



HUBBLE

Space Telescope

DEEP FIELD

Galaxies

Galaxies are massive systems made of billions of stars, dust, and gas clouds that are held together by gravity.

Shape

- Astronomers use shape to classify galaxies.
- There are three commonly recognized shapes: spiral, elliptical, and irregular.

Spiral galaxies have two or more “arms” winding out from a central disk. When viewed from the side, spiral galaxies look like fried eggs.

Elliptical galaxies appear smooth and featureless, with round or oval shapes, and look basically the same when viewed from any angle.

Irregular galaxies do not have arms or a uniform appearance. Their stars and gas clouds are scattered in random patches.

- The most difficult part about identifying galaxies by their shape is recognizing them when their orientation is unknown.

Color

- Galaxies come in a variety of colors.
- As a galaxy ages, its color changes.
- Galaxies with young stars would appear blue; galaxies with old stars would appear red.
- Galaxies with stars of varying ages may appear to be a combination of colors. For example, a galaxy with some old and young stars may appear to be a combination of blue and red.
- The presence of dust in a galaxy can make it appear more red than it actually is.
- By studying the light from a galaxy, astronomers can also get information about its chemical composition, its distance from Earth, and the speed at which it is traveling away from us.

Size/Distance

- Determining the distance from Earth for objects in space is a difficult task for astronomers.
- The size of a galaxy is not useful because objects that are nearer to Earth can appear small next to other objects that are extremely large and far away.
- Astronomers study the light from galaxies to determine their distance, which is measured in light-years.
- A light-year is equal to the distance light can travel in a year, approximately 6 trillion miles.

Hubble Deep Field–Full Image

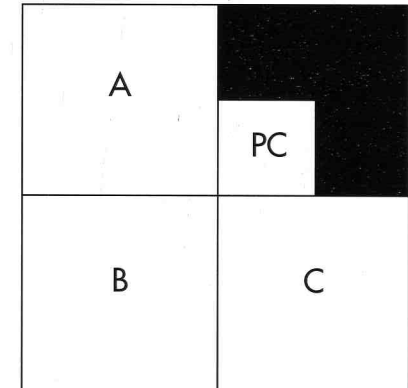
The Hubble Space Telescope reached back 10 billion years to capture the image shown on the front. The Hubble Deep Field shows the dimmest, most distant objects in the universe. The image, the longest Hubble exposure yet taken, was made by pointing the telescope at one point in the sky continuously for 10 days.



The Hubble Deep Field shows hundreds of galaxies in an area of the sky that is as small as the size of President Roosevelt’s eye on a dime held at arm’s length. The field lies in a dark patch of sky just above the Big Dipper. This field is so narrow that just a few foreground stars in our Milky Way Galaxy are visible.

Why Is the WFPC2 Field Chevron-Shaped?

The Wide Field Planetary Camera 2 (WFPC2) is actually four cameras in one; each camera looks at adjacent pieces of the sky. The resulting four separate pictures are combined together, like tiles, to create a mosaic. Three of the cameras (labeled A, B, C) are “wide field” but only in a relative sense. They look at a piece of sky only one-tenth the diameter of the full moon. A fourth camera, called the “planetary camera” (labeled PC) has an even narrower view, and looks at an area of sky only one-fourth the area of the wide field cameras but at twice the resolution. The image from the smaller camera, when combined with the three wide field images, create the unique “stair step” appearance of full field WFPC2 pictures.



Electronic Access

You can get the complete lesson plan and additional information about the Hubble Deep Field, along with other images and information about the Hubble Space Telescope, by using the Internet.

Using the World Wide Web (Mosaic, NetScape, Lynx, and other browsers), use URL <http://www.stsci.edu/pubinfo/amazing-space.html>, and follow the links from there.

For other sources of information, follow the links to the Hubble Deep Field Lesson Plan Grab Bag (resources are linked through “Outside STScI”).