



Distant Galaxies and the Hubble Deep Field

The Hubble Deep Field is our deepest and most detailed look (as of 1996) at the horizon of the visible universe. This dark patch of sky was selected by astronomers to be as empty as possible of foreground stars and known clusters of galaxies. This image was constructed from 342 separate Wide-Field and/Or Multi-Element Camera-2 (WFPC2) exposures taken in ultraviolet, blue, red, and infrared light during ten consecutive days of observing in December 1995 by the Hubble Space Telescope (HST). The Hubble Deep Field is located near the handle of the Big Dipper, and its size in the sky would appear to the naked eye about equal to the size of a grain of sand held at arm's length.

The Hubble Deep Field shows over 3000 galaxies at various distances and stages of evolution. There are only four obvious stars visible in the image (they appear as point-like objects with diffraction spikes, can you find them?). The small number of stars is a consequence both of the tiny field of view and of the fact that we are looking up out of the plane of the Milky Way Galaxy. Many different types of galaxies are visible, including spirals like our own, almost featureless ellipticals, and many disturbed-looking "oddballs." Some of these oddball galaxies may be in the midst of titanic collisions with other galaxies, while others are still in the star-forming exuberance of youth.

Astronomers are using the largest telescopes in the world to determine which of the galaxies in the image are relatively nearby and faint, and which are truly at the edge of the visible universe. The light from these farthest galaxies took many billions of years to cross the vast expanse of the universe, and so we are seeing them as they appeared very shortly after they and the universe were born. The Hubble Deep Field therefore promises to become the Rosetta Stone of cosmology, allowing astronomers to answer fundamental questions about the age, size, and composition of the universe. Whatever the answers, the Hubble Deep Field will rank among the greatest scientific treasures of the twentieth century.

Image Credits: Robert Williams (Space Telescope Science Institute), the Hubble Deep Field Team, and NASA.