

# The universe is here

Erika L. Antiche Garzón<sup>1,2</sup>

<sup>1</sup>Programa de Informática, Facultad de Ciencias y Tecnología,  
Universidad Centro Occidental Lisandro Alvarado, Barquisimeto, Estado Lara, Venezuela

<sup>2</sup>Asociación Larense de Astronomía  
C.P. 3001, Estado Lara, Venezuela  
email: [eantiche@gmail.com](mailto:eantiche@gmail.com)

**Abstract.** Astronomy is a science devoted to the study of what existed, exists and will exist, from the most elemental particle to the most massive and powerful galaxy one observes. The study of the universe is not only meant to be to achieve an important understanding about it, but also in other fields of science and technology. The most important contribution from astronomy is perhaps social: it fascinates millions of people along the globe. The history of astronomy carries along the very history of humankind.

**Keywords.** knowledge, history, humankind, science, study

---

## Poster overview

The study of planets, stars, galaxies, intergalactic and interstellar space falls under the field of astronomy. Thousands of years ago, the earliest civilisations observed the heavens. Calendars have usually been set by the Sun and Moon (measuring the day, month and year), and were of importance to agricultural societies, in which the harvest depended on planting at the correct time of year. In ancient Babylon, about 1,700 BCE, astronomers estimated that the Sun took 365 days and a fraction to go back to the same position in the sky. The closest divisible number to that was 360, and they adopted it as a base for their calendar, because it is a multiple of 12, a number with a special meaning for them as they considered it magical. The seasons became important; during different times of the year, different stellar patterns appear in the sky. In the Spring, Virgo and accompanying constellations signal the time to prepare to plant crops, and to be wary of floods. In the fall, Orion rises to indicate time to harvest and to prepare for Winter. To early humans facing an uncertain and changeable future, the constancy of the heavens must have suggested perfection and certainly led to deification in many cultures. Eclipses would have been especially frightening to early humans. After predicting the seasons, eclipse prediction may have been one of the earliest astronomical activities. The Greeks advanced astronomy as they were brilliant philosophers and it was people such as Thales drove the mind forward. By 300 BCE Plato and Aristotle had furthered the idea of a spherical Earth circled by all the known heavenly bodies. Hipparchus is considered the greatest ancient astronomical observer and, by some, the greatest overall astronomer of antiquity. He catalogued over 1,000 stars keenly noting their positions and motions. He developed trigonometry and constructed trigonometric tables, and he solved several problems of spherical trigonometry. His work would have been long forgotten were it not for Ptolemy who some 300 years later published some of his results. He devised an ingenious system that accounted for all the variations observed. One such feature was epicycles used to explain the apparent backward motion of planets across the sky. The feature is in fact better understood with the heliocentric system.

Nicolaus Copernicus was the first astronomer to formulate a comprehensive heliocentric cosmology, which displaced the Earth from the center of the universe. His work stimulated further scientific investigations, becoming a landmark in the history of modern science that is now often referred to as the Copernican Revolution. Tycho Brahe was a Danish astronomer born in 1546 who worked to combine what he saw as the geometrical benefits of the Copernican system with the philosophical benefits of the Ptolemaic system into his own model of the universe, the Tychonic system. When he died in 1601 his young assistant Johannes Kepler took over his work and analysed some of the data and realised the only fit to the data came when one adopted the heliocentric theory. As a result he published three laws of planetary motion which were to revolutionise astronomy. Galileo Galilei was an Italian physicist, mathematician, astronomer, and philosopher who played a major rôle in the scientific revolution. He used one of the first telescopes to observe the Moon, Venus, the Sun and Jupiter. He discovered four moons around Jupiter now known as the Galilean satellites. Galileo has been called the “father of modern observational astronomy”, the “father of modern physics”, the “father of science”, and “the Father of Modern Science.” In 1642 Galileo died and Isaac Newton was born. Newton worked in many fields but his chief contribution to astronomy was his laws of gravitation, held correct for four hundred years until Einstein’s theory of relativity.

Einstein is best known for his theory of relativity and specifically mass–energy equivalence, expressed by the equation  $E = mc^2$ . He developed the theory of Special Relativity, based upon the idea that light travels at the same speed in all frames of reference. He developed the General Theory of Relativity in 1916. Since then there have been many other achievements in astronomy some theoretical and others more practical but the basic tools had been laid out by 1700. As telescopes improved so did observations and in 1781 Herschel discovered Uranus. In 1846 Galle found Neptune and in 1930 Tombaugh discovered Pluto. In 1957 the Russians launched Sputnik placing man-made objects in to space for the first time. By 1965 Yuri Gagarin had become the first human in space, Valentina Tereshkova the first woman in space and Leonov had undertaken the first space walk. In 1969 humans set foot on another heavenly body for the first time when Neil Armstrong and Buzz Aldrin landed on the Moon.

The Hubble Space Telescope (HST) was carried into orbit by the space shuttle in April 1990. Although not the first space telescope, the HST is one of the largest and most versatile, and is well-known as both a vital research tool and a public relations boom for astronomy. It has revolutionised astronomy by providing unprecedented deep and clear views of the Universe, ranging from our own solar system to extremely remote fledgling galaxies forming not long after the Big Bang 13.7 billion years ago. The heavens are vast and we have explored so little and yet what we do know is so beautiful and unimaginable that one always feels a sense of awe. This is the year in which we can all make difference; everyone should realise the impact of astronomy and other fundamental sciences on our daily lives. Astronomy is not only one of the oldest fundamental sciences; the discoveries of great astronomers have brought with it evolution and advances in each of the fields of the scientific knowledge, besides a conscience of our context in the Universe.