C-notes

Astronomy Intro

Astronomy- is the study of space- ALL OF IT

Universe- includes ALL matter, energy and forces

Galaxies are the key unit that make up the universe

C-notes

Astronomy Intro

Big to small:

Universe- all matter, energy and forces. Made up of Galaxies

Galaxies- made of millions of stars

Stars- massive objects, made of gases that PRODUCE their own light

Some stars have objects orbiting them (planets, asteroids, etc.)

Our star- SUN is one of those stars

C-notes

Universe: The Big Bang

Key Vocabulary:

Light year- It is a measure of distance. It is the distance that light travels in one year. One light year is equal to:

9,460,800,000,000 kilometers!

Expansion (also known as inflation)- is the constant "spreading out" of all the galaxies in the Universe

Foldable

Box 1

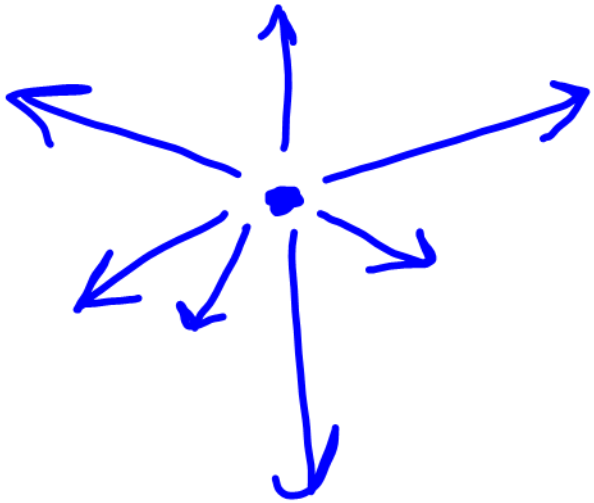
All was in one point

- **Hot, small, massive**

No atoms, molecules- NO MATTER
14 BILLION y.a.

Box 2

"Explosion" occurs stuff shoots out in all directions (but not evenly). Still, no matter exists



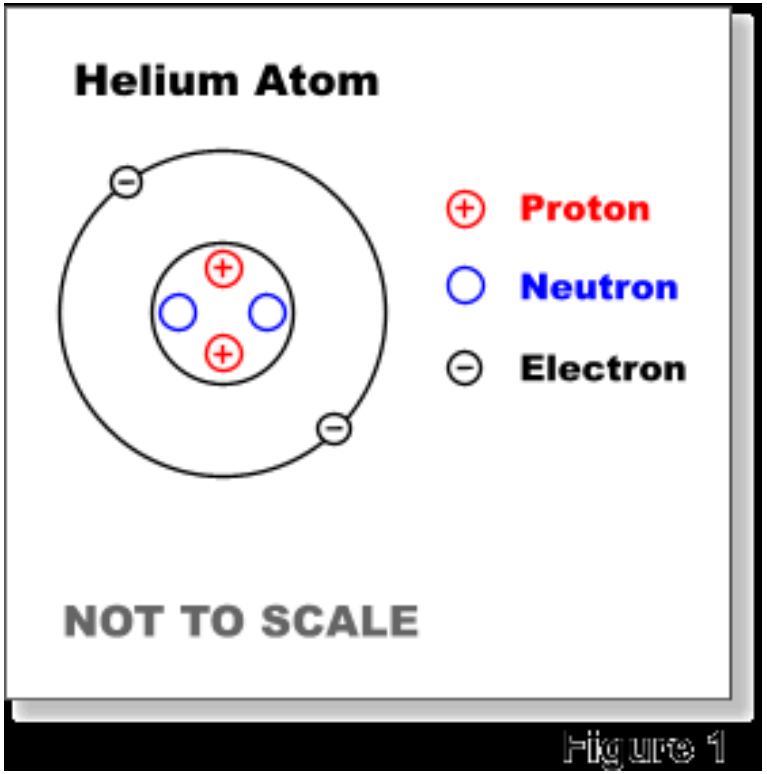
Box 3

Basic Subatomic particles form:

electrons (-)

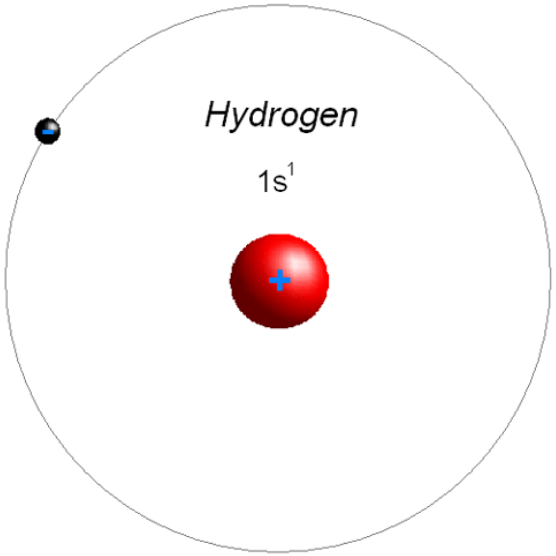
Protons (+)

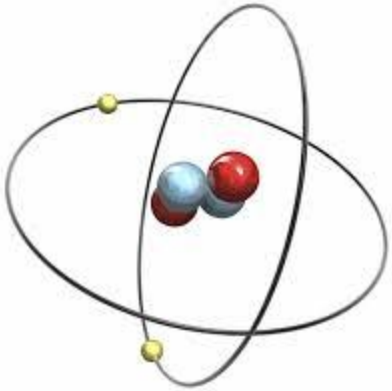
Neutrons



Box 4

First atoms/elements form:
The two smallest atoms-
hydrogen (H) and helium (He)



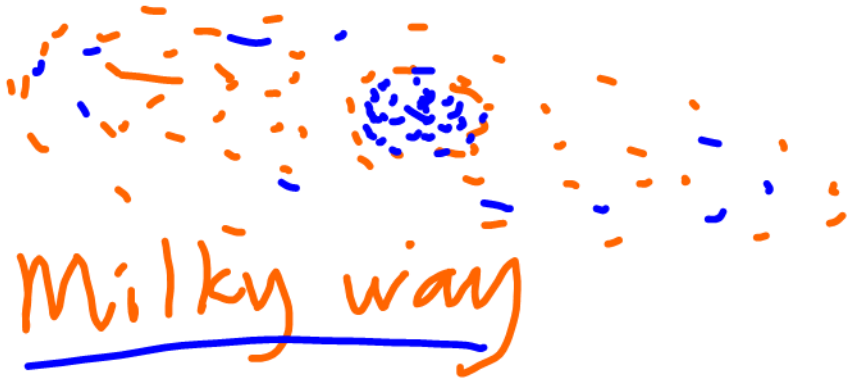


Box 5

Enough atoms were around so…the bunch of atoms could be pulled together (by gravity) to form stars

Box 6

Millions of stars in an area were held together by gravity and formed GALAXIES



Galaxies: Three types

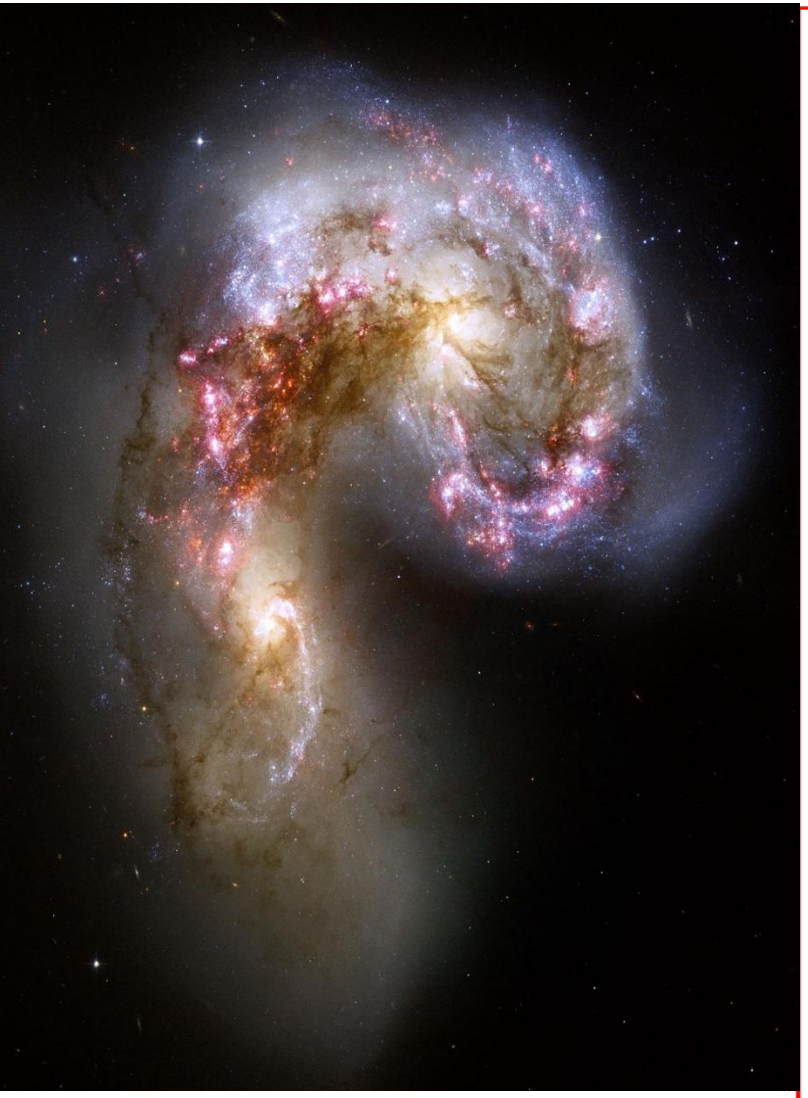
There are basically three types of galaxies:

Elliptical-are basically all bulge with no disk. They can range from spherical to elongated, football-like shapes

Galaxies: Three types

Spiral- are spiral-shaped. Spiral galaxies have three main components: a bulge, disk, and halo

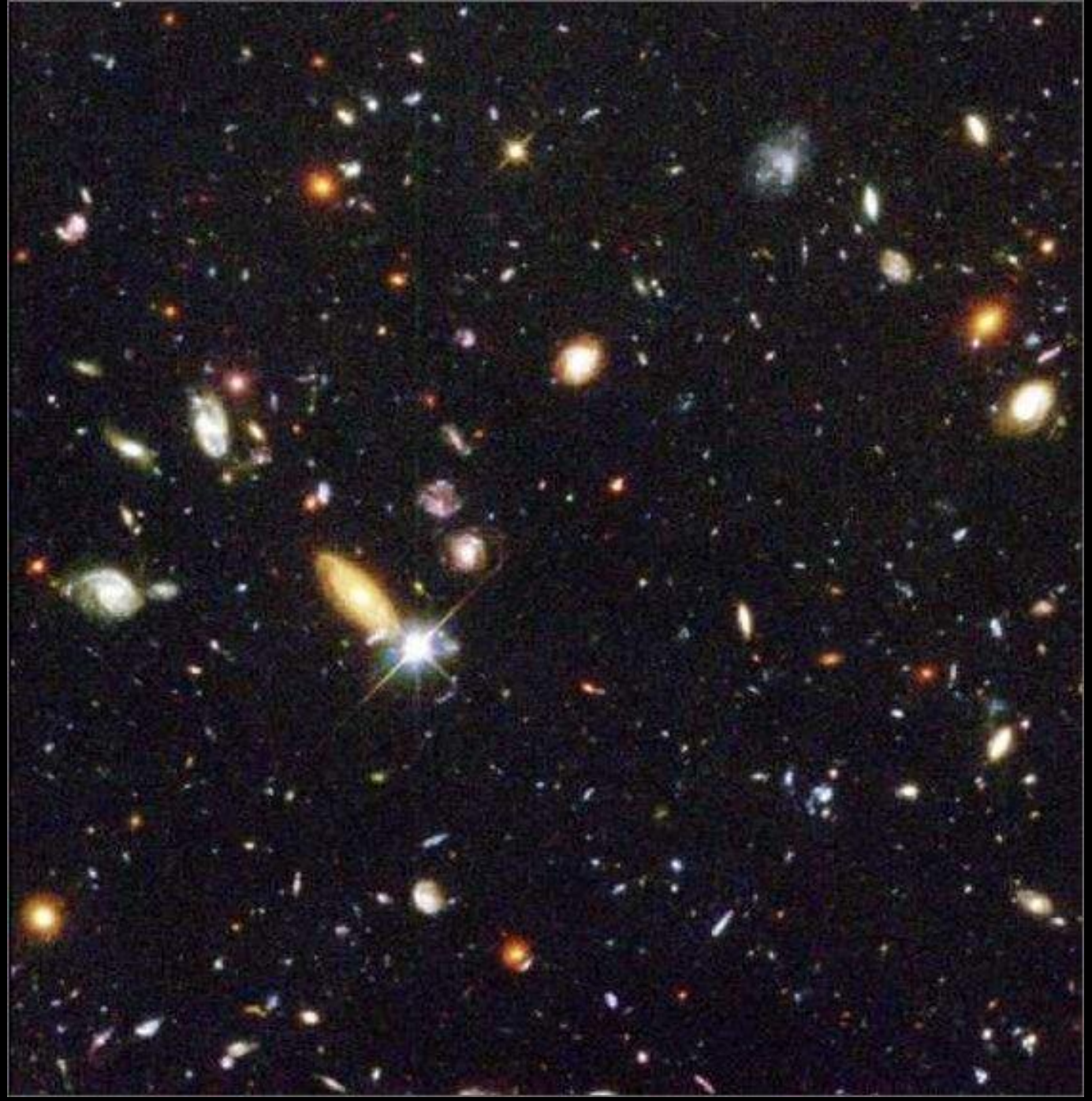
Galaxies: Three types

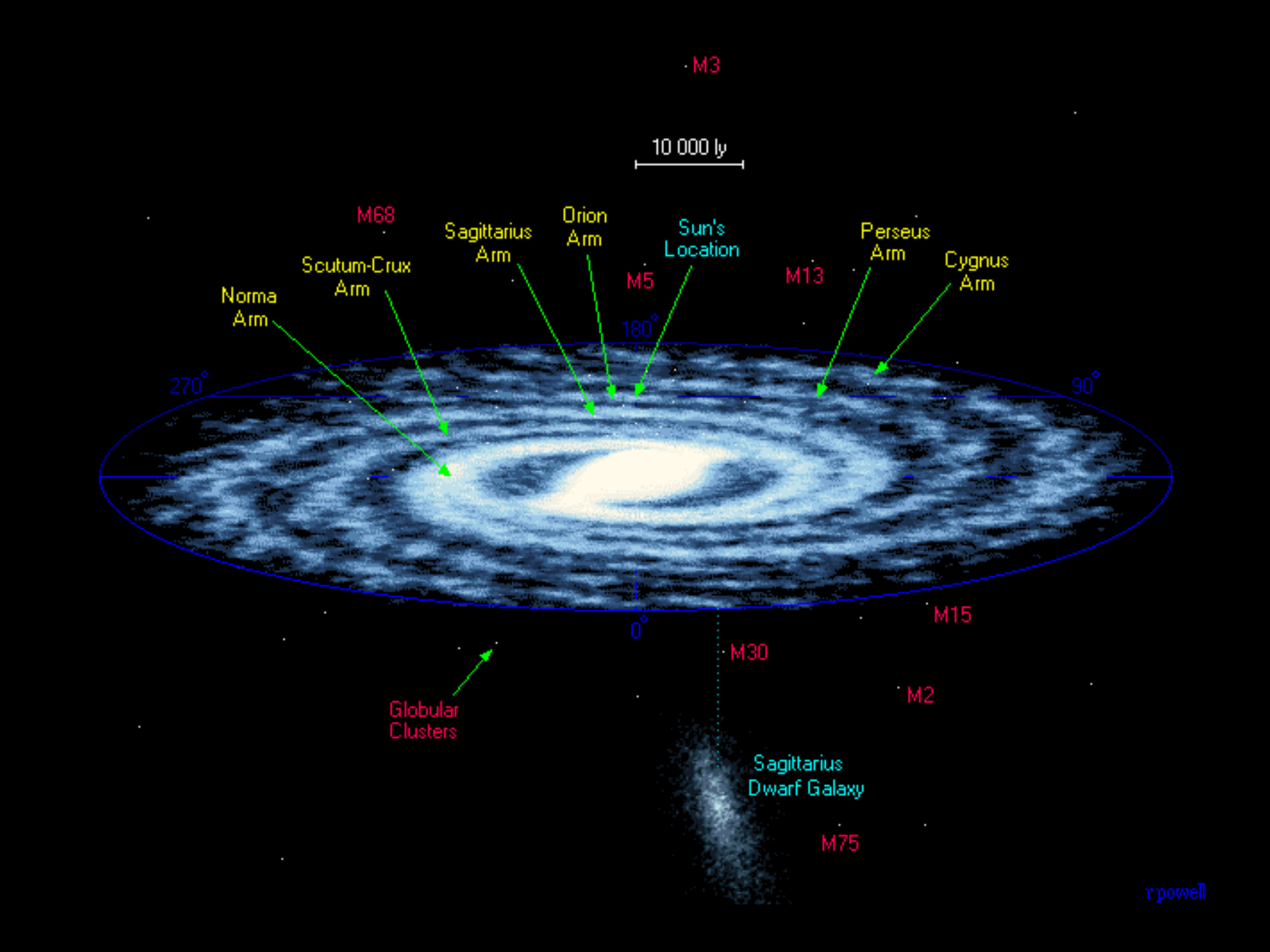


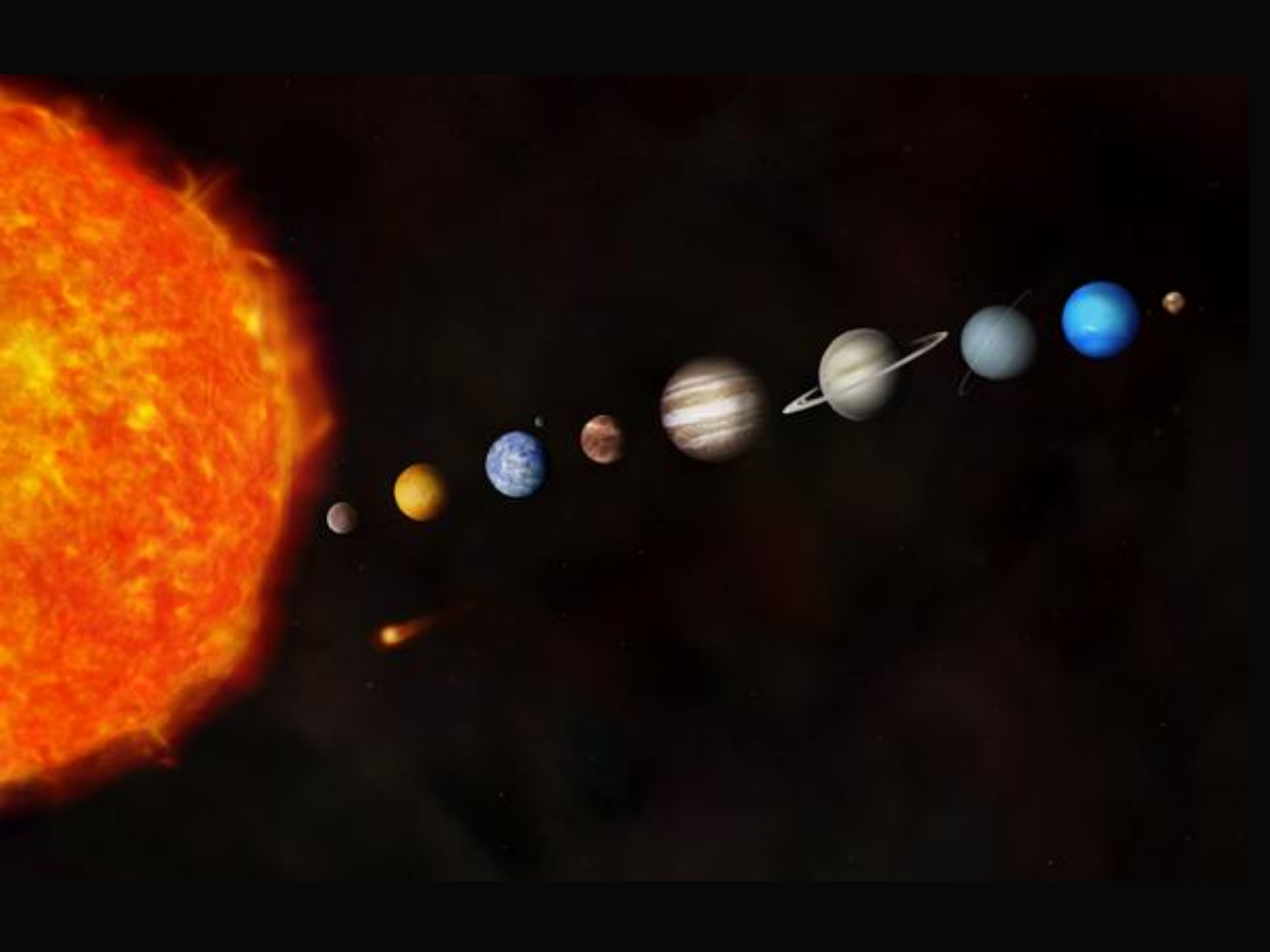
Irregular galaxies have no regular or symmetrical structure.

8th Anchor Questions Week 6 (Oct. 7-11)
Questions Due: Assigned daily
Assessment date: none

1. What is the universe composed of?
2. What evidence exists for the Big Bang? What does "red shift" show about the Universe?
3. List the three types of galaxies according to shape
4. What is the size range of galaxies?
5. What are nebulae made up of?
6. Explain the how our solar system formed




M3
10 000 ly
M68
Sagittarius Arm
Orion Arm
Sun's Location
Perseus Arm
Cygnus Arm
Scutum-Crux Arm
Norma Arm
M5
M13
180°
270°
90°
0°
M15
M30
M2
Globular Clusters
Sagittarius Dwarf Galaxy
M75
r powell

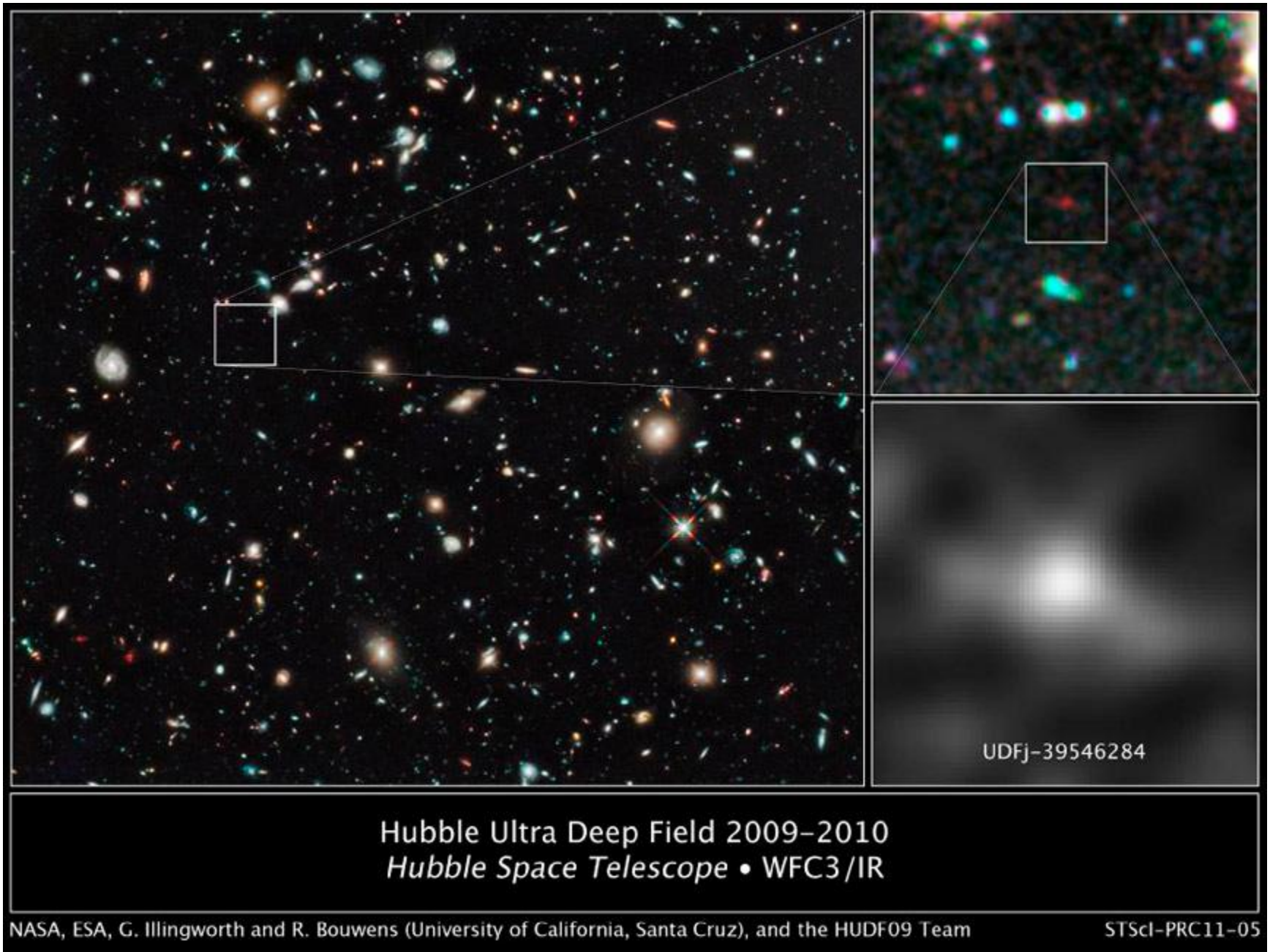


These are not c-notes- but LISTEN

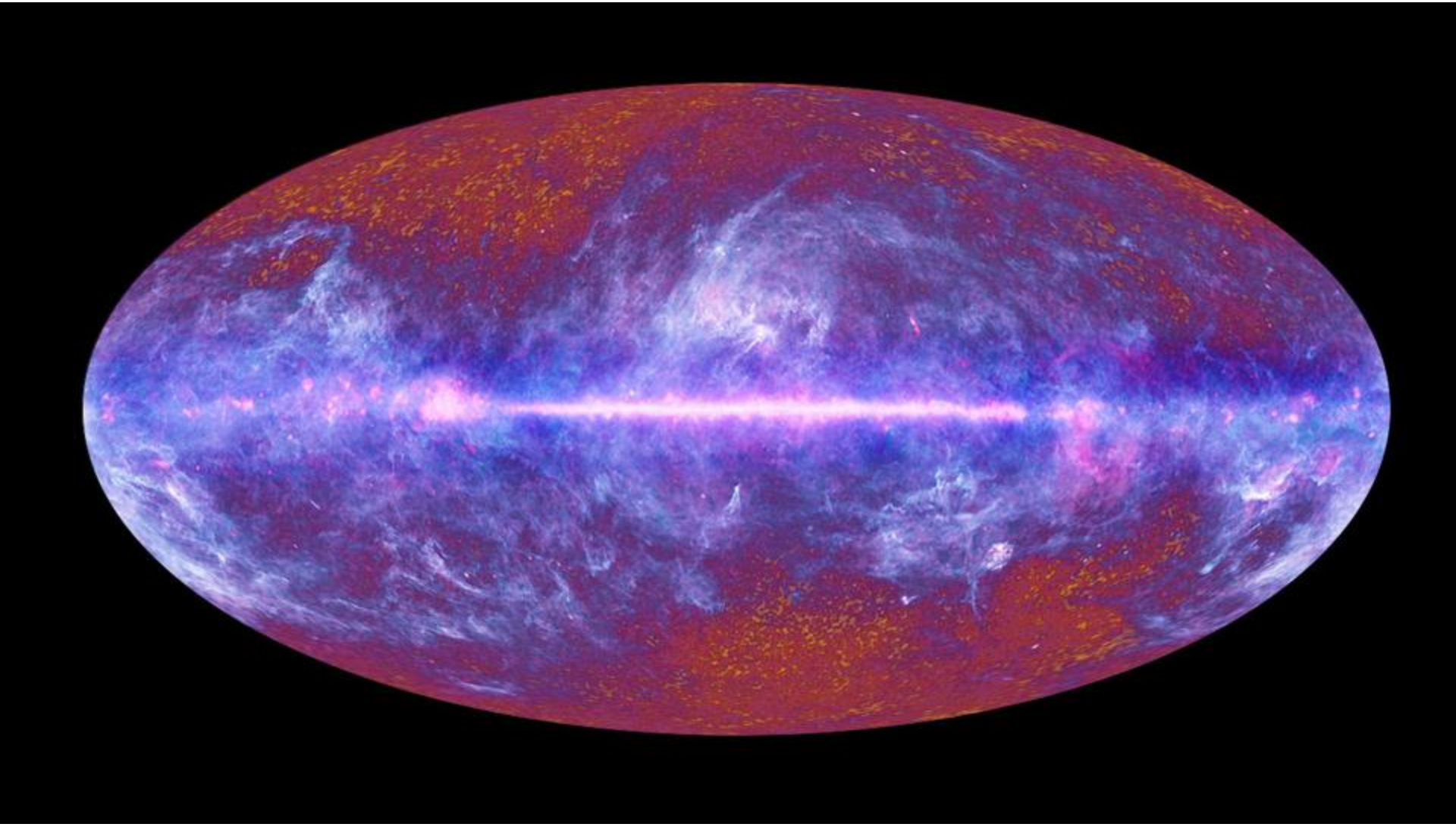
How can astronomers “calculate” the AGE of the universe?

How “far” something is and at what speed that something is travelling…
Example:
A car is travelling from Detroit to Chicago. Right now it is 120 miles away from Detroit and it is travelling at 60 miles per hour….You can say: “Two hours in the past, the car was in Detroit….

This is the “oldest” galaxy….13.2 Billion Light Years away



This is the “oldest” LIGHT notice the brightness in the center…this is about 380,000



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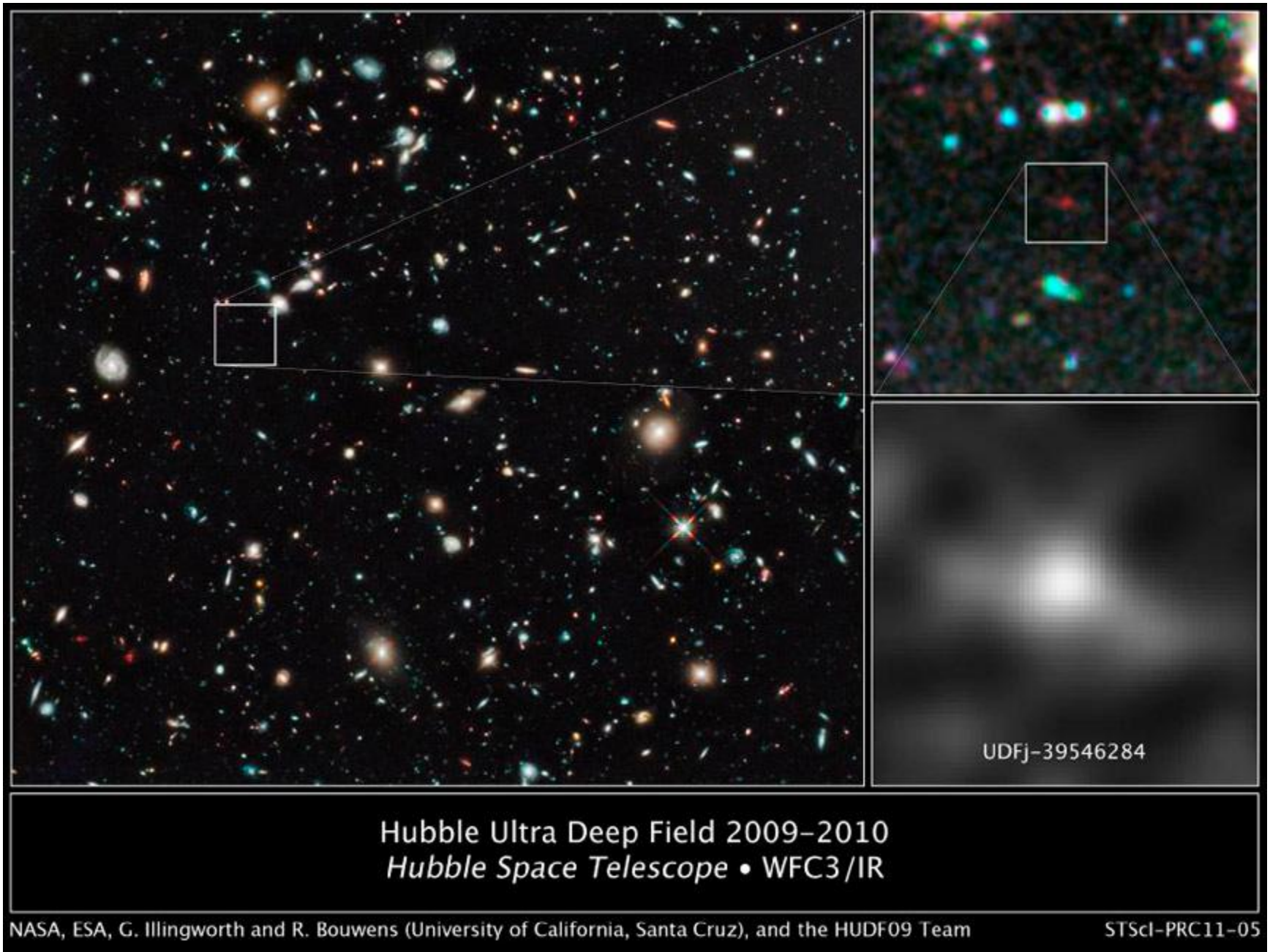
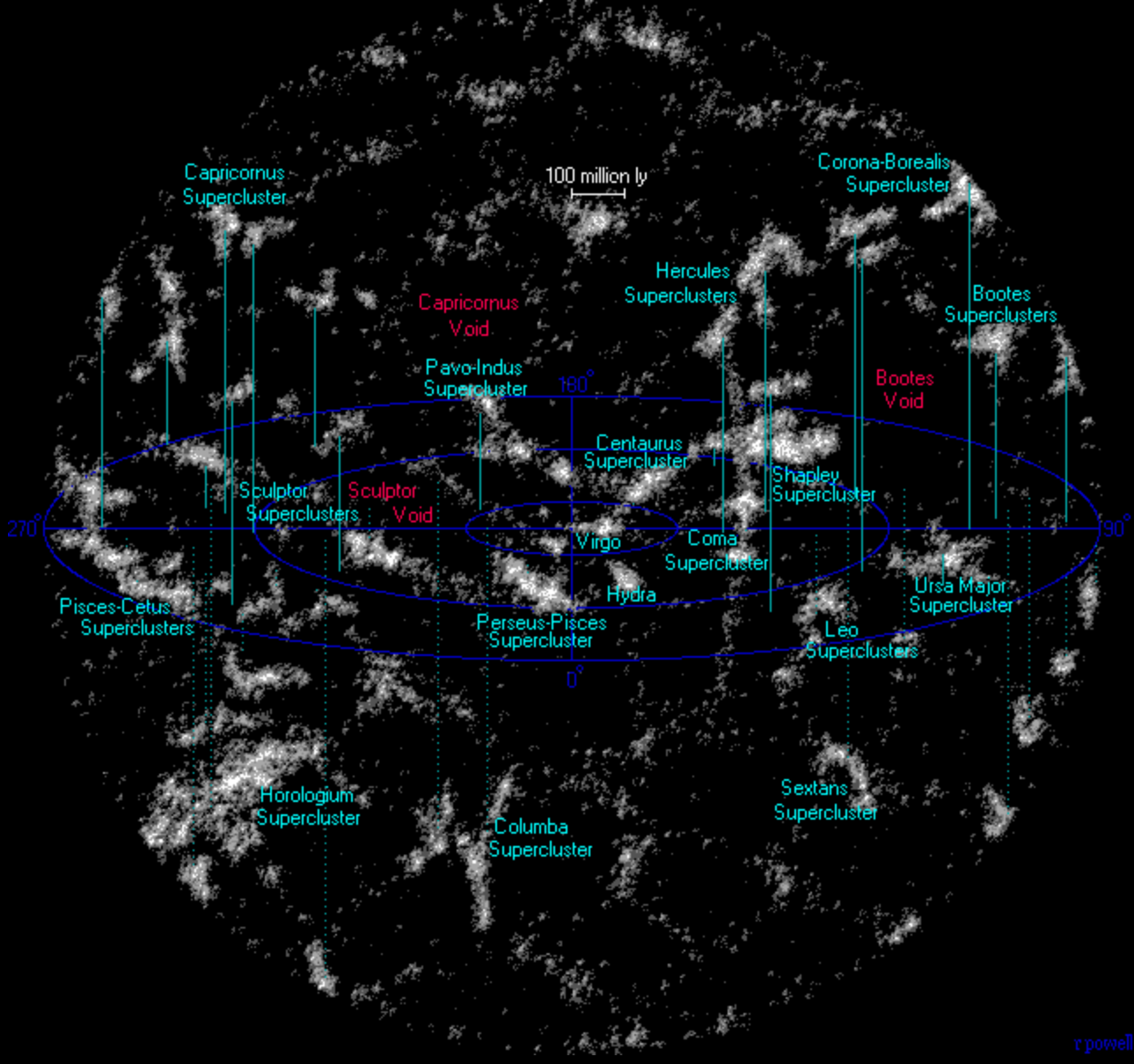
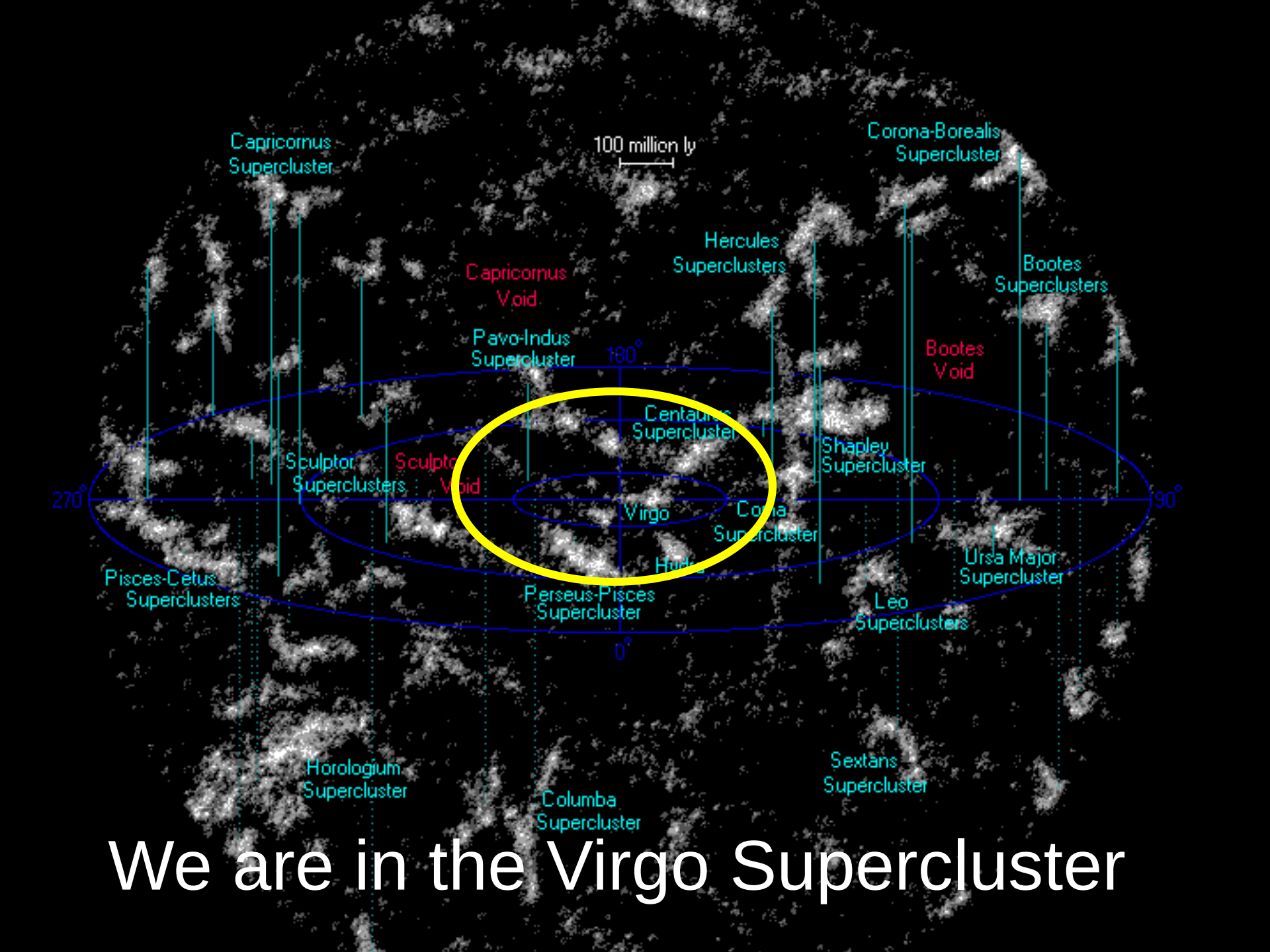


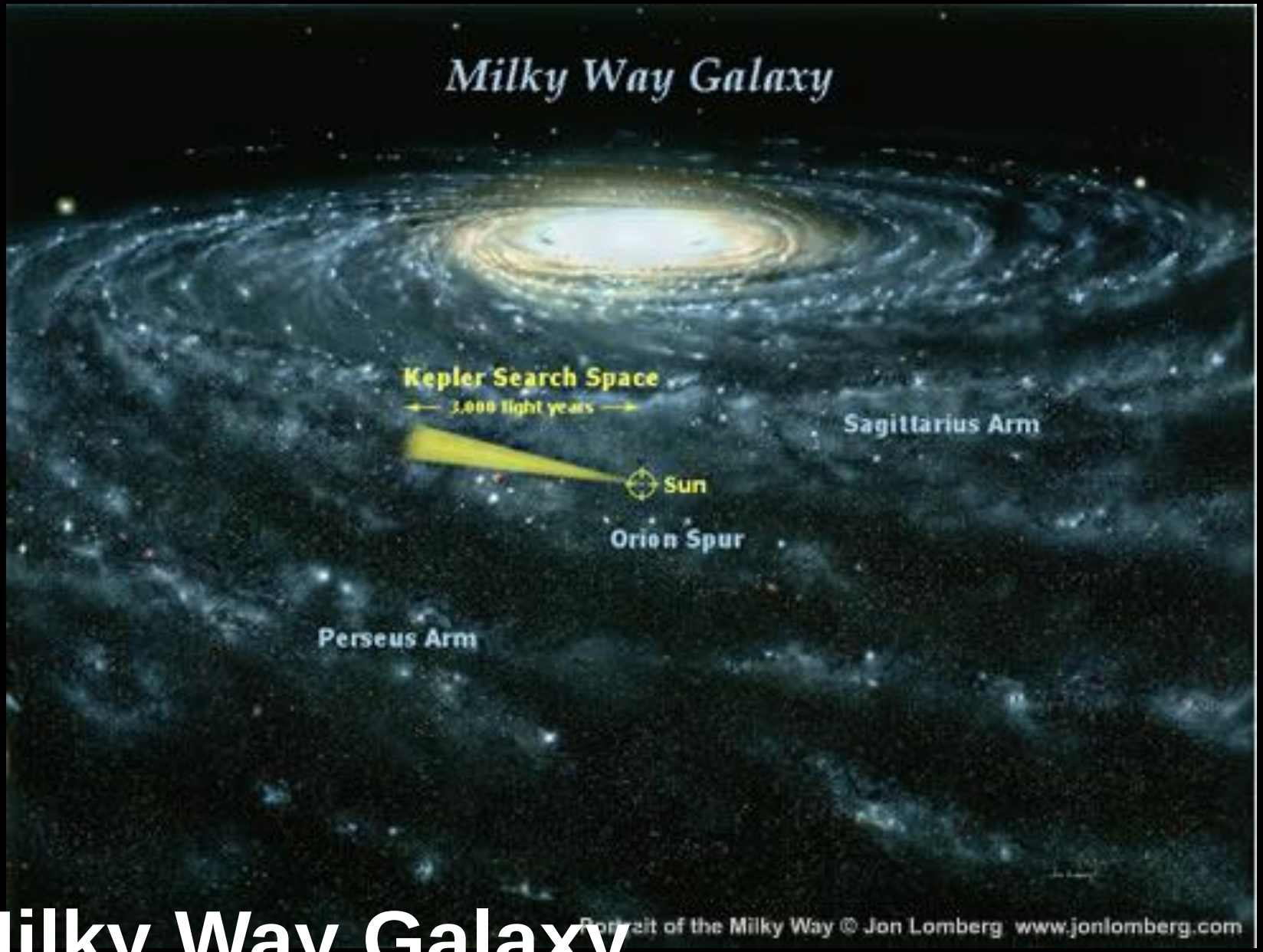
Galaxies



Galaxies- spread out, clustered

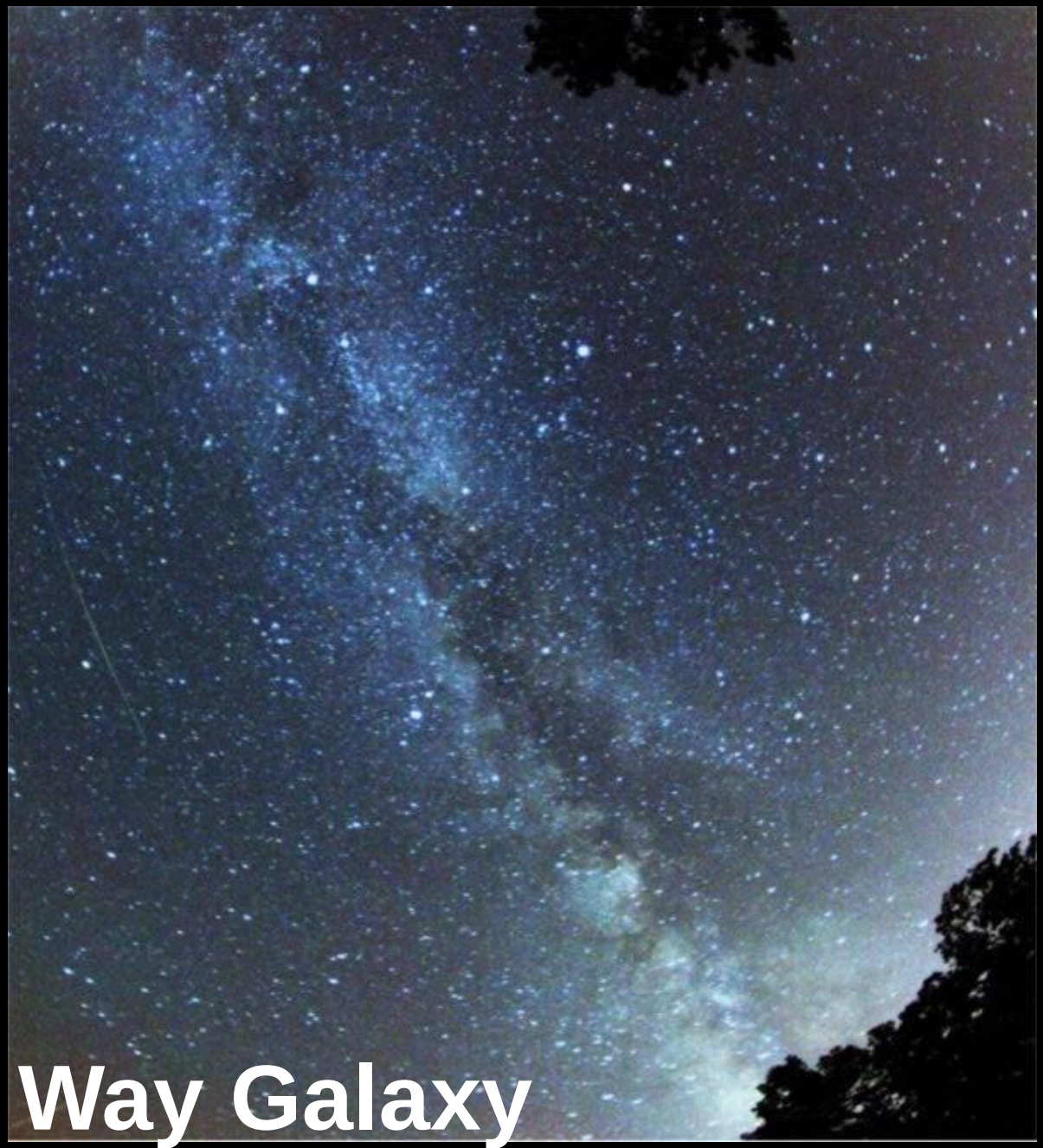


We are in the Virgo Supercluster



Milky Way Galaxy

Milky Way Galaxy



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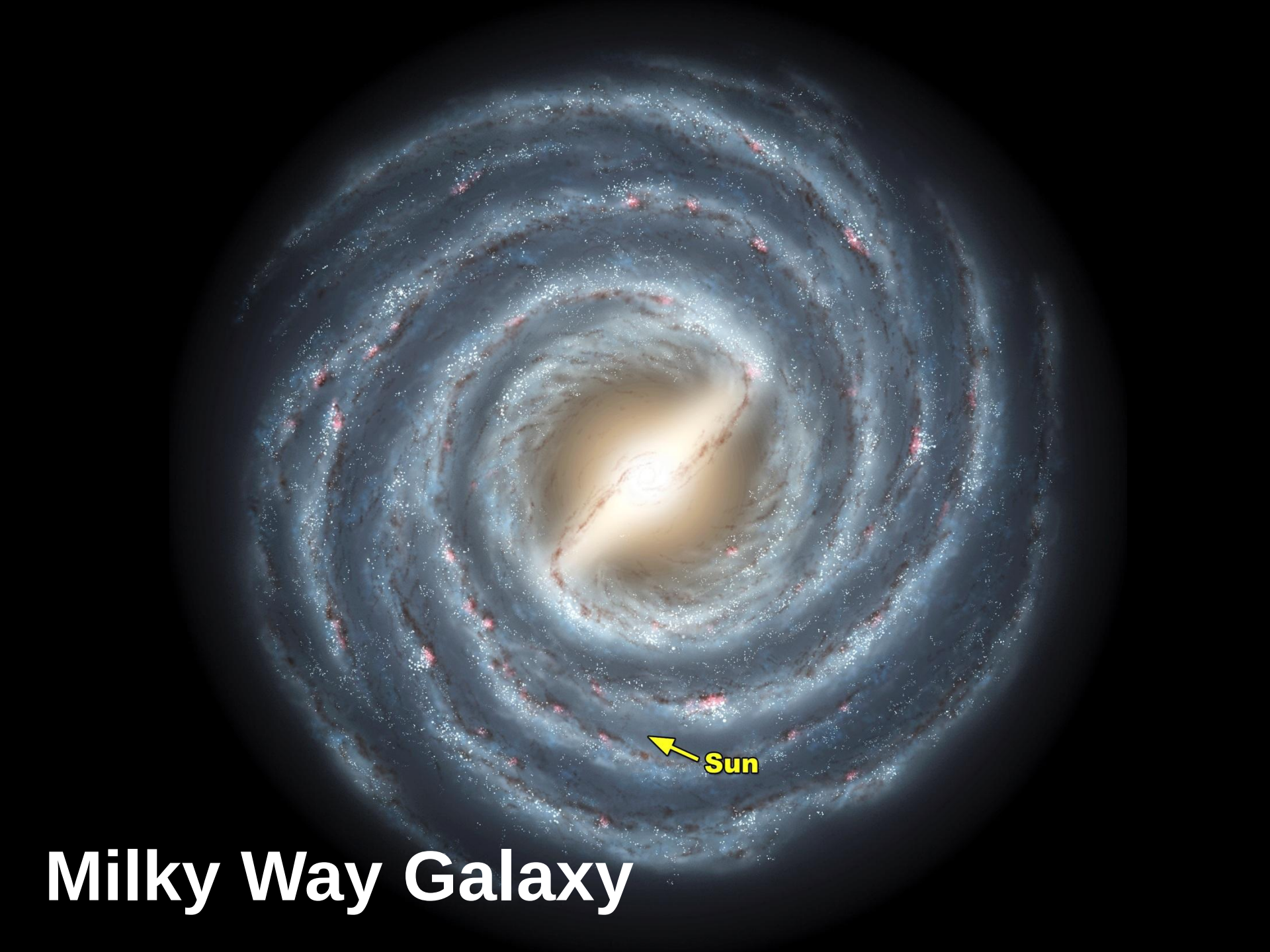
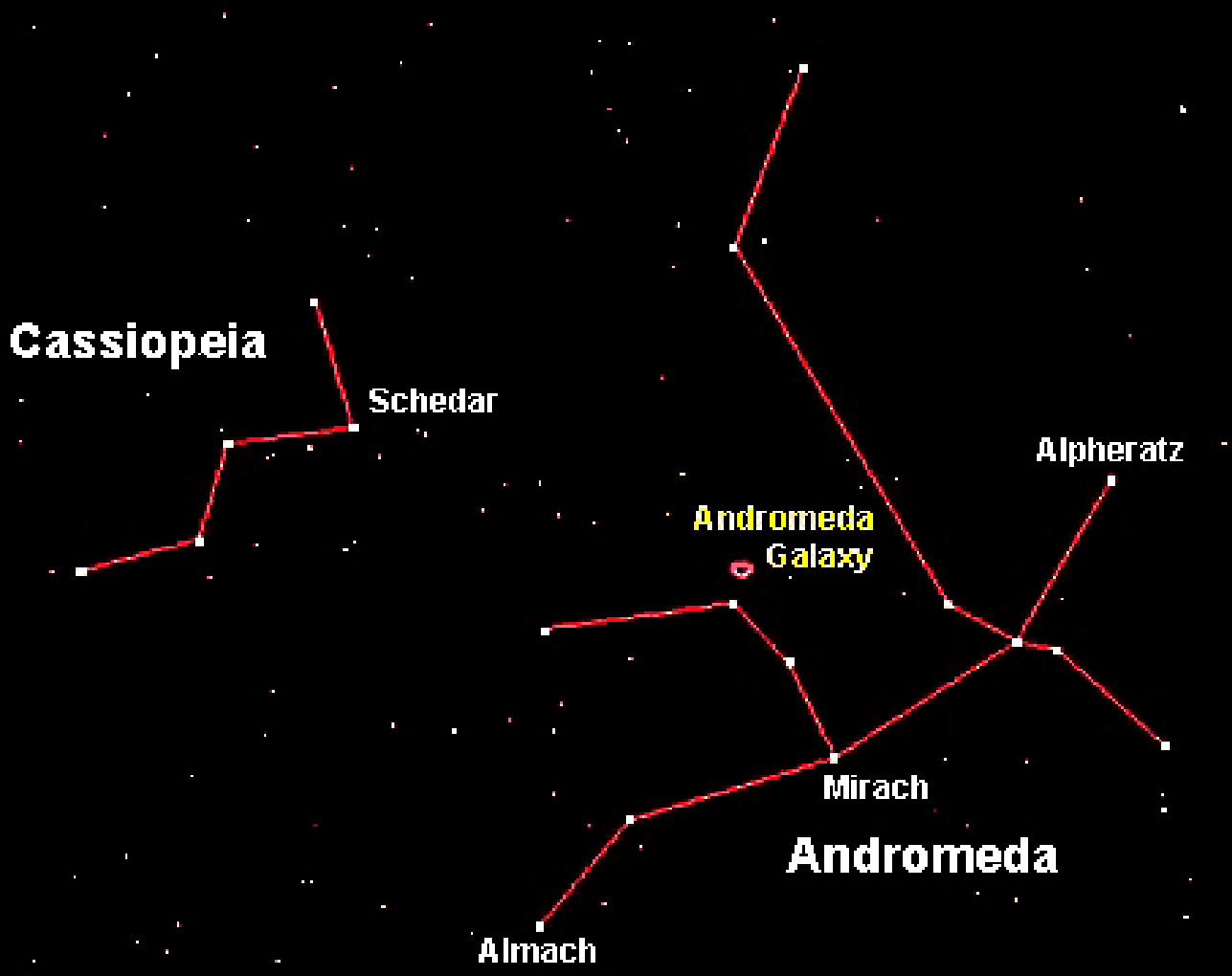


Milky Way Galaxy

Galaxies

Galaxies- **Andromeda-** **2.5 million light years from Earth**



Galaxies- Andromeda-2.5 million light years from Earth

Galaxies- middle one is 400 million light years from Earth

Nebula- left- overs from the death of a star

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The Christian Science Monitor

More than 200,000 people apply for a one-way trip to Mars

Mars One, the foundation planning to put a human settlement on Mars in 2023, has received some 202,586 applications from pioneer hopefuls eager to live out the rest of their lives on the Red Planet.

By Elizabeth Barber, *Contributor* / September 10, 2013

Mars One has received some 202,586 applications from prospective astronauts hoping to colonize the Red Planet, yet untouched by humans.

NASA/JPL-Caltech/MSSS/AP

Enlarge

Nebula- nebula in the constellation Orion

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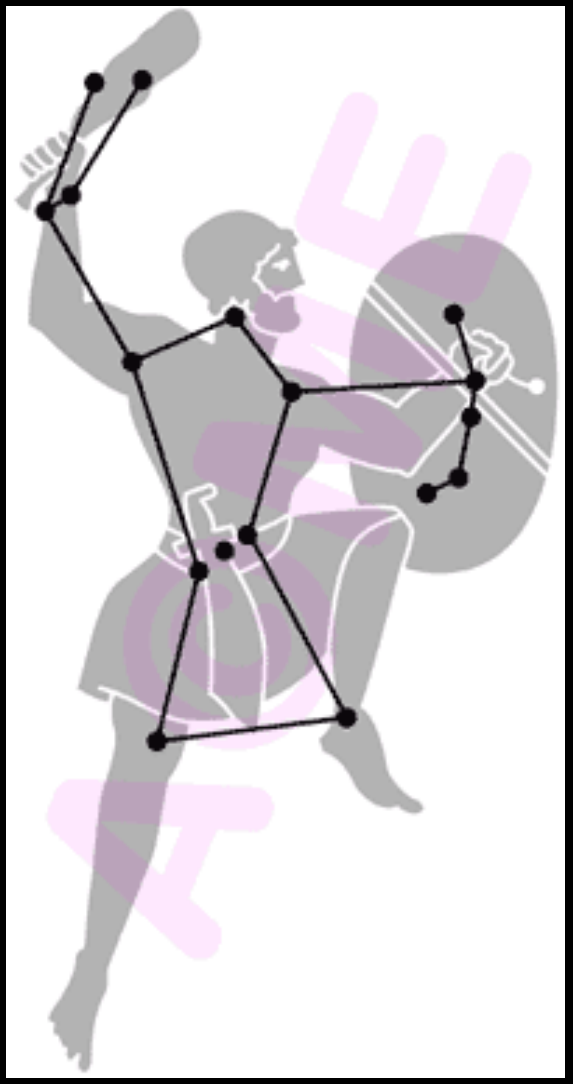

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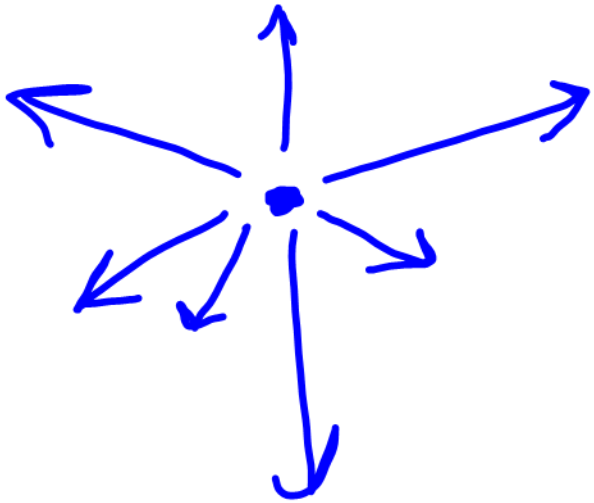

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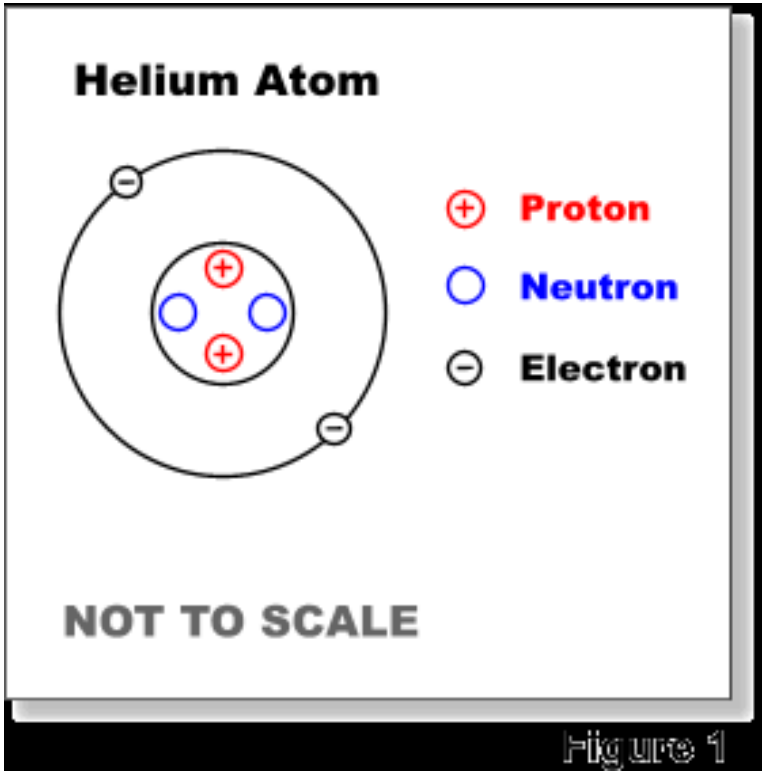

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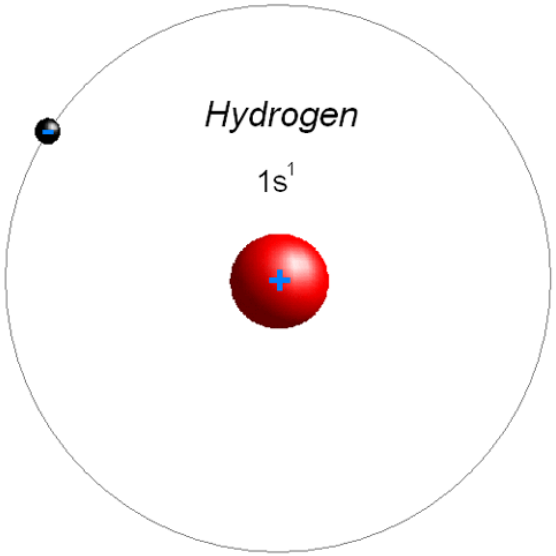

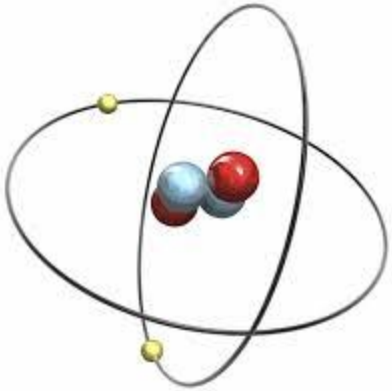

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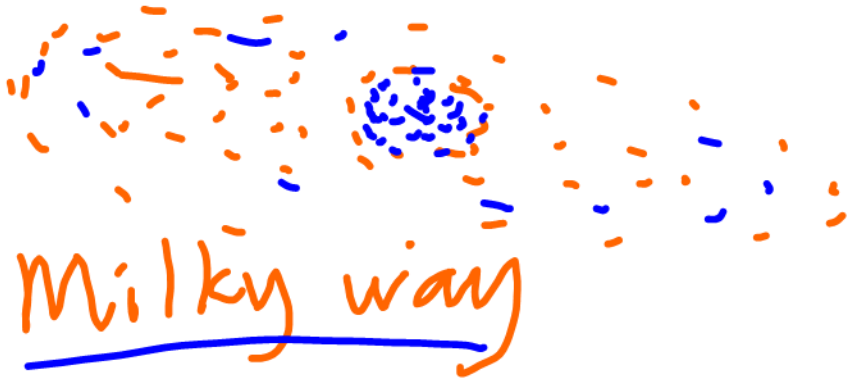

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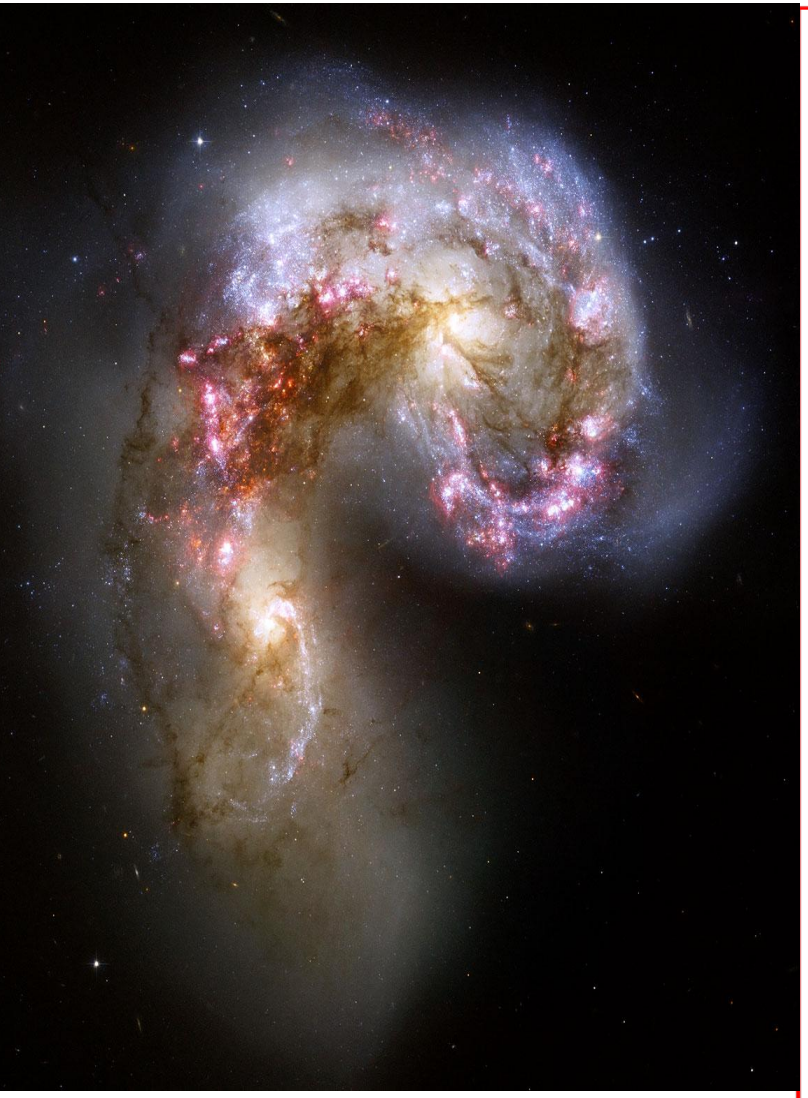


Irregular galaxies have no regular or symmetrical structure.

Huge Star exists

After about 5 billion years, star explodes: supernova

Gases and dust is left over: a nebula

The dust and gases start to gather and attract each other (due to gravity)

Most of the matter ends up near the center, but other clumps of matter are forming

The center has enough mass for a star to form. About 4.6 billion years ago

ESO 350-40 - "Cartwheel"

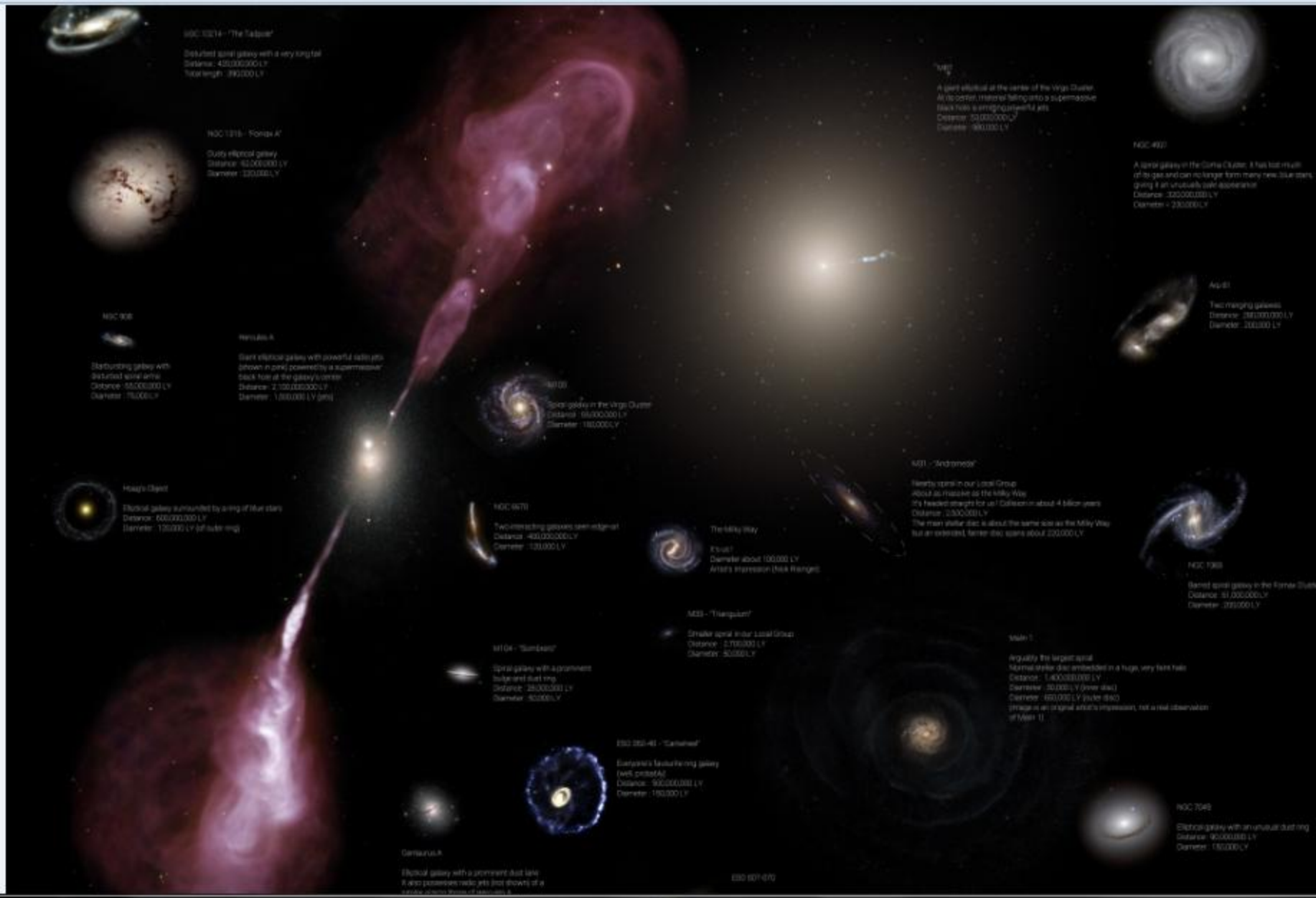
Everyone's favourite ring ga
(well, probably)
Distance : 500,000,000 LY
Diameter : 150,000 LY

Centaurus A

Elliptical galaxy with a prominent dust lane
It also possesses radio jets (not shown) of a
similar size to those of Hercules A
Distance : 13,000,000 LY
Diameter : 97,000 LY

GChart1.jpg - Windows Photo Viewer

File Print E-mail Burn Open



NGC 6670

Two interacting galaxies seen edge-on
Distance : 400,000,000 LY
Diameter : 120,000 LY

The Milky Way

It's us !
Diameter about 100,000 LY
Artist's impression (Nick Risinger)

M33 - "Triangulum"

Smaller spiral in our Local Group
Distance : 2,700,000 LY
Diameter : 50,000 LY

M104 - "Sombrero"

Spiral galaxy with a prominent
bulge and dust ring
Distance : 28,000,000 LY
Diameter : 50,000 LY

C-notes

Galaxies

- **Galaxies formed about 500 million years after the Big Bang**
- **Galaxies are made up of billions or trillions of stars, dust, gases and dark matter that are held together by gravity**

C-notes

Galaxies

- **Galaxy facts:**
- **Three shapes of galaxies- elliptical, spiral, irregular**
- **Diameters: range from 100,000 light-years (ly) across to 1,500,000 ly across**

C-notes

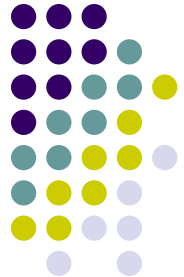
Galaxies

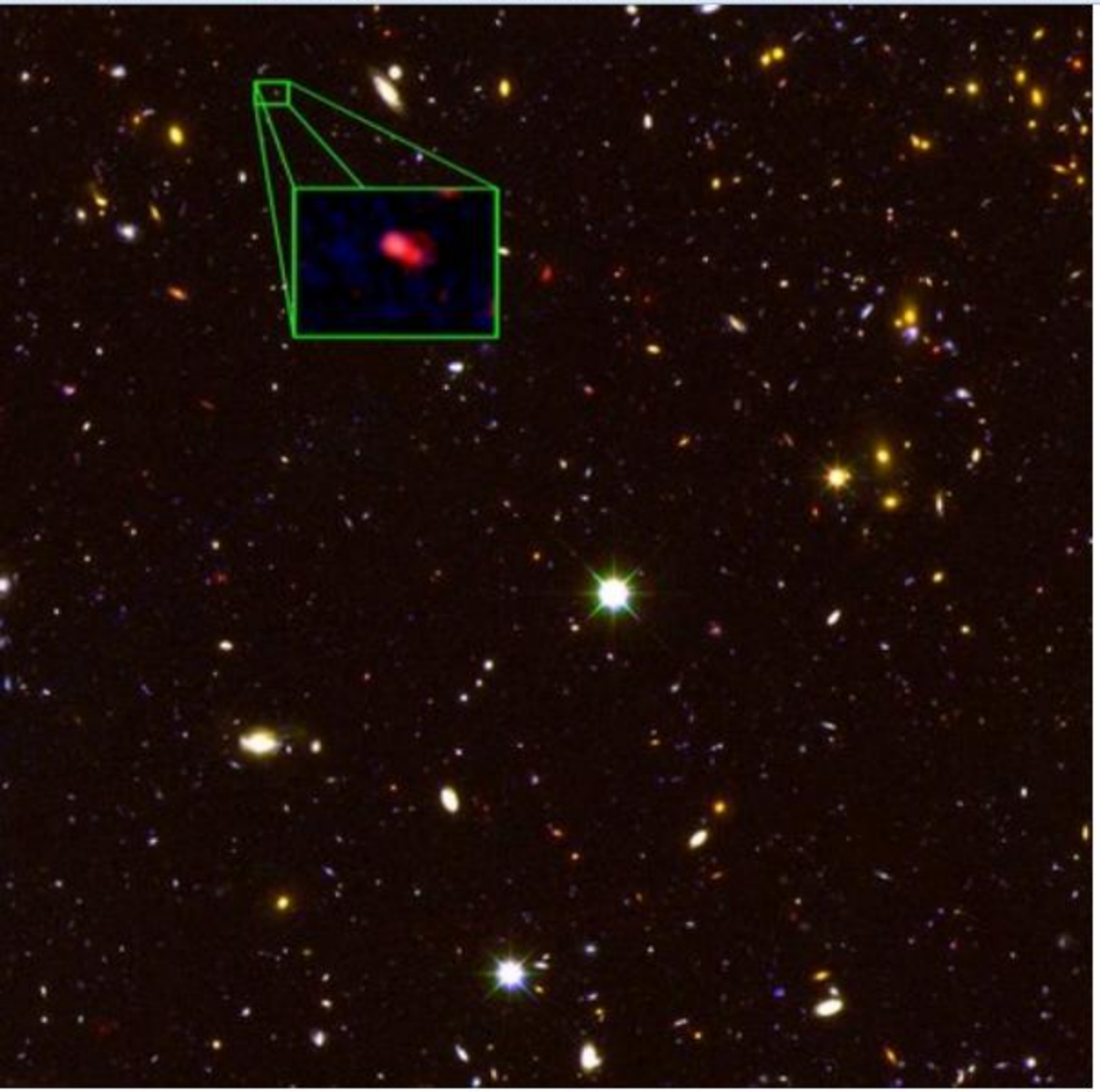
- **Milky Way- 100,000 ly across**
- **Largest Elliptical galaxy: Hercules A-1,500,000 ly across. (Distance away- 2,100,000,000 ly)**
- **Largest Spiral galaxy: NGC 6872- 520,000 ly across. (Distance away- 220,000,000 ly)**

C-notes

Nebula

- **The remains of an exploded star. The explosion is called a supernova.**
- **The left-over materials are mostly gases, dust and other materials**





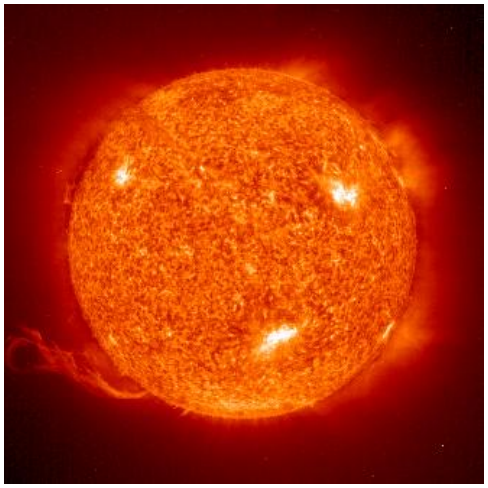
_GND_5296 is churning out stars at a remarkable rate, say astronomers

Coffee v smo
Pakistan 'enc

Supers
future

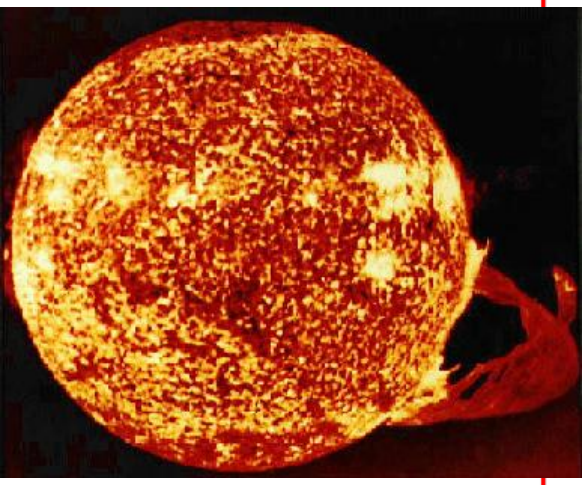
Will we see the
more...

Star: What is it?



- STAR: means that it is made of a gas and produces LIGHT on its own
- It is made of mostly Hydrogen.
- That hydrogen is in the form of “plasma” (one of the states of matter)

Star: Energy



- A star produces its own light by something called “nuclear fusion”
- In nuclear fusion hydrogen atoms are smashed together to make helium atoms- this produces energy…
- Stars have a “lifecycle”- they are born, change over life and “die” (or end as stars)

LIST 8–13. LIFE CYCLES OF TWO TYPES OF STARS

Scientists theorize that stars develop and disappear through a process consisting of stages. Despite the fact that stars are not living organisms, scientists use terms such as *life cycle*, *birth*, and *death*. These terms are descriptive analogies, not scientific biological description.

Stages of an Average-mass Star

1. Nebula
2. Contraction of gases
3. Birth of star
4. Yellow star
5. Red giant
6. White dwarf

Stages of a High-mass Star

1. Nebula
2. Contraction of gases
3. Birth of star
4. Blue giant
5. Red giant
6. Nova or supernova
7. Neutron star or pulsar

Note: Depending on mass or other conditions, a high-mass star may evolve to a supergiant. Most stars eventually contract to white dwarfs. However, some explode as supernovas producing neutron stars called pulsars.

LIST 8–12. CLASSIFICATION OF STARS BY COLOR AND TEMPERATURE

Most stars are classified into one of seven groups according to their color spectrum, which is caused by the temperatures in the star's atmosphere. Type "O" stars are the hottest and type "M" stars are the coolest.

Classification of Stars

CLASS	*APPROX. TEMP. IN °C*	*APPROX. TEMP. IN °F*	*COLOR*	*EXAMPLE*
O	35,000–40,000	63,000–90,000	Blue	Alnilam, Iota Orionis
B	11,000–35,000	20,000–63,000	Blue	Rigel, Spica
A	7,500–11,000	13,500–20,000	White	Sirius, Vega, Castor
F	6,000–7,500	11,000–13,500	Yellowish white	Procyon, Canopis
G	5,100–6,000	9,200–11,000	Yellow	Sun, Capella
K	3,600–5,100	6,500–9,200	Orange	Arcturus, Albebanan
M	2,000–3,600	3,000–6,500	Red	Betelgeuse, Antares, Benard's star

Mnemonic for the seven star groups: "O, Be A Fine Girl Kiss Me."

LIST 8–13. LIFE CYCLES OF TWO TYPES OF STARS

Star Color Temperature and Life-cycle

Tape/Glue the handout on the next available page.

Answer the following questions on that page:

1. **Write three facts that you notice about the color and temperatures of stars.**
2. **List three differences that you see between the lifecycle of average mass and high-mass stars**