

Solar Systems - 7

Do Now: What is the “Big Bang”?

Order of the Universe

Singularity → Inflation → Inflation slows down/cooling → stars/galaxies start to form → our solar system forms

*See notes on website for more detail

How do we know?

The Universe is EXPANDING!

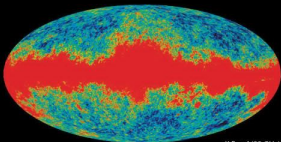
-We can observe other galaxies moving further from us and further apart, which means that the whole universe is getting bigger, and has been since the beginning.

How do we know?

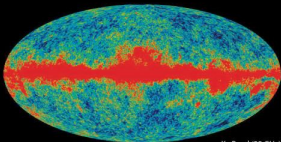
ENERGY!

There was so much energy released during the Big Bang that we can still measure it today. It's called Cosmic Microwave Background Radiation.

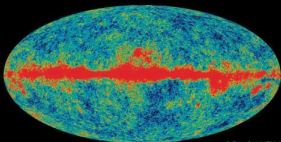
WILKINSON MICROWAVE ANISOTROPY PROBE (WMAP)



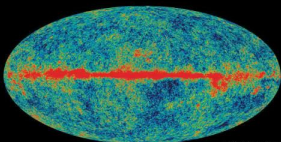
K Band (23 GHz)



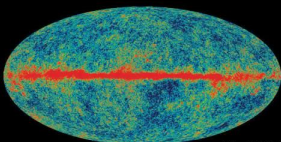
Ka Band (33 GHz)



Q Band (41 GHz)

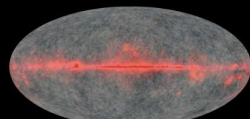
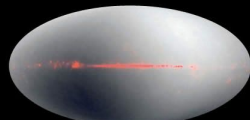
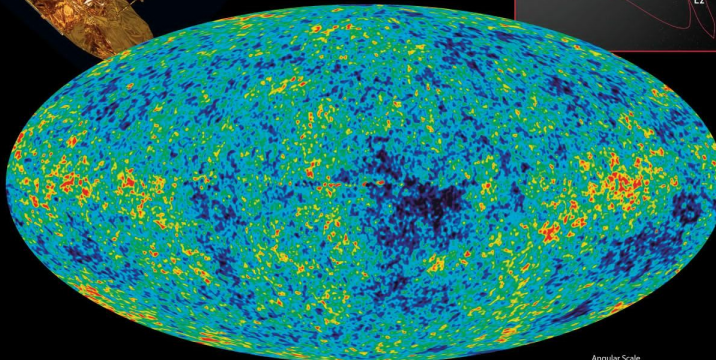
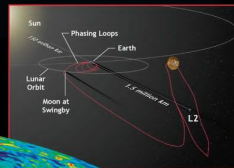
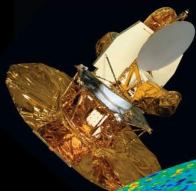


V Band (61 GHz)

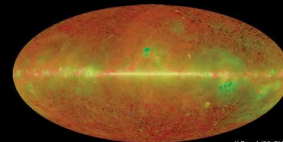
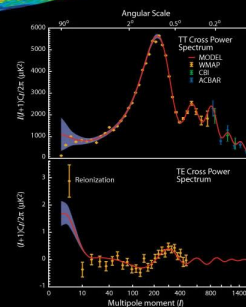


W Band (94 GHz)

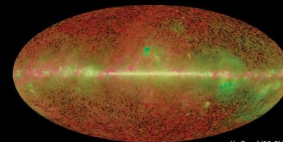
WMAP Full-sky Maps



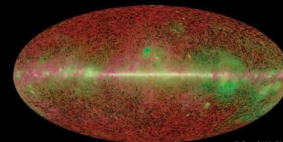
WMAP Foregrounds vs. Cosmic Microwave Background
Red-Q band Green-V band Blue-W band



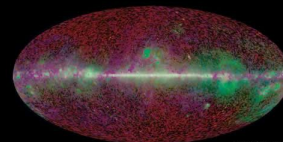
K Band (23 GHz)



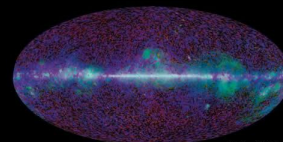
Ka Band (33 GHz)



Q Band (41 GHz)



V Band (61 GHz)



W Band (94 GHz)

WMAP Foregrounds
Red-Synchrotron Green-Free-Free Blue-Thermal Dust



How do we know?

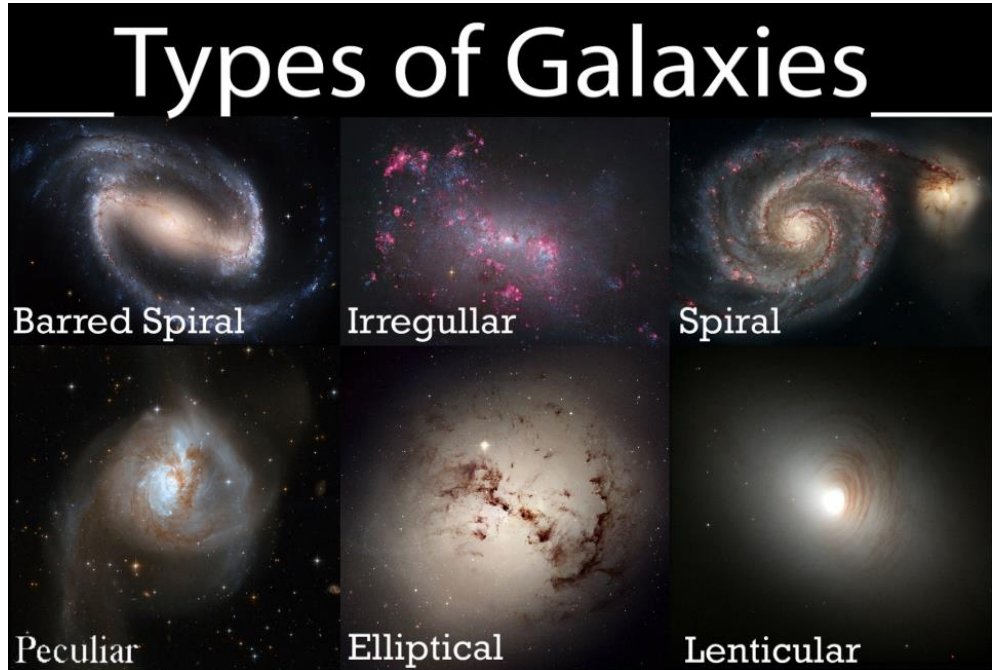
ELEMENTS & ATOMS

What atoms are made of and how they're put together took A LOT of energy to create.

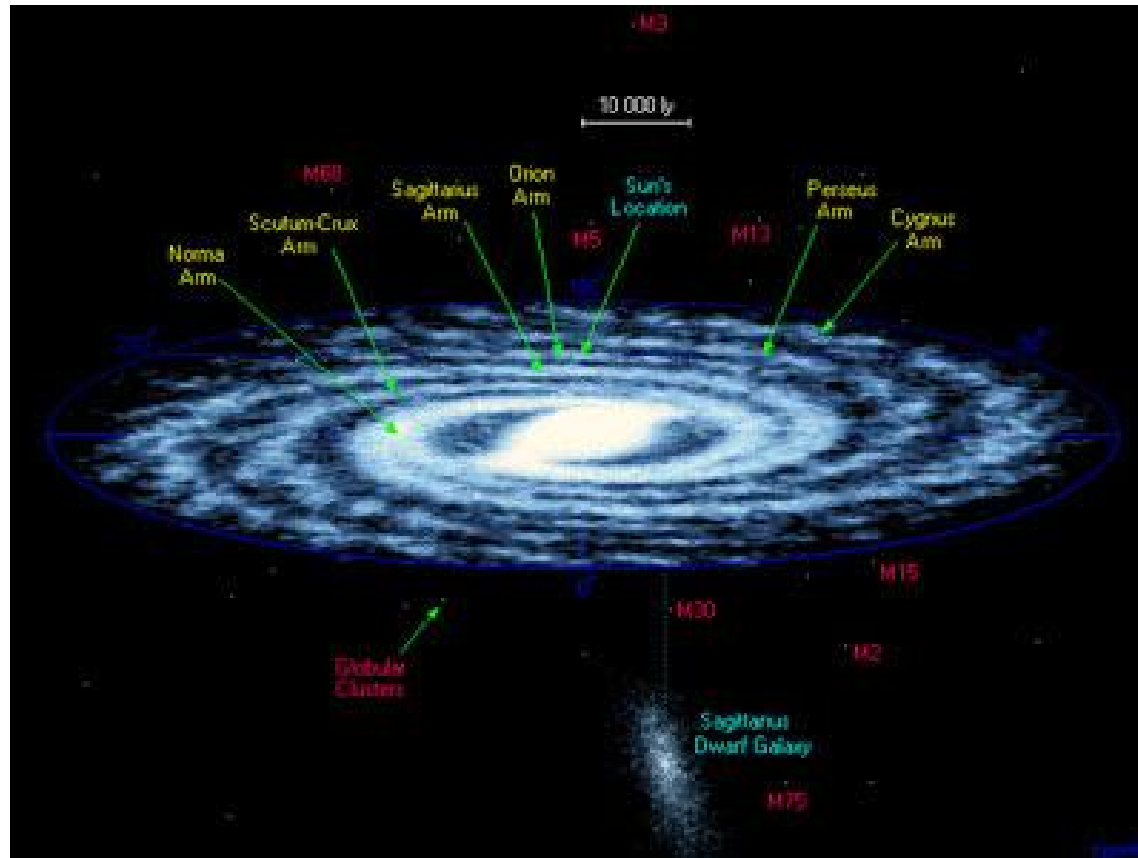
Closer to home...

Galaxy: An enormous collection of gas, dust, and billions of stars that is held together by gravity.

-The universe is made up of approximately 100,000,000,000 galaxies.



The Milky Way Galaxy



Even Closer to Home...

Solar System: A collection of planets and their moons that orbit (revolve) around a central star, along with smaller bodies (asteroids, meteors, comets.)

How did our solar system form?

Solar System Formation Order

HOT GAS & DUST → CENTER COLLAPSES/DISK FORMS AROUND IT →
DUST IN DISK STARTS STICKING TOGETHER → CLUMPS OF DUST
BECOME LARGE CLUMPS OF ROCK (PLANETS) AND FALL INTO REGULAR
ORBITS AROUND THE CENTRAL SUN

*See Notes on Website for more detail

Do Now

Where did our Solar System come from?

You are Responsible for:

Names properties of planets

Including additional objects in diagram of Solar System

Descriptions of motion

Distances between planets

By the end of class tomorrow (Friday!)

Review So Far

Universe Formation:

Solar System Formation:

Objects in the Universe:

Do Now!

Why do the objects in the Solar System move in such a predictable way?



Planetary/Object Motion

Inertia: the resistance of any physical object to any change in its state of motion, including changes to its speed and direction. It is the tendency of objects to keep moving in a straight line at constant velocity.

-Inertia makes still objects want to stay still, and moving objects want to keep moving

Gravitational Force: The force of attraction between two objects. Objects with less mass feel the force more, so they're pulled towards objects with more mass.

Solar System Movement & Gravity

-Since the Big Bang, objects in the Universe have been in motion, and want to keep moving because of _____.

-Since our Solar System was formed, planets have been in motion around the sun.

-Inertia keeps the planets in motion, but the sun's gravity makes them move in a circle instead of a straight line = regular orbits!

-The planets don't fall into the sun, because they have enough mass to resist the sun's gravity, but not enough mass to fly away. (you don't have enough mass for that, you would fall into the sun)