= 1089 (z =
0 corresponds to present time) , and it shows the state of the Universe about 13 @.@ 8 billion years ago , and 379 @,@ 000 years after the initial moments of the Big Bang .

The luminous point @-@ like cores of quasars were the first " high @-@ redshift " (z > 0 @.@ 1) objects discovered before the improvement of telescopes allowed for the discovery of other high @-@ redshift galaxies .

For galaxies more distant than the Local Group and the nearby Virgo Cluster , but within a thousand megaparsecs or so , the redshift is approximately proportional to the galaxy 's distance . This correlation was first observed by Edwin Hubble and has come to be known as Hubble 's law . Vesto Slipher was the first to discover galactic redshifts , in about the year 1912 , while Hubble correlated Slipher 's measurements with distances he measured by other means to formulate his Law . In the widely accepted cosmological model based on general relativity , redshift is mainly a result of the expansion of space : this means that the farther away a galaxy is from us , the more the space has expanded in the time since the light left that galaxy , so the more the light has been stretched , the more redshifted the light is , and so the faster it appears to be moving away from us . Hubble 's law follows in part from the Copernican principle . Because it is usually not known how luminous objects are , measuring the redshift is easier than more direct distance measurements , so redshift is sometimes in practice converted to a crude distance measurement using Hubble 's law .

Gravitational interactions of galaxies with each other and clusters cause a significant scatter in the normal plot of the Hubble diagram . The peculiar velocities associated with galaxies superimpose a rough trace of the mass of virialized objects in the Universe . This effect leads to such phenomena as nearby galaxies (such as the Andromeda Galaxy) exhibiting blueshifts as we fall towards a common barycenter , and redshift maps of clusters showing a Fingers of God effect due to the scatter of peculiar velocities in a roughly spherical distribution . This added component gives cosmologists a chance to measure the masses of objects independent of the mass to light ratio (the ratio of a galaxy 's mass in solar masses to its brightness in solar luminosities) , an important tool for measuring dark matter .

The Hubble law 's linear relationship between distance and redshift assumes that the rate of expansion of the Universe is constant . However , when the Universe was much younger , the expansion rate , and thus the Hubble " constant " , was larger than it is today . For more distant galaxies , then , whose light has been travelling to us for much longer times , the approximation of constant expansion rate fails , and the Hubble law becomes a non @-@ linear integral relationship and dependent on the history of the expansion rate since the emission of the light from the galaxy in question . Observations of the redshift @-@ distance relationship can be used , then , to determine the expansion history of the Universe and thus the matter and energy content .

While it was long believed that the expansion rate has been continuously decreasing since the Big Bang , recent observations of the redshift @-@ distance relationship using Type Ia supernovae have suggested that in comparatively recent times the expansion rate of the Universe has begun to accelerate .

= = = Highest redshifts = = =