



COSMIC EXPANSION
To clarify the spatial relationship between Earth and the rest of the universe, 407,702 objects with known distances and discovery dates are displayed as a ring flattened to the Earth's equator.

The Data-Centric Universe

How information makes the world a bigger place
ILLUSTRATION BY TULP INTERACTIVE

Before the telescope was invented in 1608, our picture of the universe consisted of six planets, our moon, the sun and any stars we could see in the Milky Way galaxy. But as our light-gathering capabilities have grown, so too have the boundaries of the visible universe. In the late 1700s, William Herschel, an English astronomer using a telescope with an 18.7-inch aperture, made the first systematic surveys of the skies, revealing more than 2,000 distant galaxies, nebulae and other objects invisible to the naked eye. Since then, increasingly powerful optical and radio telescopes have greatly expanded our store of knowledge. In 1948, astronomers erected the 200-inch Hale Telescope at Palomar Observatory in California, and now, large-scale projects such as the Sloan Digital Sky Survey and NASA's Kepler mission use sensitive digital imaging and computational power to collect and analyze hundreds of terabytes of data on millions of galaxies billions of light-years from Earth. With each additional bit of data, the universe itself grows larger.—MARA GRUNBAUM

→ **2500 B.C.** The first known calendar system is established in Mesopotamia, creating a 360-day year.

→ **1770 B.C.** Hammurabi writes down 282 laws prescribing civil behavior in the kingdom of Babylon.

Sources: J. Richard Gott III et al., "A Map of the Universe," *The Astrophysical Journal*, 624:463 (2005); Michael Vogeley and James Zhang, Drexel University; NASA Jet Propulsion Laboratory; The Extrasolar Planets Encyclopedia, *exoplanet.eu*; Sloan Digital Sky Survey; International Astronomical Union Minor Planet Center; Strasbourg Astronomical Data Center; Wolfram Mathematica AstronomicalData; SEDS.org; Catalogue of Comet Discoveries, *comethunter.de*

BY THE NUMBERS