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## Origin of the Universe

 

# INTRODUCTION

## STRUCTURE OF THE UNIVERSE

HOW OLD IS THE UNIVERSE?

-The universe, on the other hand, appears to be about 13.8 billion years old. Scientists arrived at that number by measuring the ages of the oldest stars and the rate at which the universe expands. They also measured the expansion by observing the Doppler shift in light from galaxies, almost all of which are traveling away from us and from each other. The farther the galaxies are, the faster they’re traveling away. One might expect gravity to slow the galaxies’ motion from one another, but instead they’re speeding up and scientists don’t know why. In the distant future, the galaxies will be so far away that their light will not be visible from Earth.

WHAT IS THE UNIVERSE MADE OF?

-The universe contains all the energy and matter there is. Much of the observable matter in the universe takes the form of individual atoms of hydrogen, which is the simplest atomic element, made of only a proton and an electron (if the atom also contains a neutron, it is instead called deuterium). Two or more atoms sharing electrons is a molecule. Many trillions of atoms together is a dust particle. Smoosh a few tons of carbon, silica, oxygen, ice, and some metals together, and you have an asteroid. Or collect 333,000 Earth masses of hydrogen and helium together, and you have a Sun-like star. For the sake of practicality, humans categorize clumps of matter based on their attributes. Galaxies, star clusters, planets, dwarf planets, rogue planets, moons, rings, ringlets, comets, meteorites, raccoons.

-They’re all collections of matter exhibiting characteristics different from one another but obeying the same natural laws.

## WONDERS OF THE COSMOS

BLACK HOLES

-A black hole is a region of space packed with so much matter that its own gravity prevents anything from escaping — even a ray of light. Although we can’t see a black hole, the material around it is visible. Material falling into a black hole forms a disk, similar to a whirlpool in a bathtub drain. Matter swirling around a black hole heats up and emits radiation that can be detected. Around a stellar black hole, this matter is composed of gas. Around a supermassive black hole in the center of a galaxy, the swirling disk is made not only of gas, but also of stars.

QUASARS

-The most powerful objects in the universe.

-Quasar is a massive and extremely remote celestial object that emits large amounts of energy. A quasar typically has a star-like image in a telescope. But, contrary to showing stellar phenomenon, they are strong sources of radio waves. they were named Quasi-Stellar (star-like) Radio Sources, later abbreviated as QUASARS. They shine very brightly, and sometimes they are bright enough to eclipse the ancient galaxies that contain them. These powerful dynamos have fascinated astronomers since their discovery.

COMETS

-Are frozen leftovers from the formation of the solar system composed of dust, rock, and ices. They range from a few miles to tens of miles wide, but as they orbit closer to the Sun, they heat up and spew gases and dust into a glowing head that can be larger than a planet. This material forms a tail that stretches millions of miles.