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# What is Astronomy? Definition & History

By Nola Taylor Redd, Space.com Contributor | September 7, 2017 09:20pm ET

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Humans have long gazed toward the heavens, searching to put meaning and order to the universe around them. Although the movement of constellations — patterns imprinted on the night sky — were the easiest to track, other celestial events such as eclipses and the motion of planets were also charted and predicted.

**Definition of astronomy:** Astronomy is the study of the sun, moon, stars, planets, comets, gas, galaxies, gas, dust and other non-Earthly bodies and phenomena. In curriculum for K-4 students, NASA defines astronomy as simple "the study of stars, planets and space." Astronomy and astrology were historically associated, but [astrology is not a science](#) and is no longer recognized as having anything to do with astronomy. Below we discuss the history of astronomy and related fields of study, including [cosmology](#).



NGC 7026, a planetary nebula, lies just beyond the tip of the tail of the constellation of Cygnus (The Swan).

Credit: ESA/Hubble & NASA

Historically, astronomy has focused on observations of heavenly bodies. It is a close cousin to astrophysics. Succinctly put, astrophysics involves the study of the physics of astronomy and concentrates on the behavior, properties and motion of objects out there. However, modern astronomy includes many elements of the motions and characteristics of these bodies, and the two terms are often used interchangeably today.

Modern astronomers tend to fall into two fields: the theoretical and the observational.

- **Observational astronomers** focus on direct study of stars, planets, galaxies, and so forth.
- **Theoretical astronomers** model and analyze how systems may have evolved.

Unlike most other fields of science, astronomers are unable to observe a system entirely from birth to death; the lifetime of worlds, stars, and galaxies span millions to billions of years. Instead, astronomers must rely on snapshots of bodies in various stages of evolution to determine how they formed, evolved and died. Thus, theoretical and observational astronomy tend to blend together, as theoretical scientists use the information actually collected to create simulations, while the observations serve to confirm the models — or to indicate the need for tweaking them.

Astronomy is broken down into a number of subfields, allowing scientists to specialize in particular objects and phenomena.

**Planetary astronomers** (also called **planetary scientists**) focus on the growth, evolution, and death of planets. While most study the worlds [inside the solar system](#), some use the growing body of evidence about planets around other stars to hypothesize what they might be like. According to the [University College London](#), planetary science "is a cross-discipline field including aspects of astronomy, atmospheric science, geology, space physics, biology and chemistry."

**Stellar astronomers** turn their eyes to the stars, including the black holes, nebulae, white dwarfs and supernova that survive stellar deaths. The [University of California, Los Angeles](#), says, "The focus of stellar astronomy is on the physical and chemical processes that occur in the universe."

**Solar astronomers** spend their time analyzing a single star — our sun. According to [NASA](#), "The quantity and quality of light from the sun varies on time scales from milli-seconds to billions of years." Understanding those changes can help scientists recognize how Earth is affected. The sun also helps us to understand how other stars work, as it is the only star close enough to reveal details about its surface.

**Galactic astronomers** study our galaxy, the Milky Way, while extragalactic astronomers peer outside of it to determine how these collections of stars form, change, and die. The [University of Wisconsin-Madison](#) says, "Establishing patterns in the distribution, composition, and physical conditions of stars and gas traces the history of our evolving home galaxy."

**Cosmologists** focus on the universe in its entirety, from its violent birth in the [Big Bang](#) to its present evolution, all the way to its eventual death. Astronomy is often (not always) about very concrete, observable things, whereas cosmology typically involves large-scale properties of the universe and



Red spots on Jupiter,  
photographed on  
Feb. 27, 2006.

Credit: Christopher  
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esoteric, invisible and sometimes purely theoretical things like string theory, dark matter and dark energy, and the notion of multiple universes.

Astronomical observers rely on different wavelengths of the [electromagnetic spectrum](#) (from radio waves to visible light and on up to X-rays and gamma-rays) to study the wide span of objects in the universe. The first telescopes focused on simple optical studies of what could be seen with the naked eye, and many telescopes continue that today. [[Celestial Photos: Hubble Space Telescope's Latest Cosmic Views](#)]

But as light waves become more or less energetic, they move faster or slower. Different telescopes are necessary to study the various wavelengths. More energetic radiation, with shorter wavelengths, appears in the form of ultraviolet, X-ray, and gamma-ray wavelengths, while less energetic objects emit longer-wavelength infrared and radio waves.

**Astrometry**, the most ancient branch of astronomy, is the measure of the [sun](#), [moon](#) and [planets](#). The precise calculations of these motions allows astronomers in other fields to model the birth and evolution of planets and [stars](#), and to predict events such as [eclipses](#) meteor showers, and the appearance of [comets](#). According to the [Planetary Society](#), "Astrometry is the oldest method used to detect extrasolar planets," though it remains a difficult process.

**Early astronomers** noticed patterns in the sky and attempted to organize them in order to track and predict their motion. Known as [constellations](#), these patterns helped people of the past to measure the seasons. The movement of the stars and other heavenly bodies was tracked around the world, but was prevalent in China, Egypt, Greece, Mesopotamia, Central America and India.

The image of an astronomer is a lone soul at a telescope during all hours of the night. In reality, most hard-core [astronomy today](#) is done with observations made at remote telescopes — on the ground or in space — that are controlled by computers, with astronomers studying computer-generated data and images.

Since the advent of photography, and particularly digital photography, astronomers have provided [amazing pictures of space](#) that not only inform science but enthrall the public. [[All-Time Great Galaxy Photos](#)]

Astronomers and spaceflight programs also contribute to the study of our own planet, when missions primed at looking outward (or travelling to the moon and beyond) look back and snap [great pictures of Earth from space](#).

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This large field-of-view image of sunspots in Active Region 10030 was observed on July 15, 2002. Researchers colored the image yellow for aesthetic reasons.

Credit: Royal Swedish Academy of Sciences