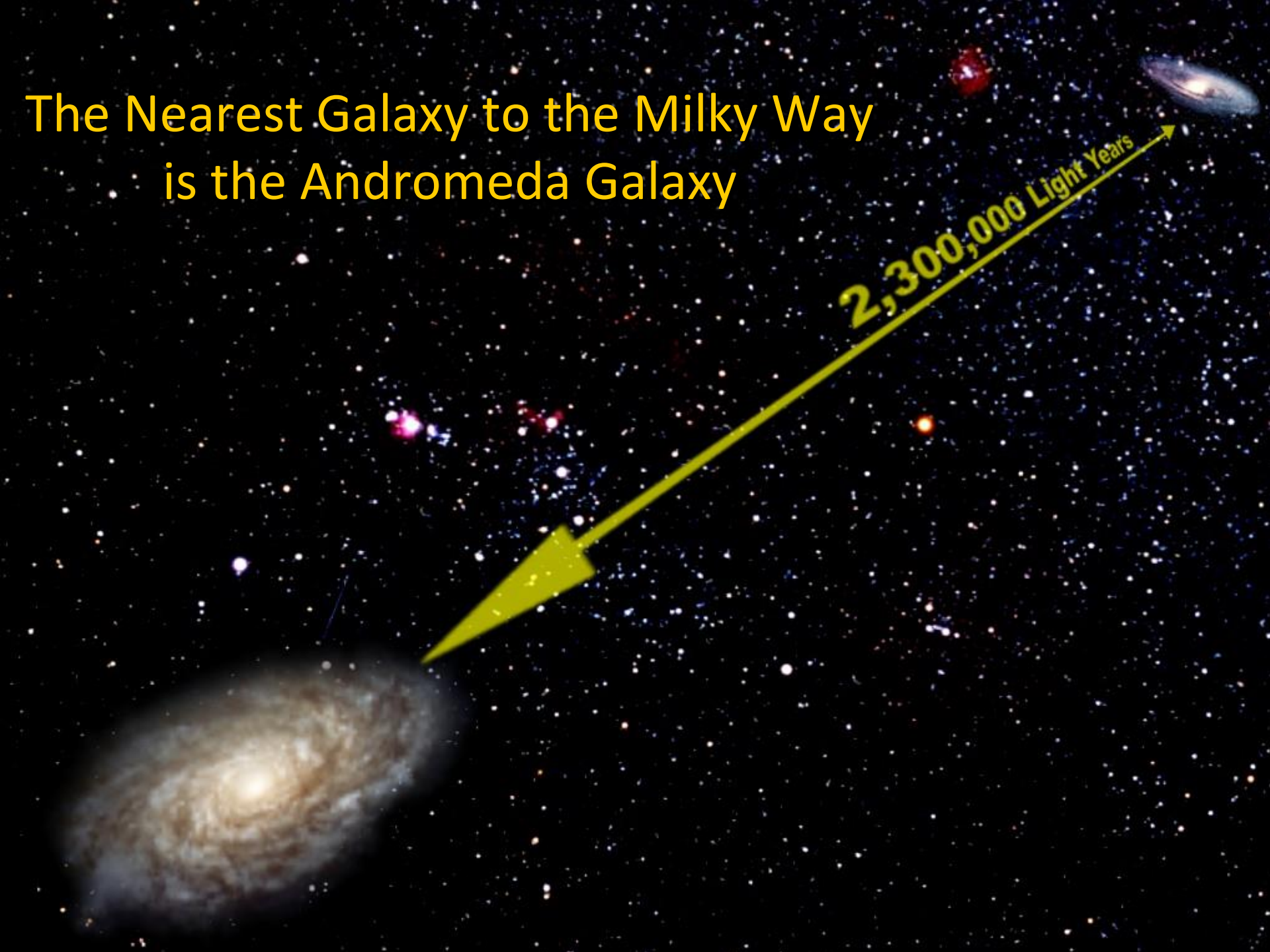
…the Galaxy would be the size **of** North America



The Universe



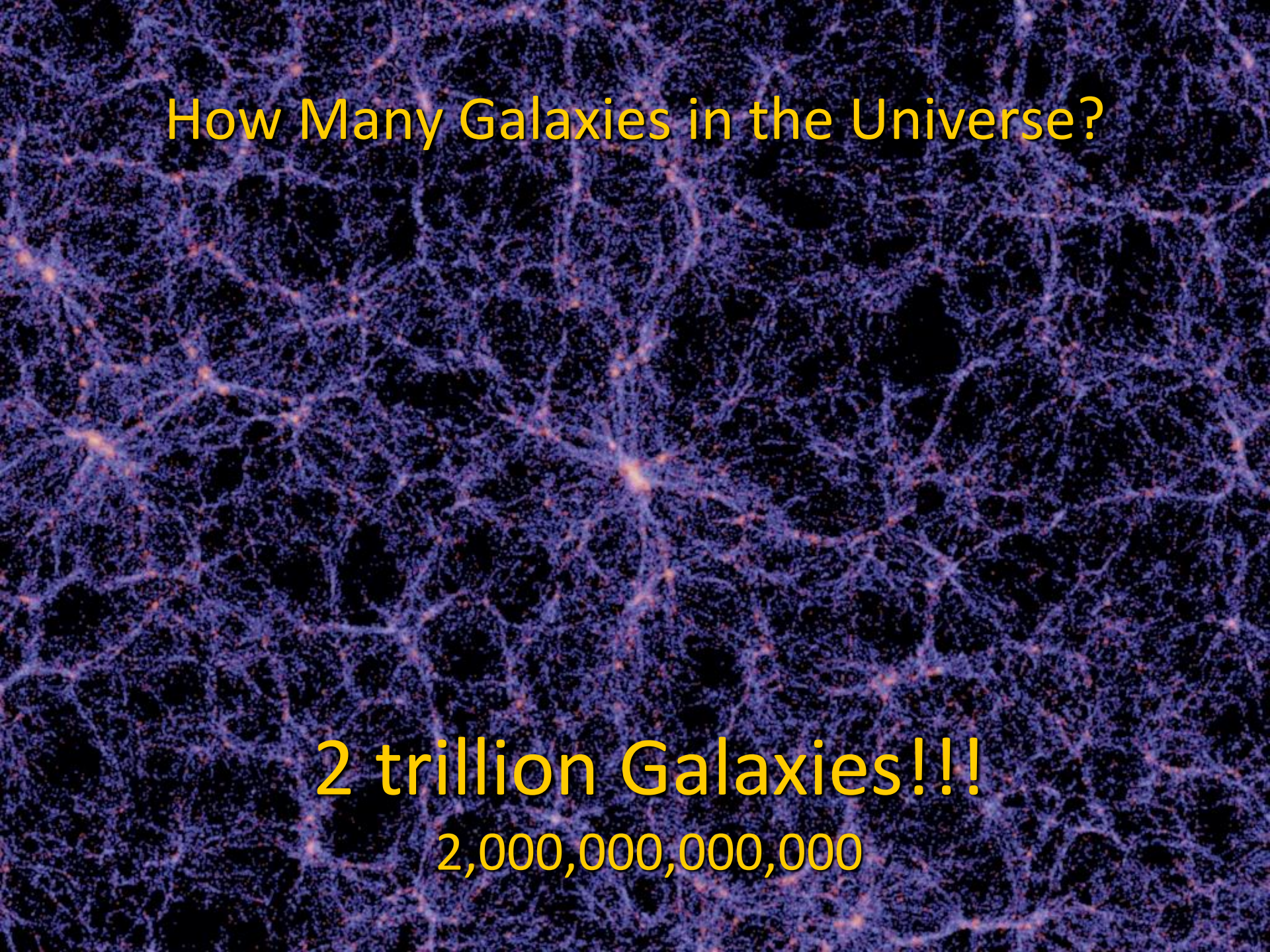



The Nearest Galaxy to the Milky Way
is the Andromeda Galaxy
2,300,000 Light Years


Andromeda Galaxy
8 Feet
Andromeda Galaxy and Milky Way are approaching each other at 300,000 MPH and will collide.
© Robert Gendler


0.000 billion years


M33 Pinwheel Galaxy
8 Feet
M81 Bode's Galaxy
16 Yards
M33 Whirlpool Galaxy
50 Yards
M104 Sombrero Galaxy
67 Yards


How Many Galaxies in the Universe?
2 trillion Galaxies!!!
2,000,000,000,000

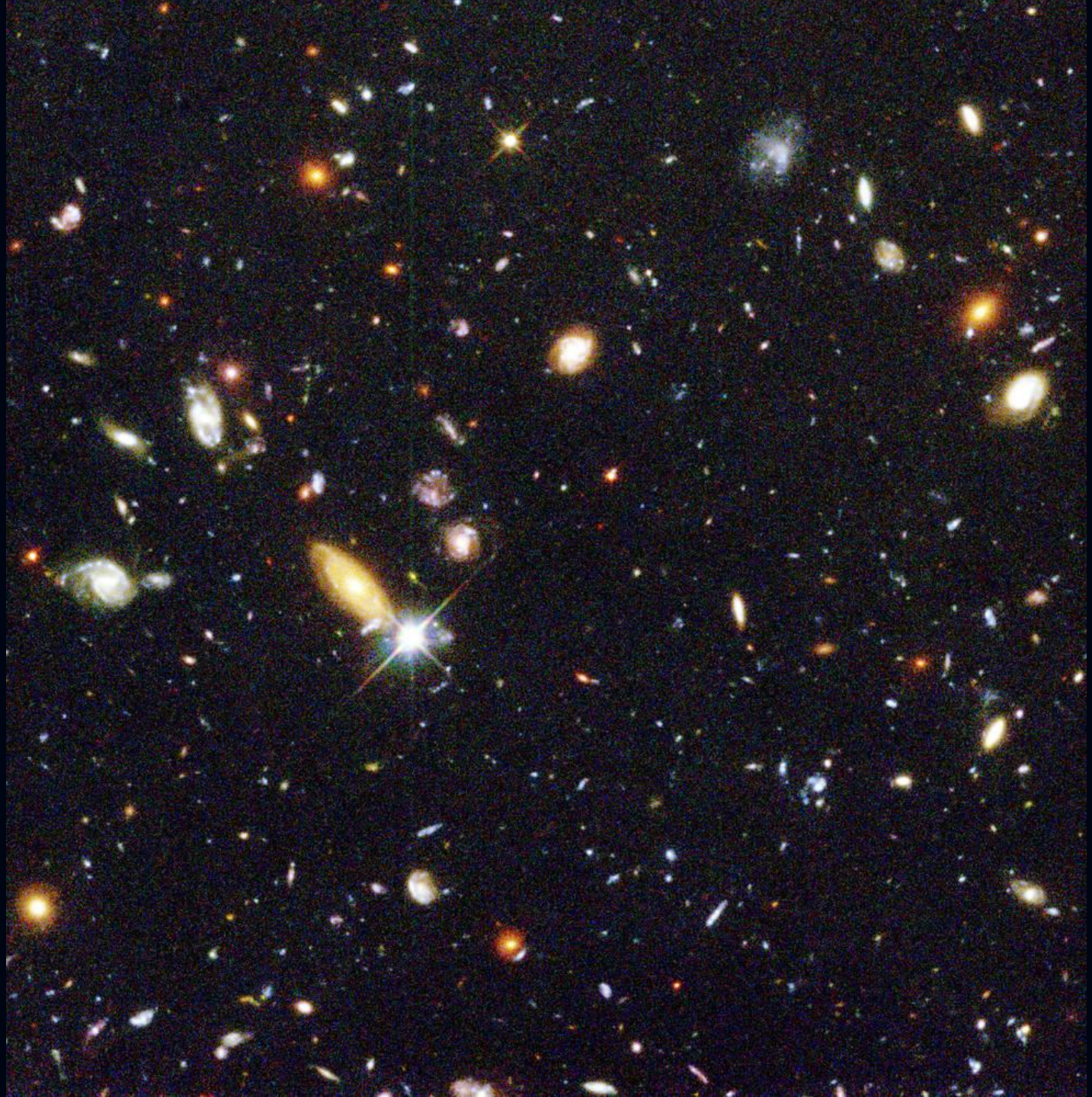
How Many Galaxies in the Universe?

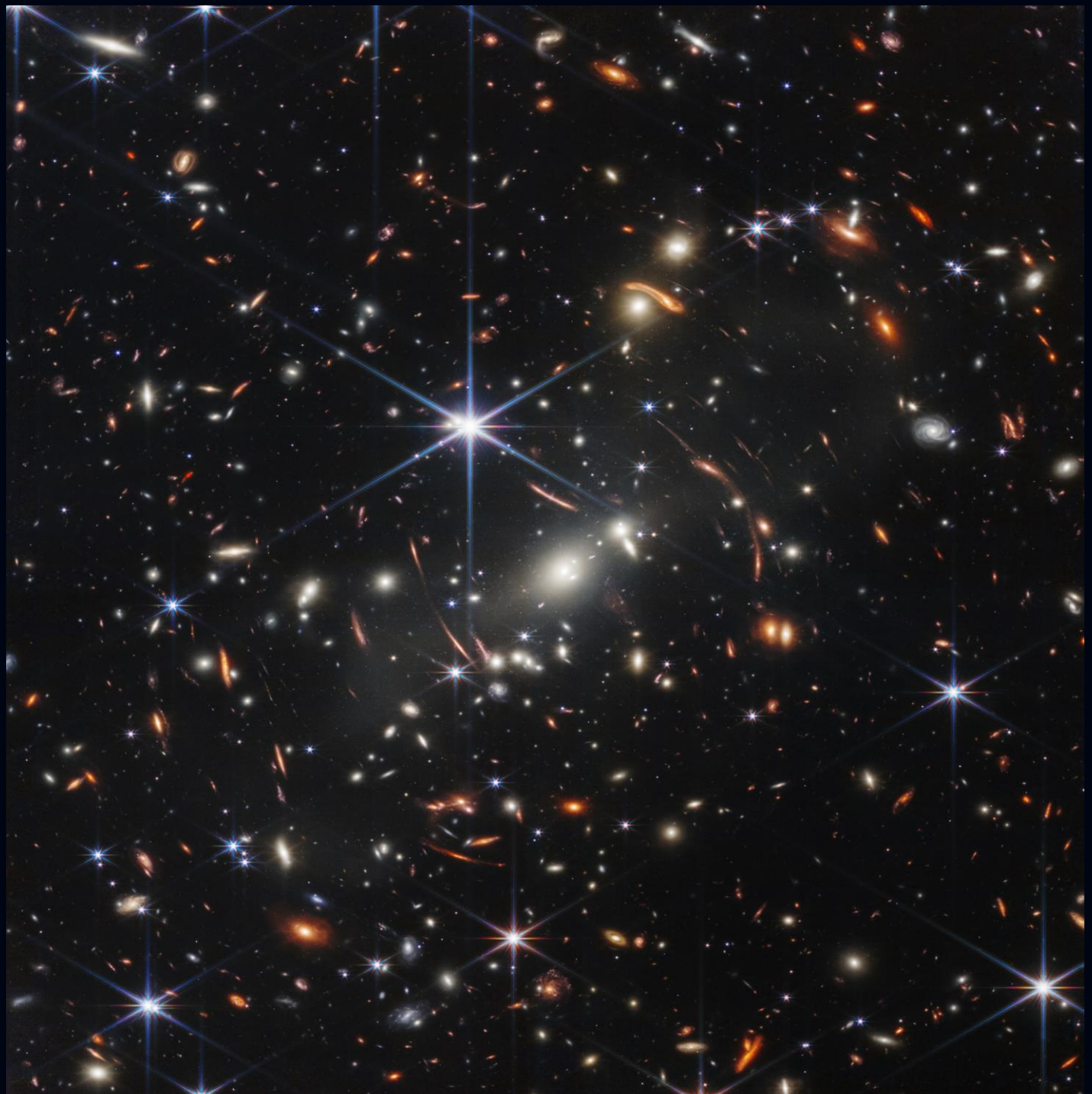
How Fast Are You Moving When Sitting Still?

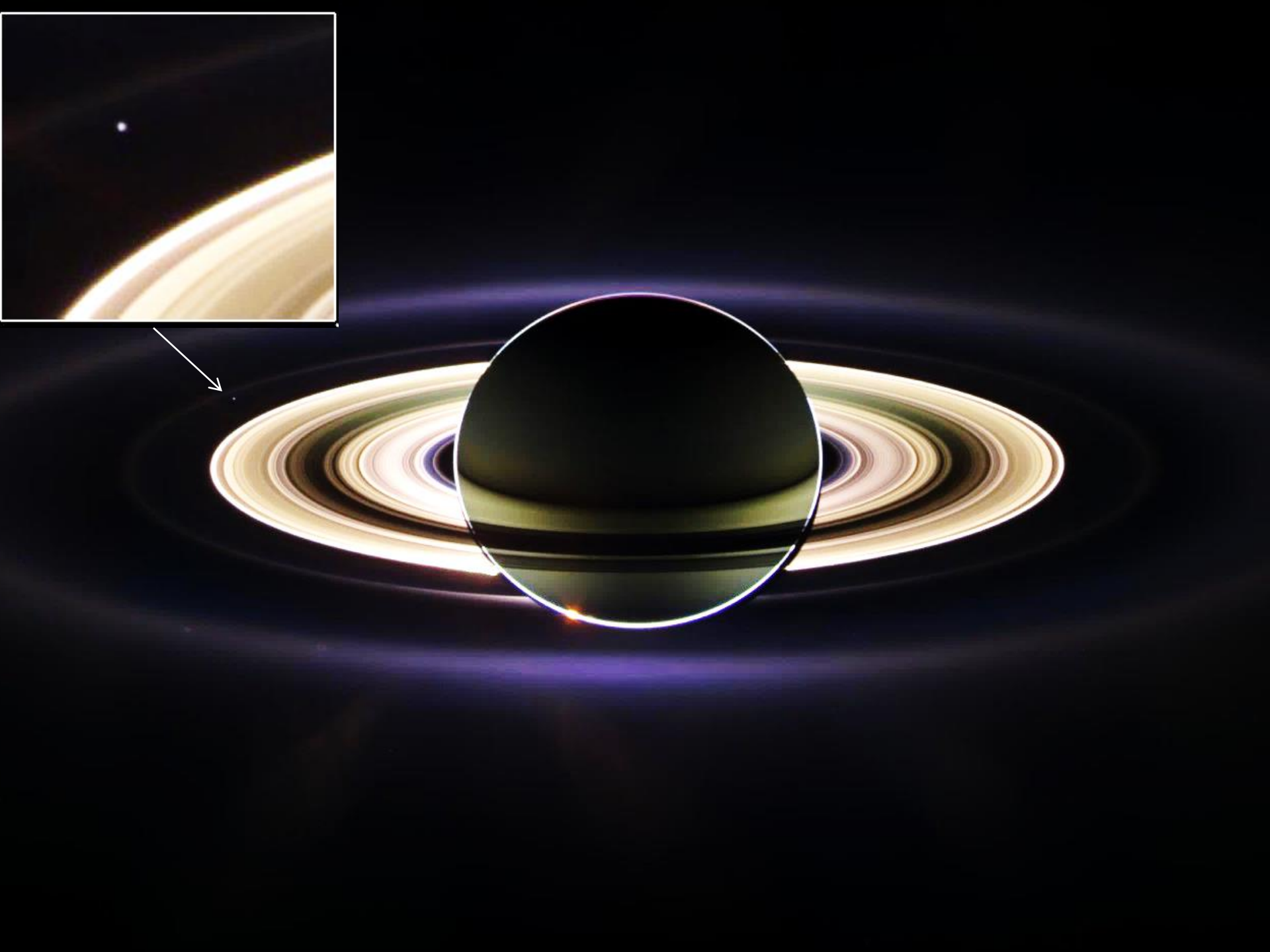
- Earth Rotation – 1000mph toward the East.
- Earth's orbital motion 66,000mph (that speed could get you from SF to Washington DC in 3 minutes.)
- The Sun orbits the Milky Way in 225 Million Years meaning a speed of 483,000mph.
- Our galaxy's motion relative to the Universe is 1,300,000mph.

How Far Have We Seen?

- Hubble Deep Field
  - 1995
- Hubble Ultra Deep Field
  - 2012
- James Webb Space telescope deep field
  - 2023








Questions?