

A deep field image of galaxies, showing a vast array of celestial objects in various colors (blue, orange, red) against a dark background. The galaxies are scattered across the frame, with some appearing as bright, distinct points and others as faint, diffuse structures. The colors suggest different stages of star formation or different types of galaxies.

Astronomical

The Sizes and Numbers
that Describe Our Universe

Cosmic Address

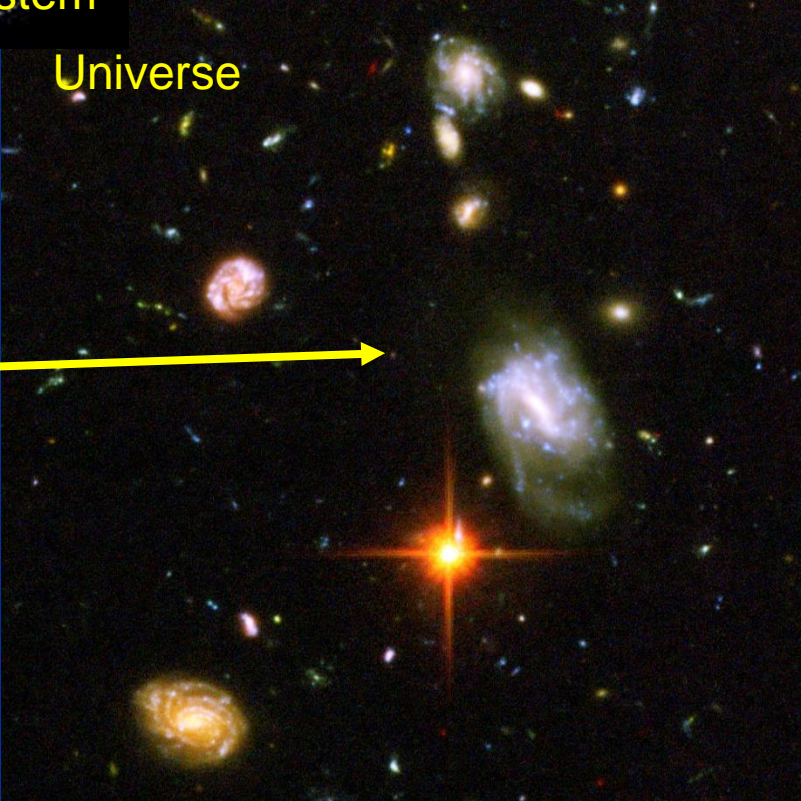
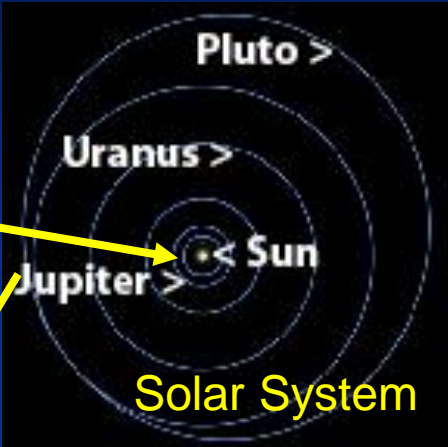
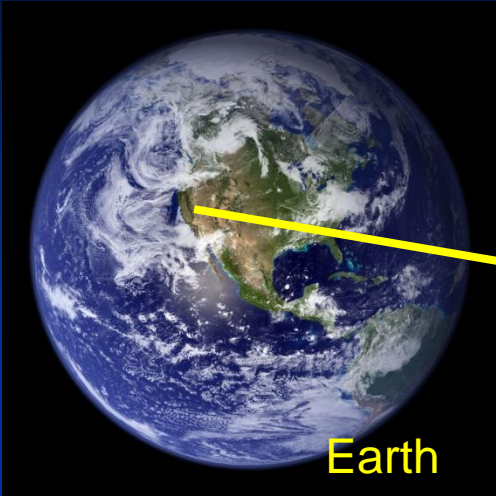


Image credits: NASA, STScI

The Solar System

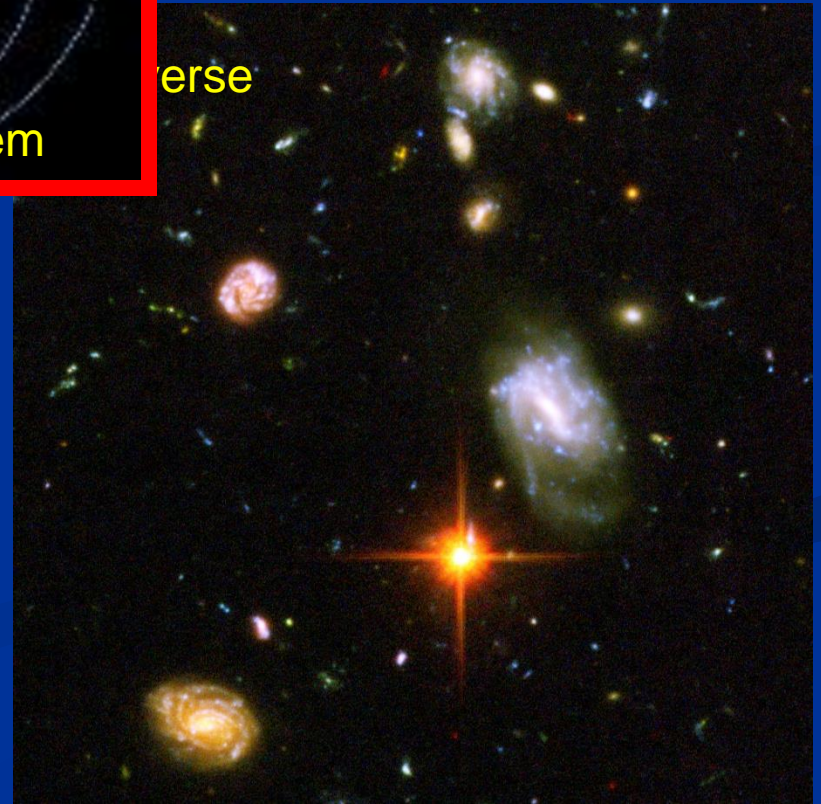
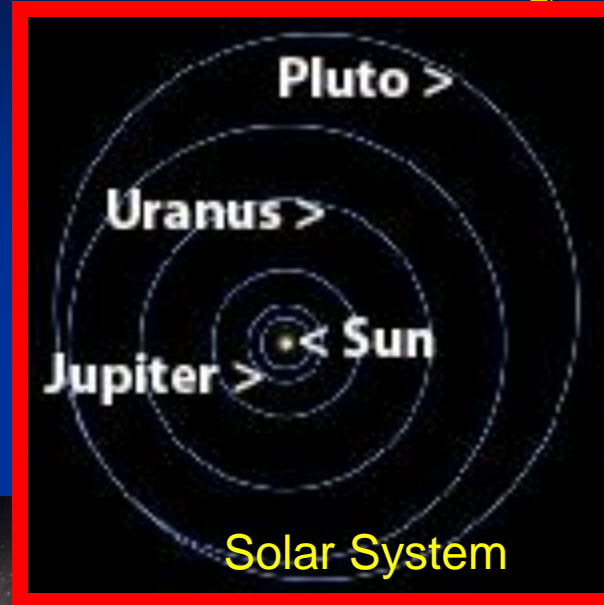


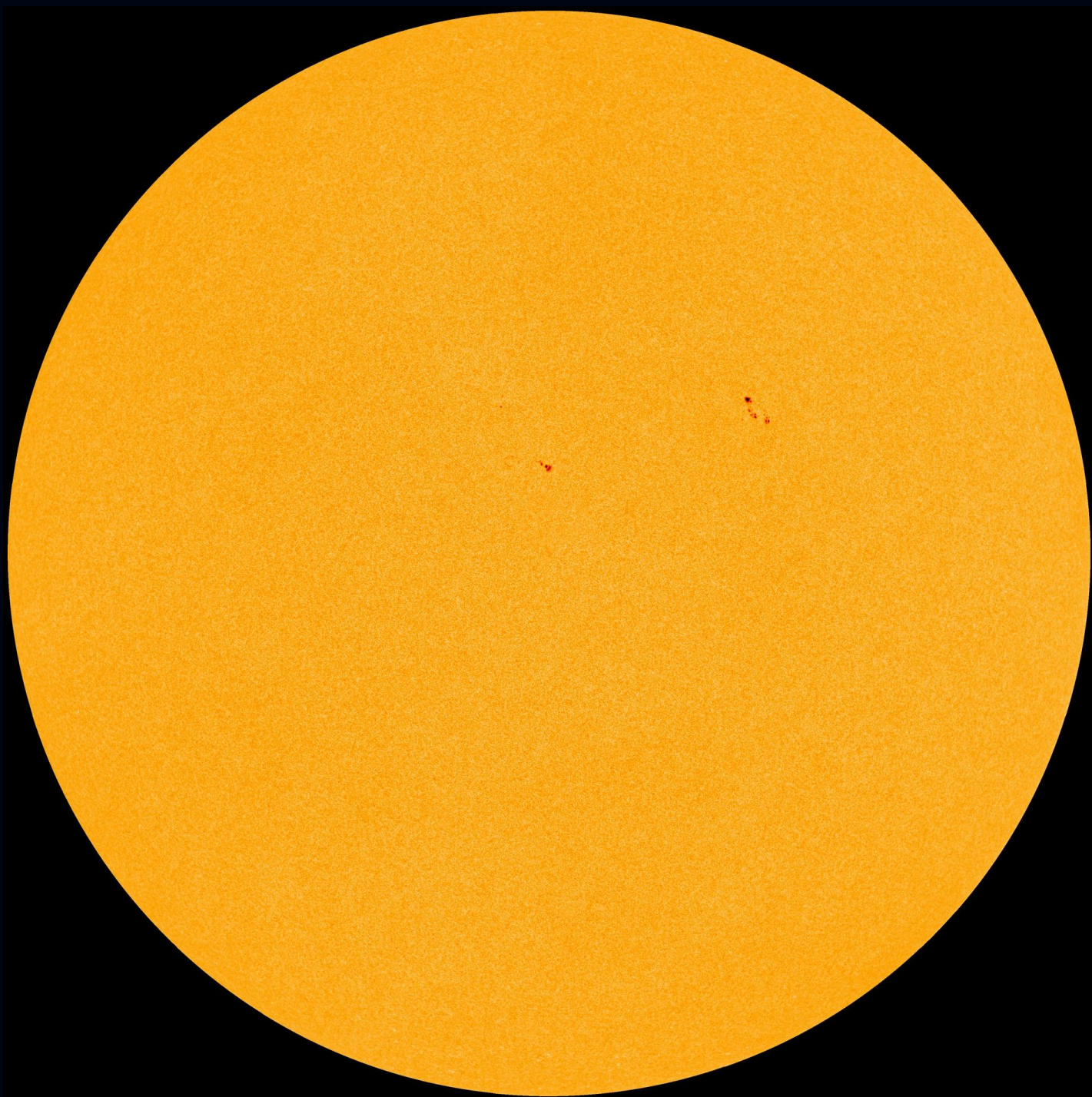
Image credits: NASA, STScI

My Very Elegant Mother Just Sat Upon Nine Porcupines



My Very Elegant Mother Just Sat Upon Nine Porcupines






The Sun

The largest object in the solar system
containing more than 99.8% of
the total mass of the Solar
System

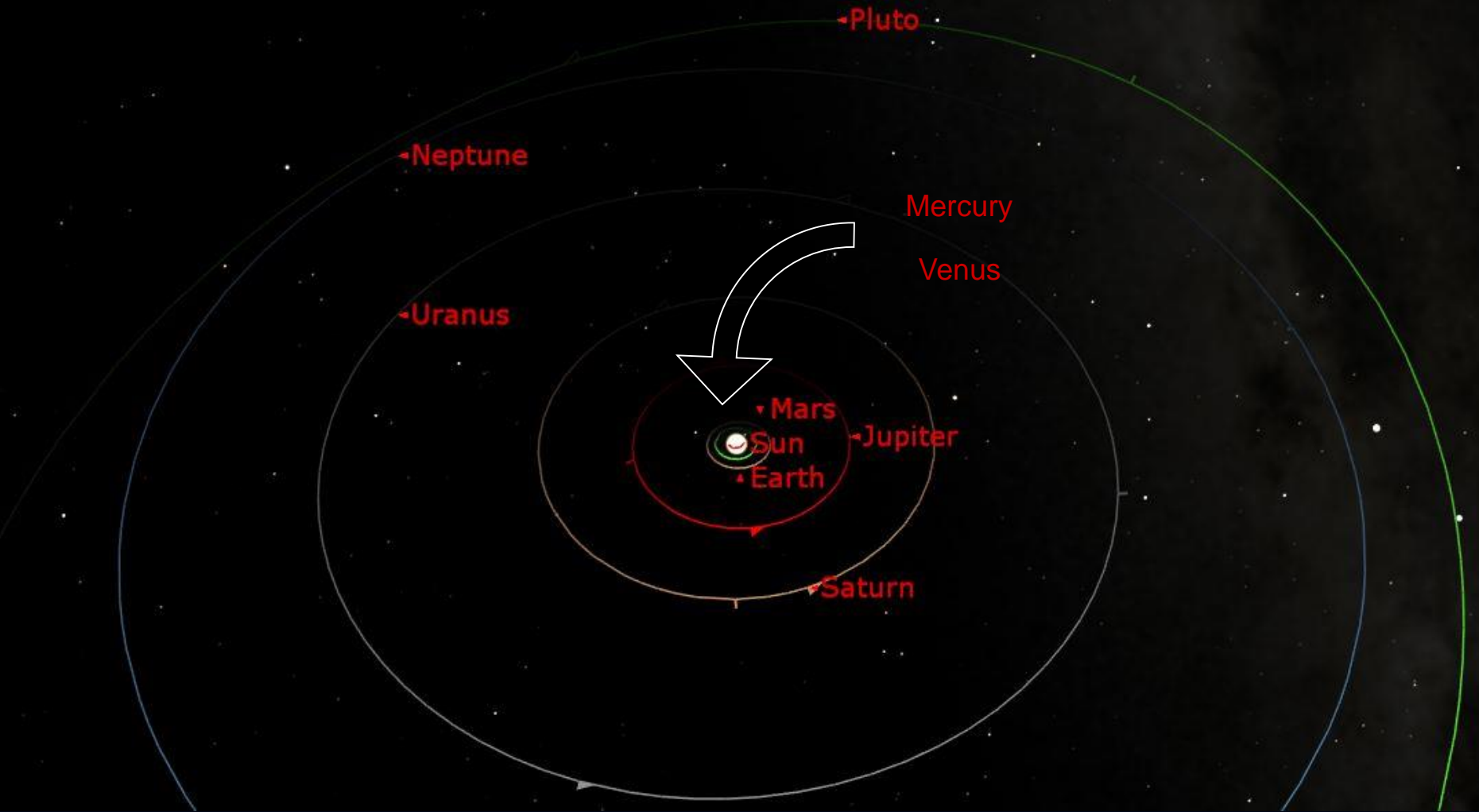


A large, glowing mushroom cloud from a nuclear explosion dominates the sky. The cloud has a bright, orange-yellow core that tapers into a thick, dark grey cap. The ground below is a flat, open landscape with some low-lying vegetation and a small structure visible in the distance. The overall scene is dramatic and powerful.

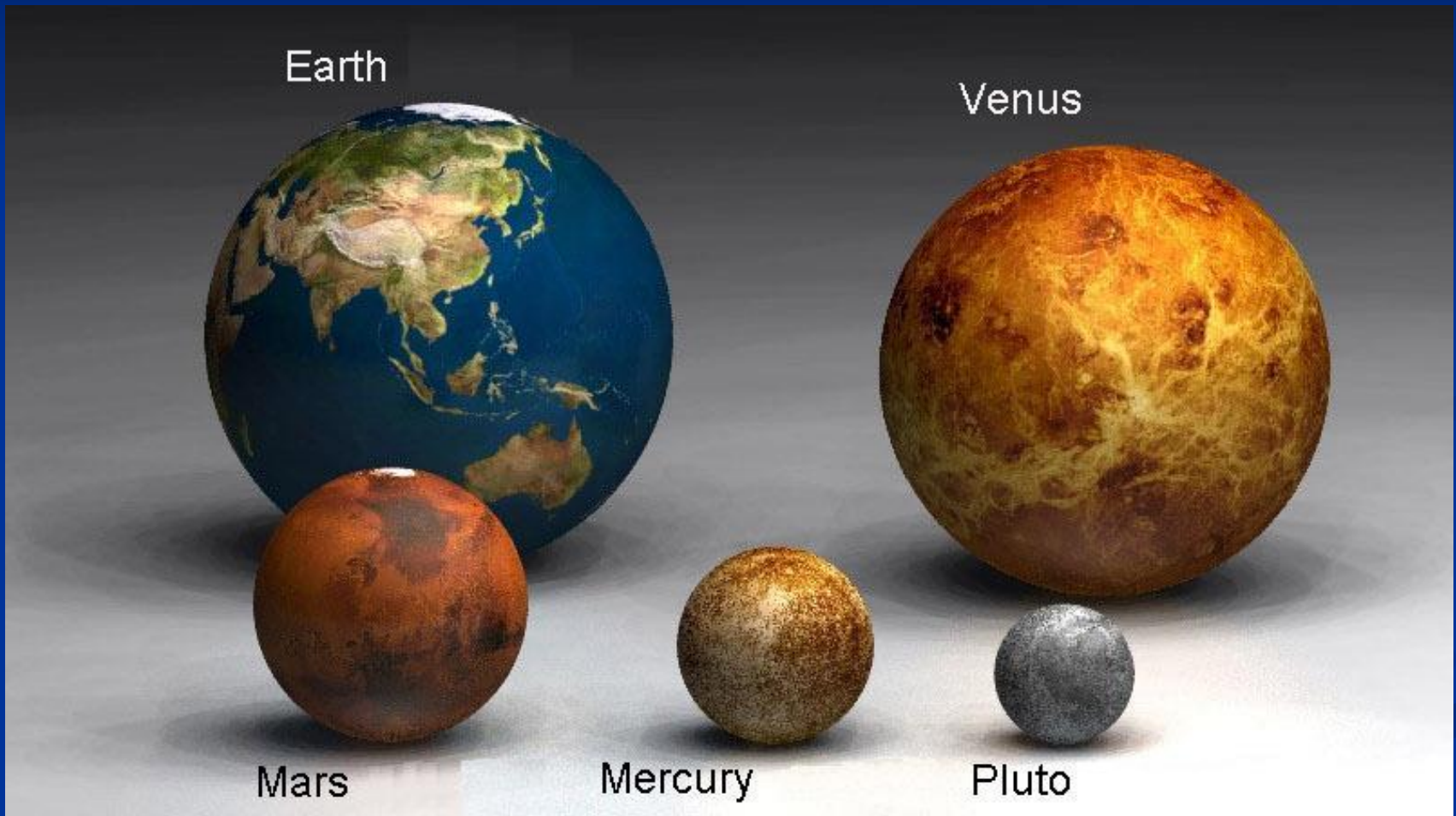
This Explosion burns about 6 pounds
of Hydrogen

The Sun burns 600 Million Tons of
Hydrogen per second.

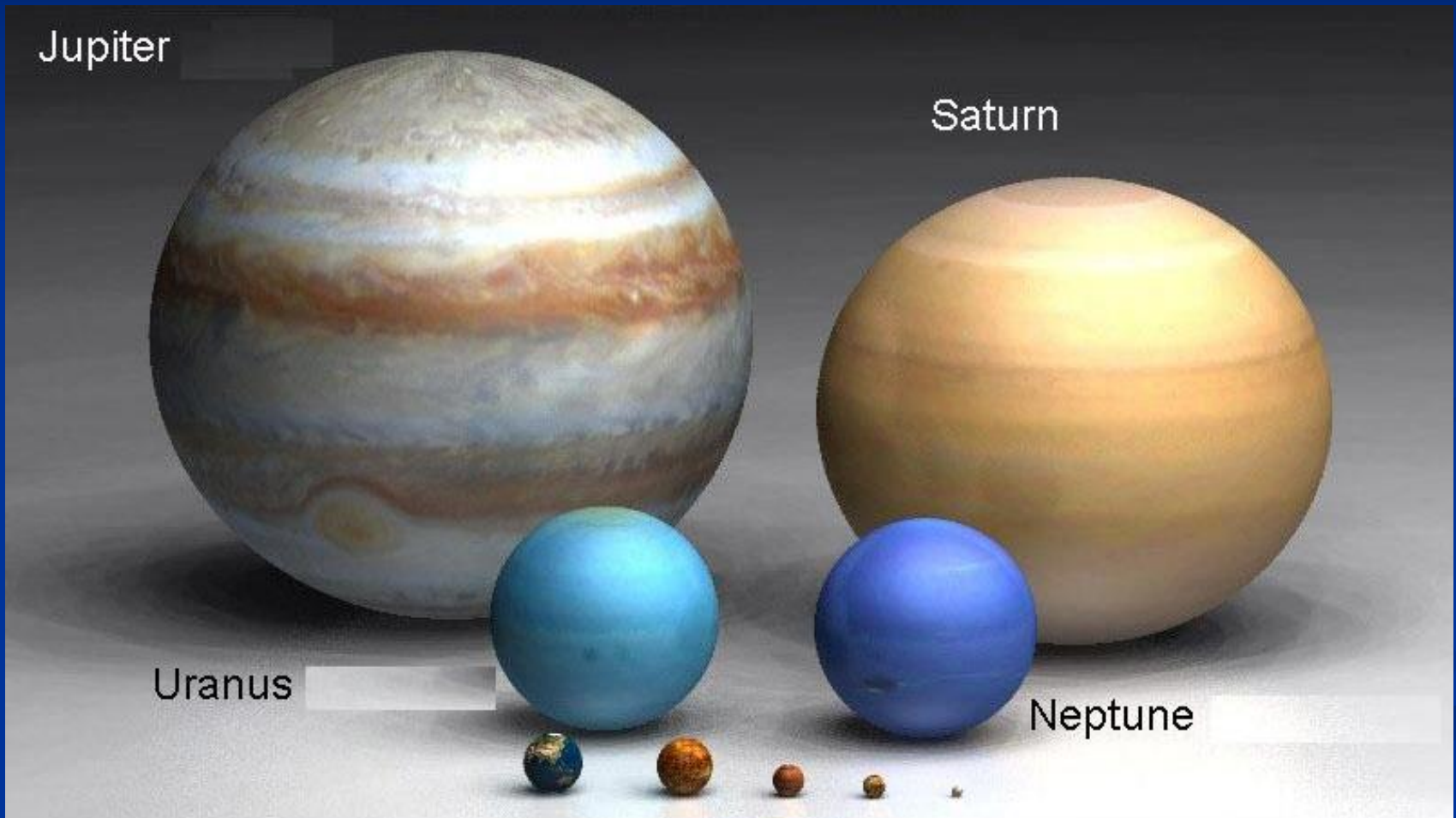
Solar System



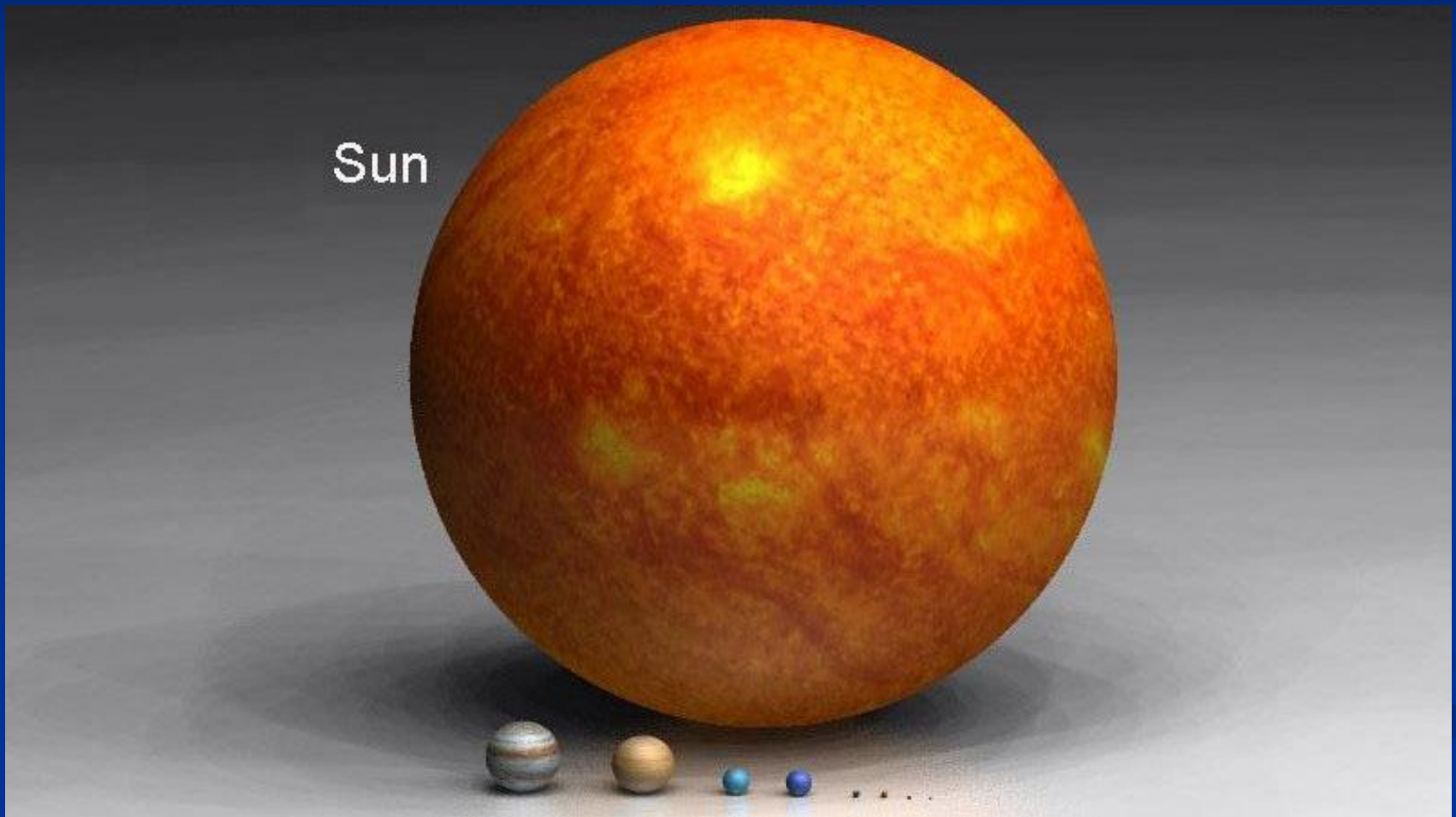
The Size of the Planets



The Size of the Planets

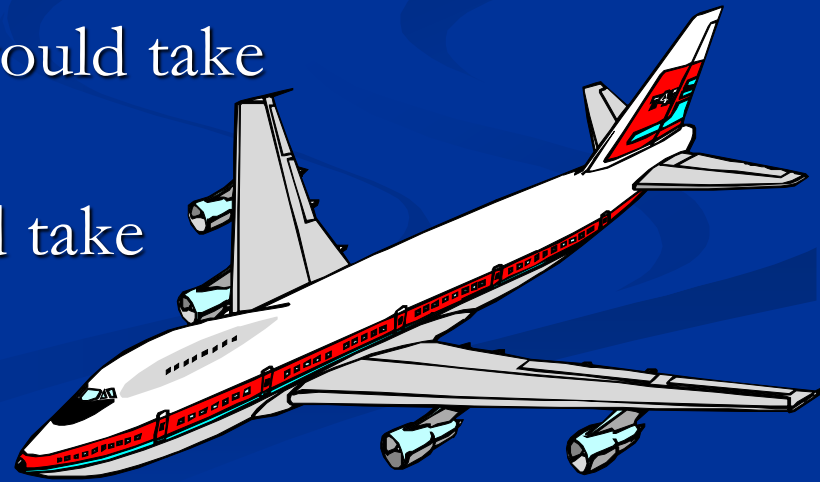


The Planets



A Boeing 747 Cruising at 550 MPH.

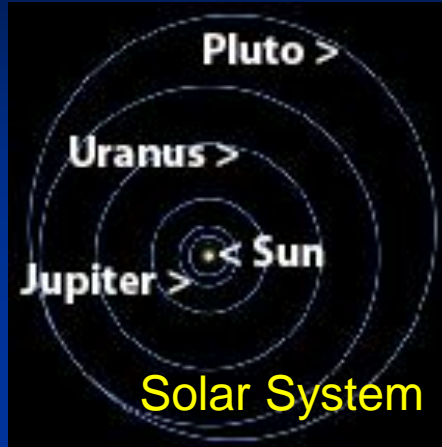
- To travel from San Francisco to New York takes about 6 Hours.
- To travel all of the way around the Earth takes less than 2 days.
- To get from Earth to the Sun would take 18 Years!
- To get from the Sun to Pluto would take 700 Years!
- To get to the nearest star would take 4,718,913 years



Milky Way Galaxy



Earth

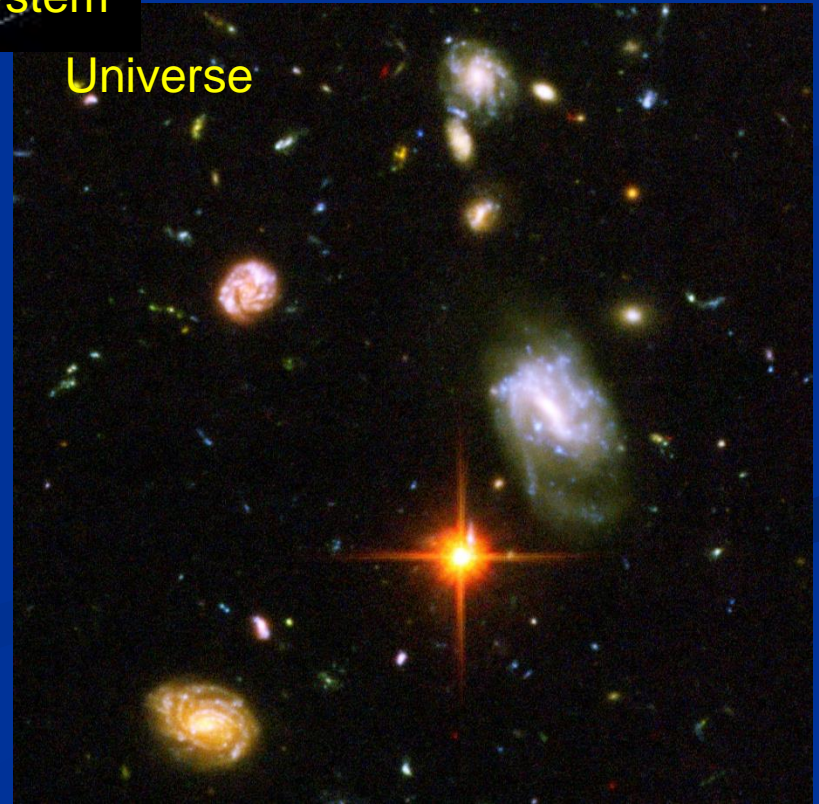


Solar System



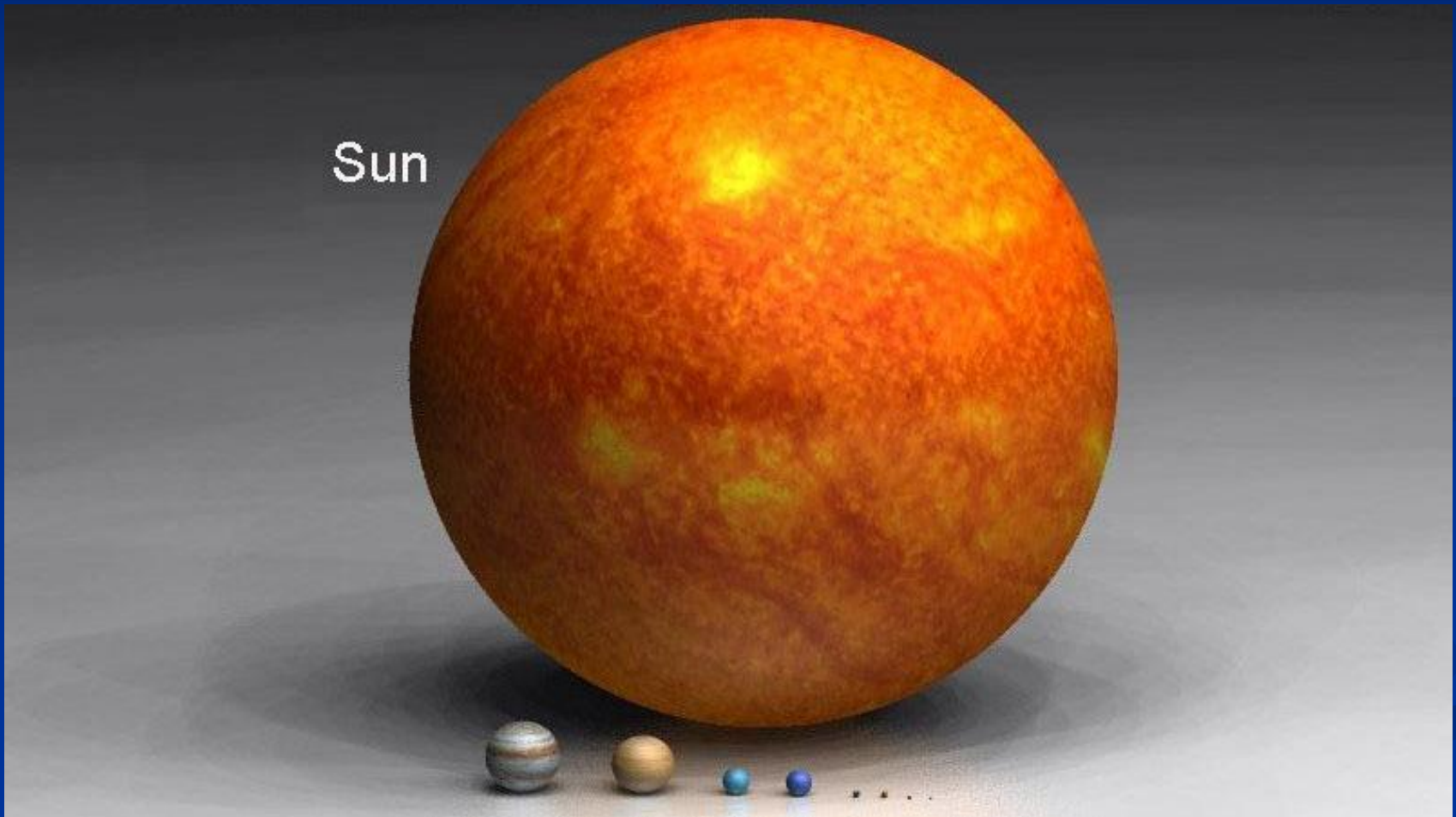
Galaxy

SA, STScI

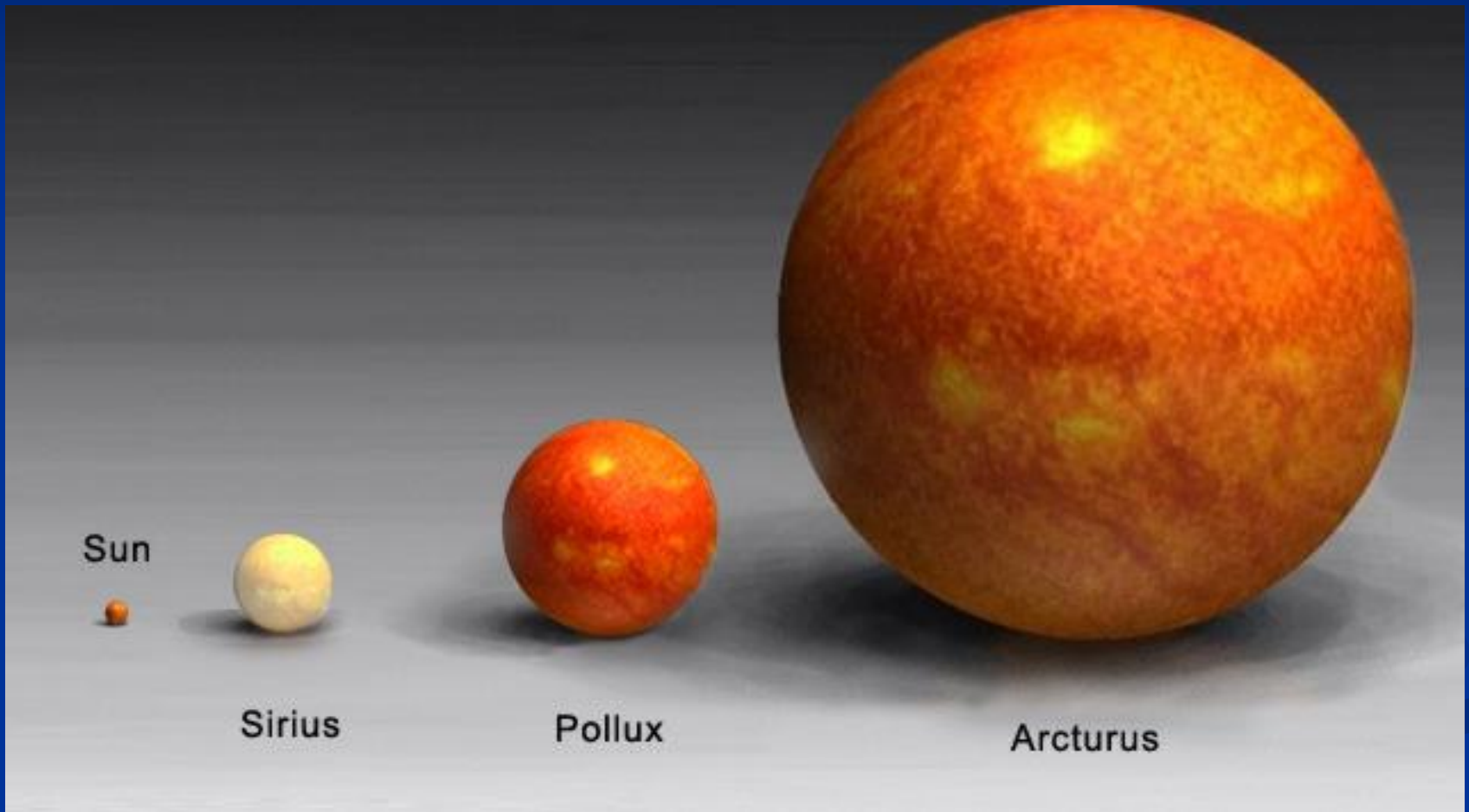


Universe

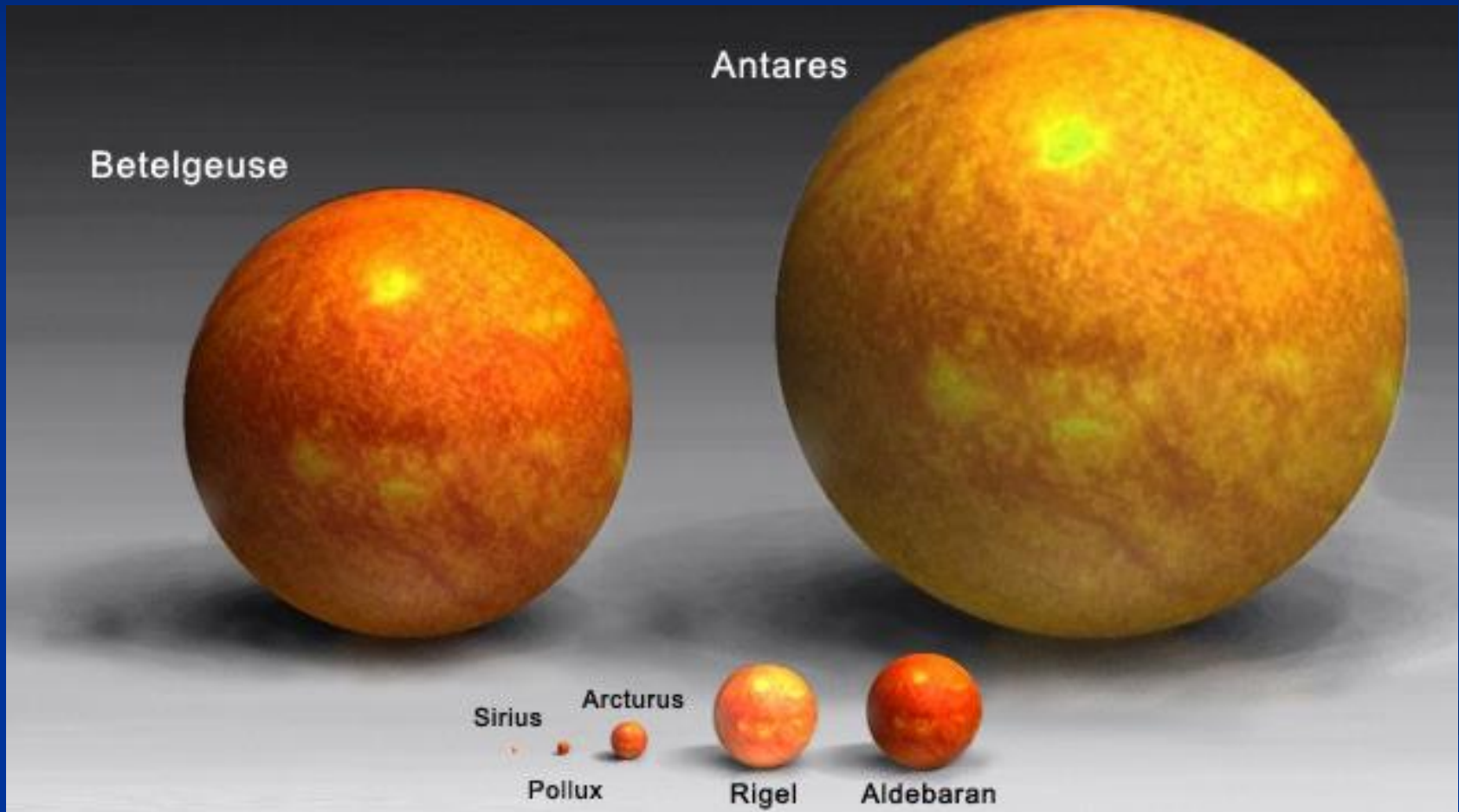
The Size of the Sun



The Size of the Sun



The Size of the Sun



The Distance Between Suns

Shrinking the sun to the size of a golf ball.



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.



The Size of the Galaxy

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

Then.....

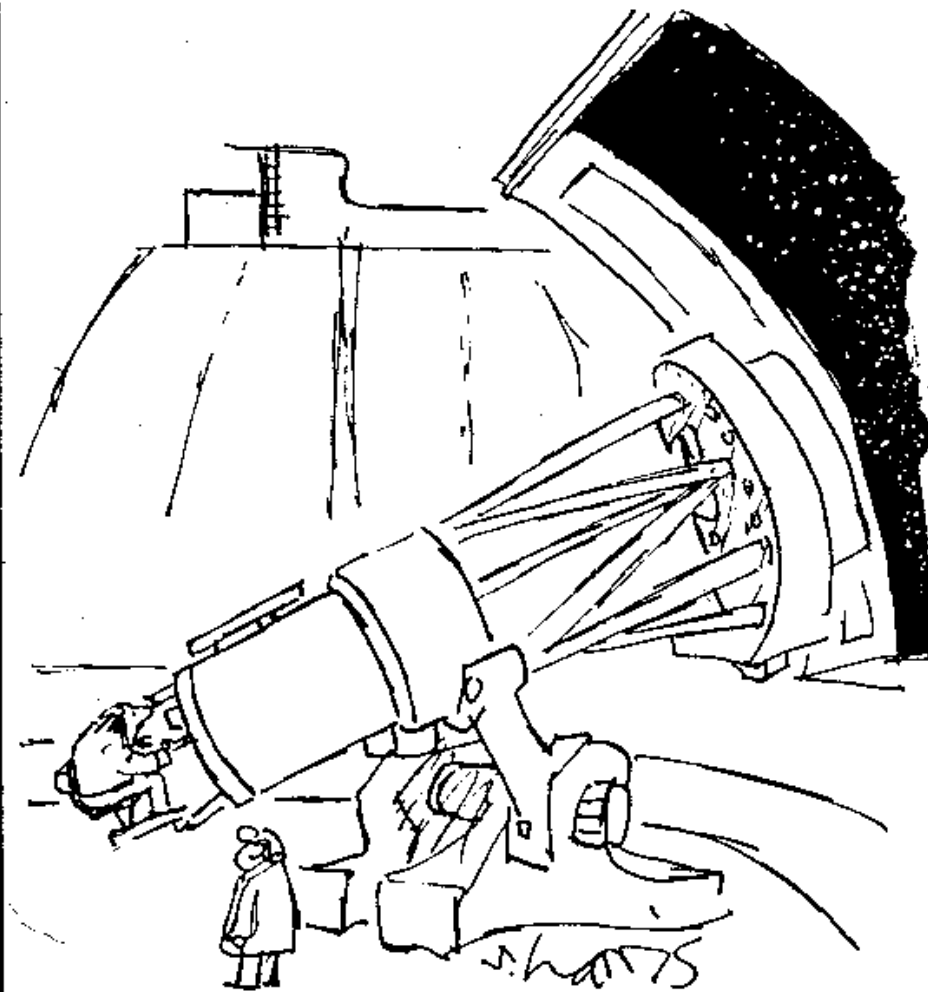


...the Galaxy would be the size of North America



How Many Stars in our Galaxy?

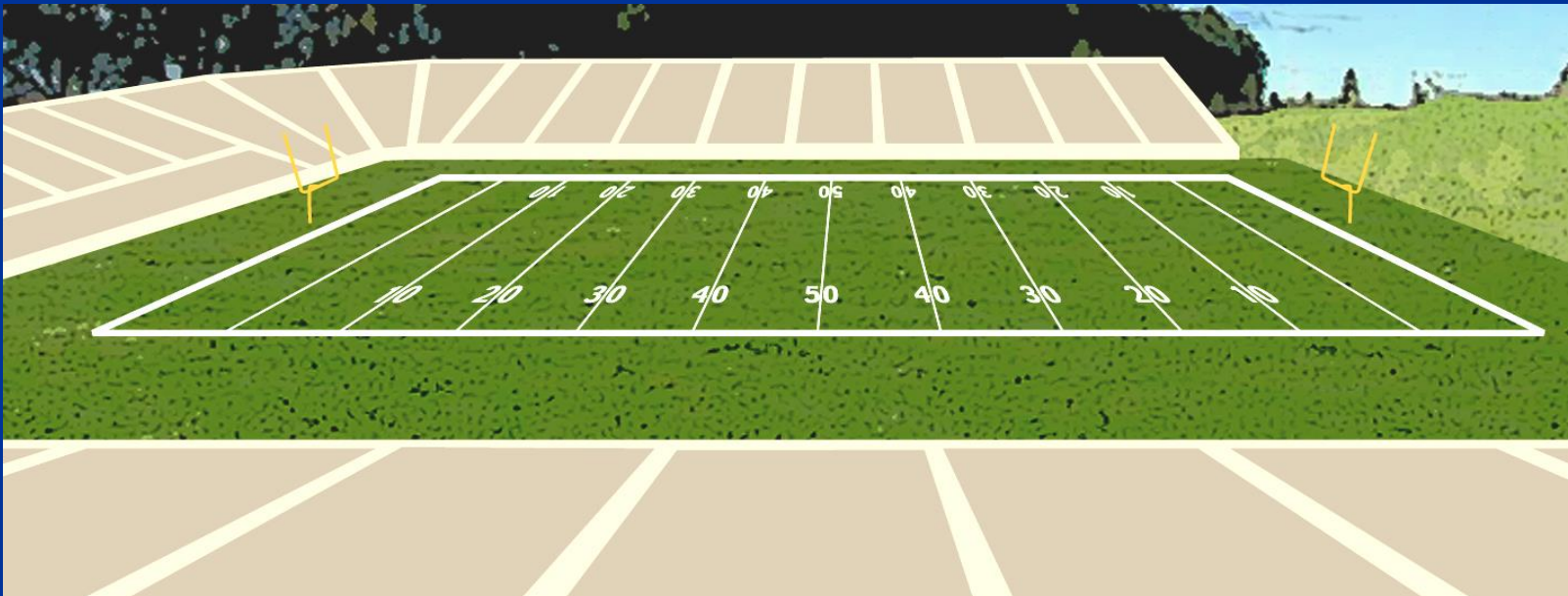
200 BILLION Stars!!!



“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 4 foot wall all around it
- ❖ Fill the field with birdseed



200 BILLION Seeds



200 BILLION Stars

The Universe

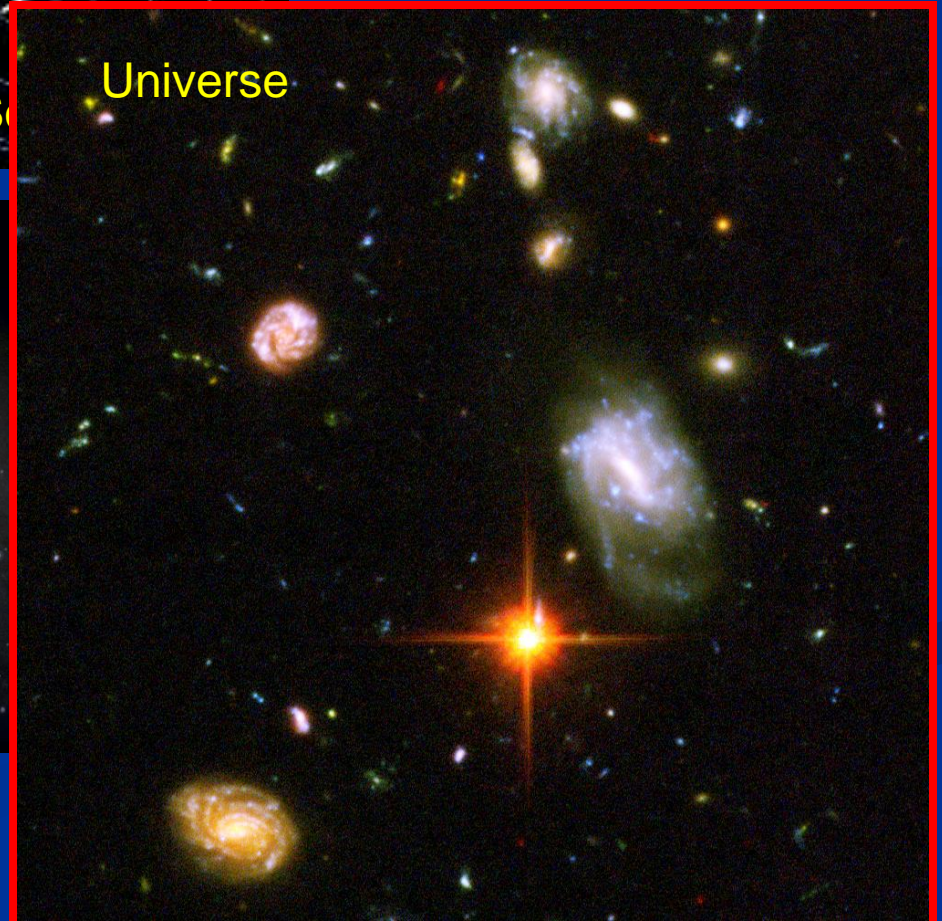


Image credits: NASA,

How Many Galaxies in the Universe?

We can see about half as many galaxies as there are stars in the Milky Way!!!



The Distance to the Nearest Galaxy

2,300,000 Light Years

A yellow double-headed arrow is drawn across the image, pointing from a large, bright, yellowish-white galaxy in the lower-left towards a smaller, blueish-white galaxy in the upper-right. The text "2,300,000 Light Years" is written in yellow along the length of the arrow.

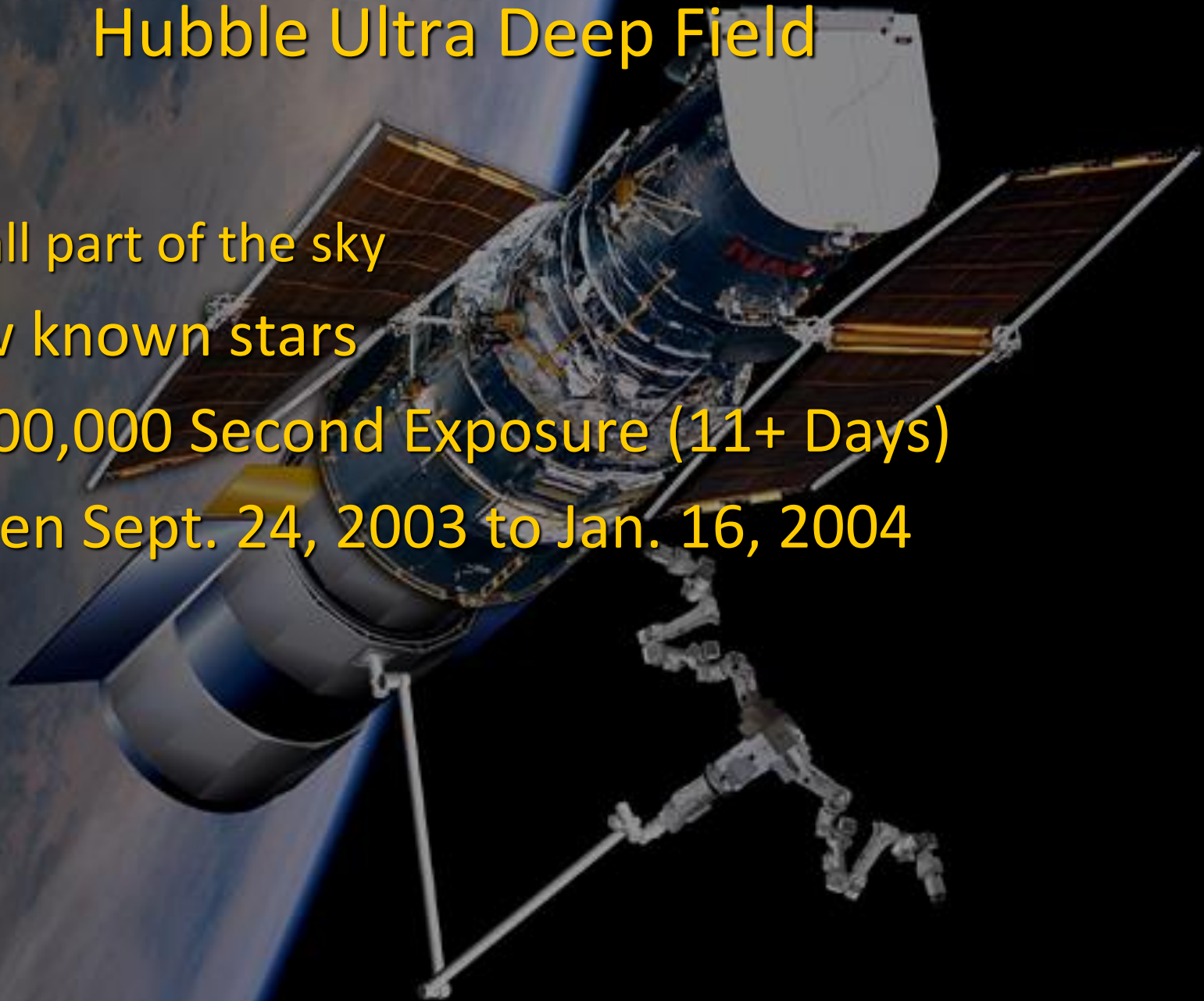
23 times the diameter of the
Milky Way

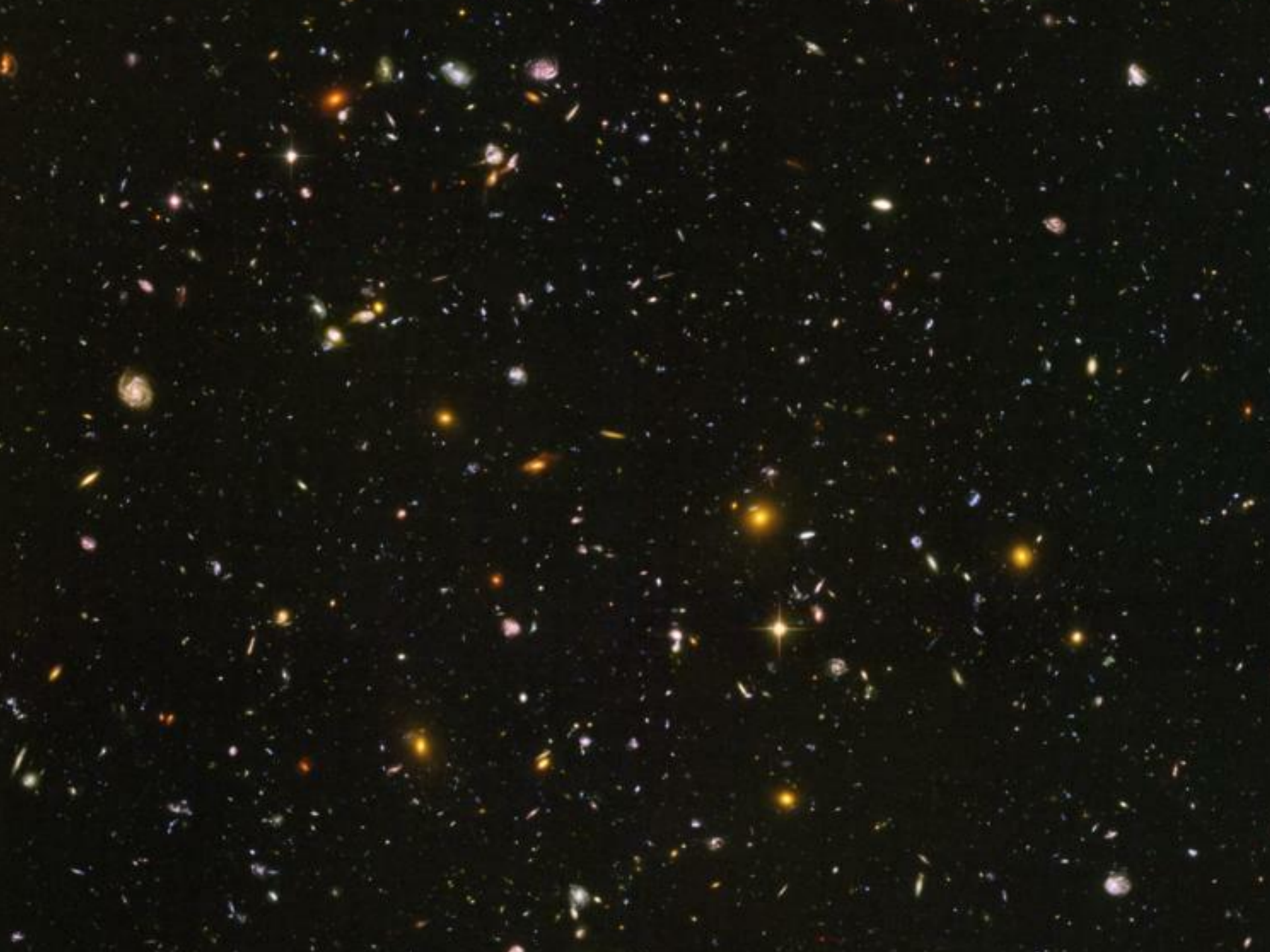


Furthest Man Has Seen

Hubble Ultra Deep Field

- Small part of the sky
- Few known stars
- 1,000,000 Second Exposure (11+ Days)
- Taken Sept. 24, 2003 to Jan. 16, 2004





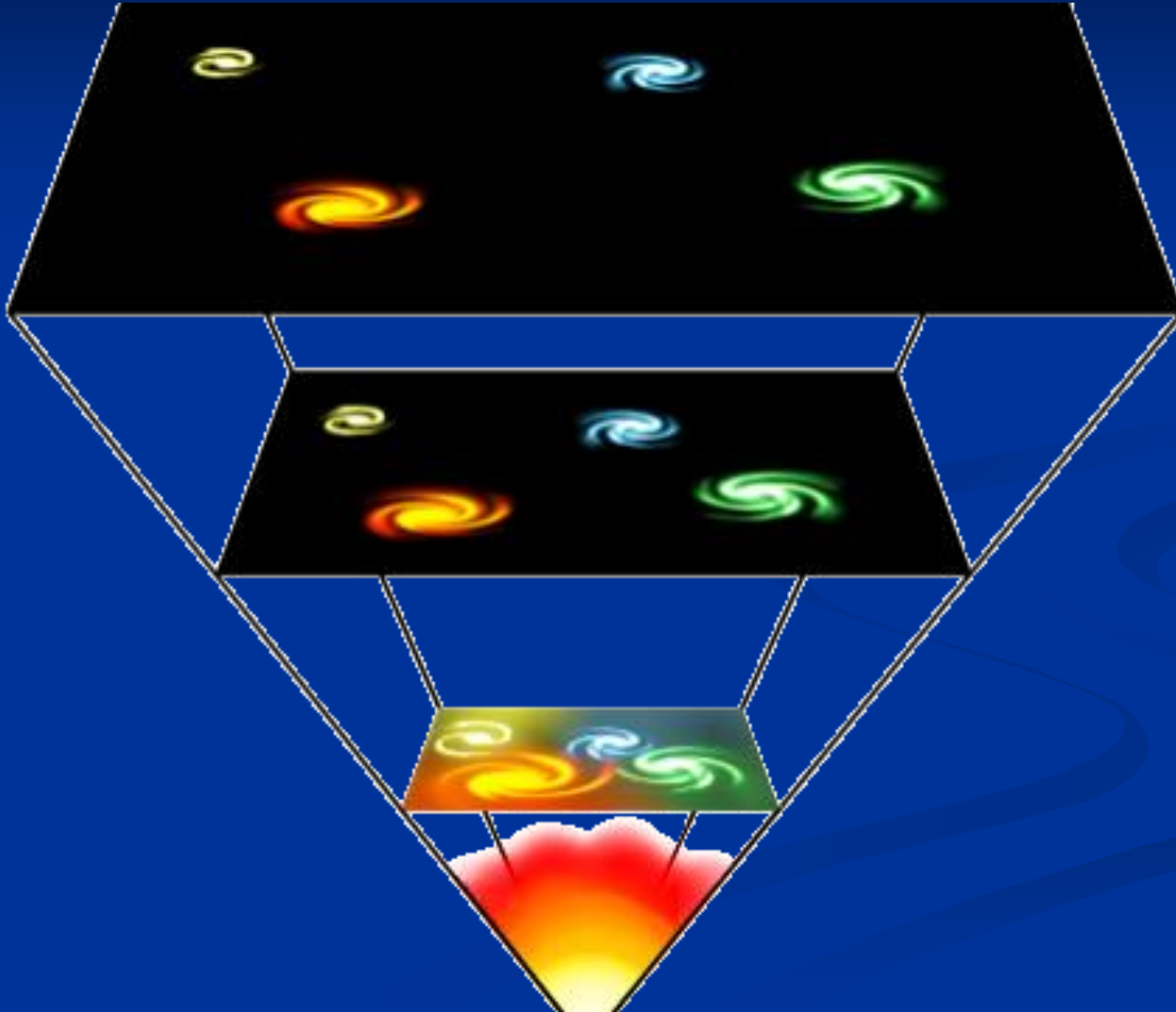


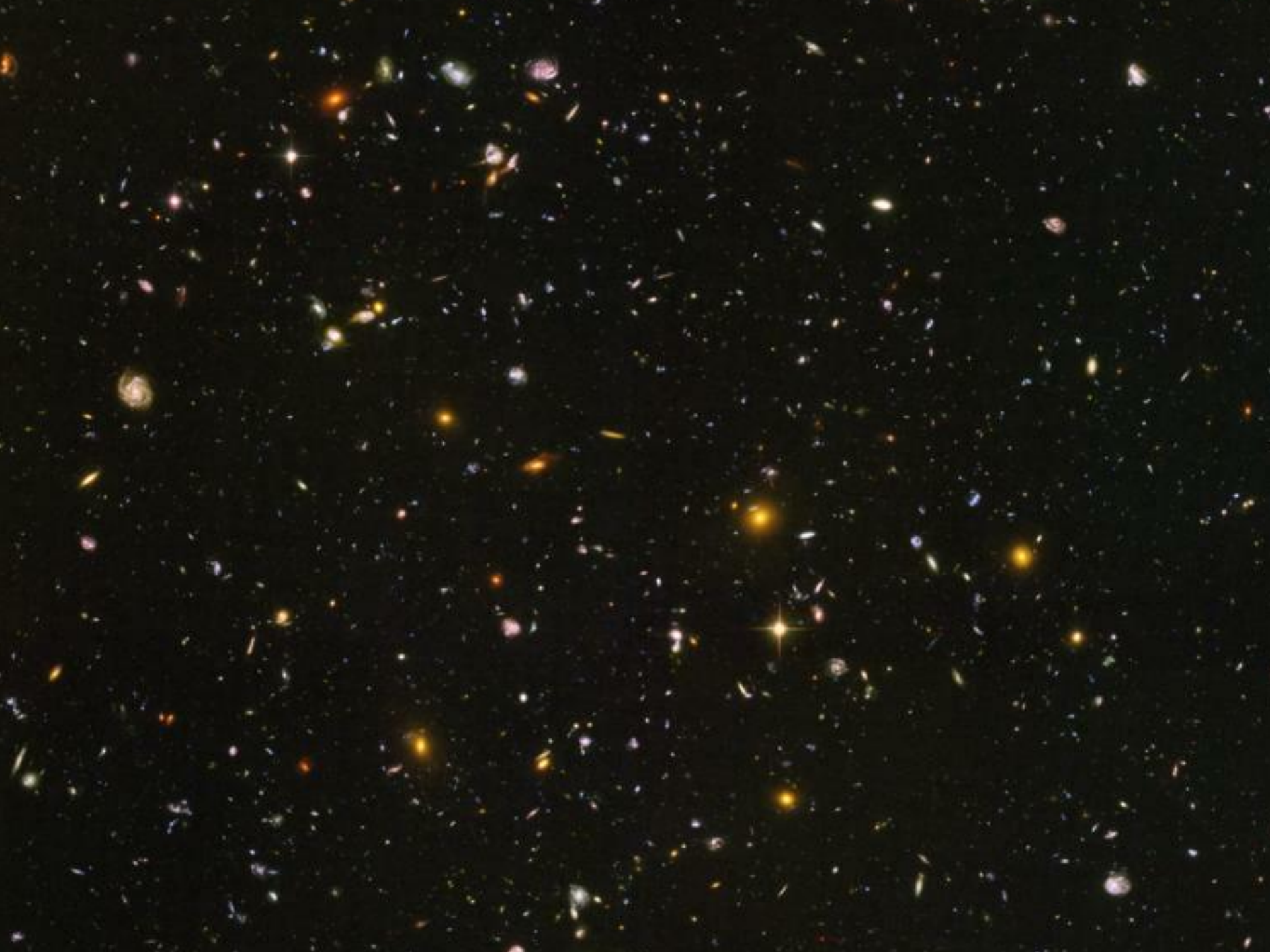
These Galaxies are as far as 13 Billion Light Years Away.

Light left these galaxies when the universe was only 5% of its current age.

If the Milky Way were the size of a CD, these galaxies would be 10 miles away.

The Universe is Expanding





The Galaxy Song

Monty Python's The Meaning of Life

Whenever life gets you down Mrs. Brown
And things seem hard or tough
And people are stupid, obnoxious or daft
And you feel that you've had quite enough...
Just, remember that you're standing on a planet
that's evolving
And revolving at nine hundred miles an hour
That's orbiting at nineteen miles a second, so
it's reckoned
A sun that is the source of all our power
The sun, and you and me, and all the stars that
we can see
Are moving at a million miles a day
In an outer spiral arm at forty thousand miles
an hour
Of the galaxy we call the Milky Way
Our galaxy itself, contains a hundred billion
stars
It's a hundred thousand light years side-to-side
It bulges in the middle, sixteen thousand light
years thick

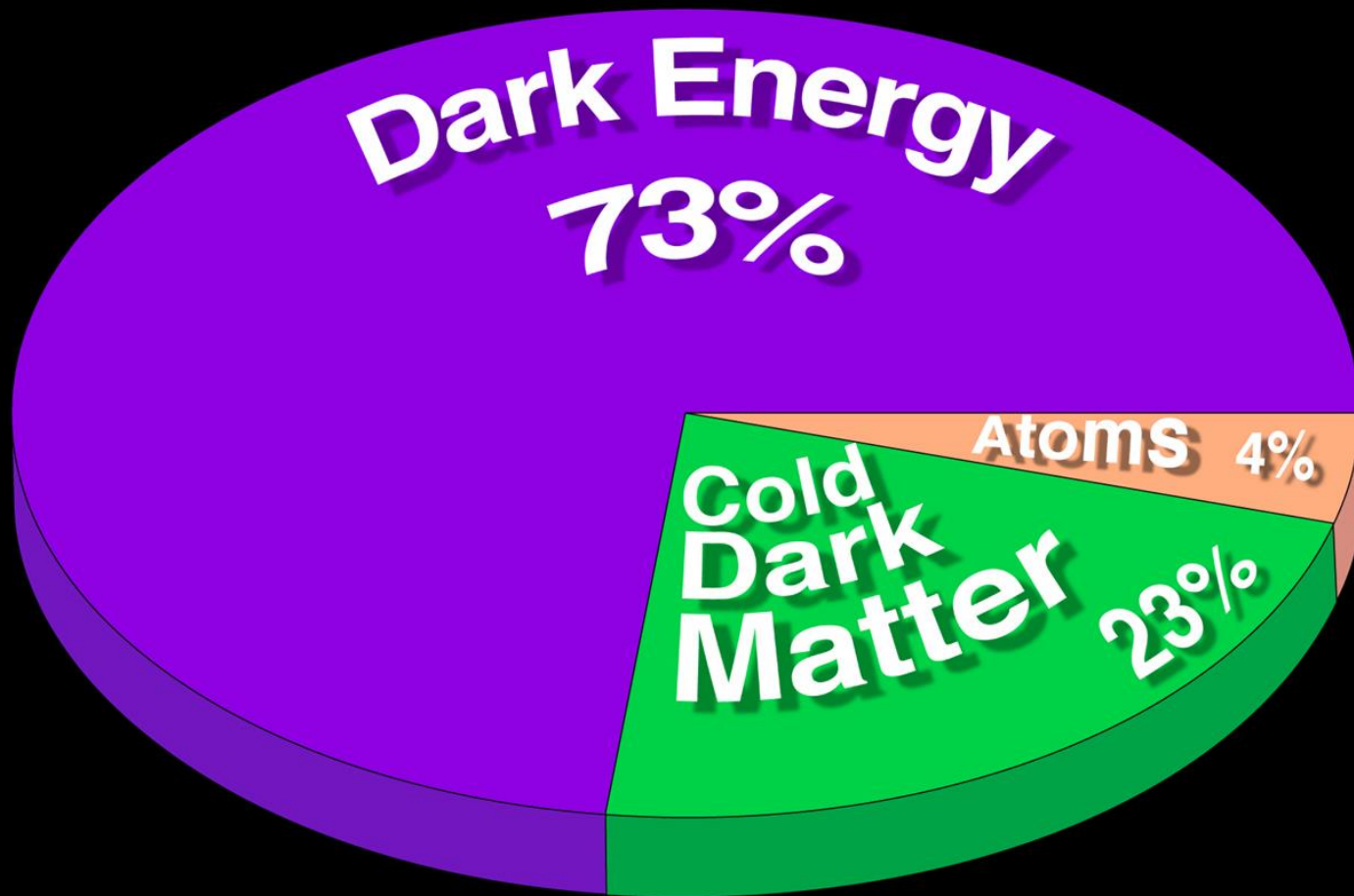
But out by us its just three thousand light
years wide
We're thirty thousand light years from galactic
central point
We go round every two hundred million years
And our galaxy is only one of millions of
billions
In this amazing and expanding universe
The universe itself keeps on expanding and
expanding
In all of the directions it can whiz
As fast as it can go, the speed of light you
know
Twelve million miles a minute and that's the
fastest speed there is
So remember, when you're feeling very small
and insecure,
How amazingly unlikely is your birth;
And pray that there's intelligent life
somewhere out in space,
'Cause there's bugger all down here on Earth!



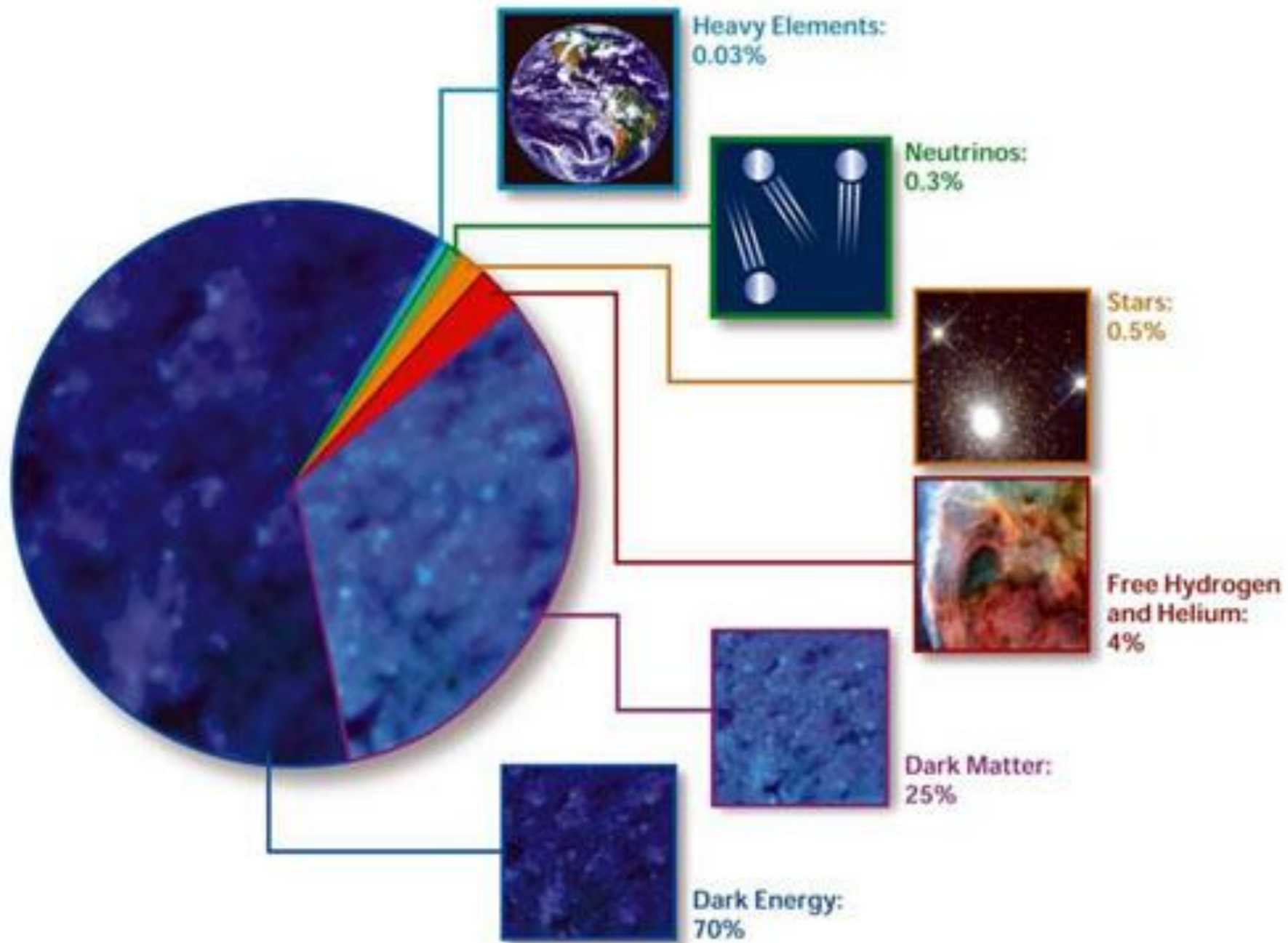
Universe

What is the Universe Made of
?





COMPOSITION OF THE COSMOS



General Relativity



Planets

Quantum Mechanics



Atoms



People



Hadrons

General Relativity



Planets



People



Quantum Mechanics



Atoms



Hadrons

The End

