

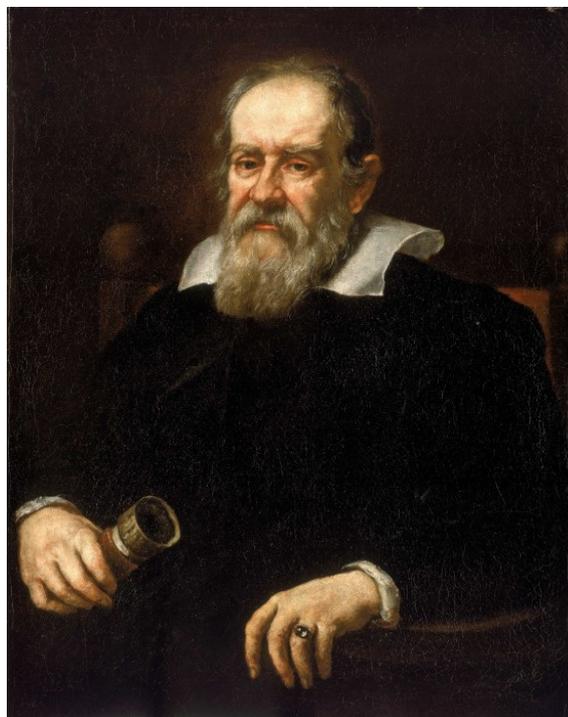
TODAY IN SCIENCE: GALILEO'S BIRTHDAY

Happy 455th birthday to one of the first modern scientists, Galileo. With the aid of an early telescope, he helped remove Earth from the centre of the universe. Born on February 15, 1564 the Italian astronomer, mathematician, and physicist **Galileo Galilei** was one of the first people on Earth to aim a telescope at the heavens. He found – among many other things – phases for the planet Venus and four starry points of light orbiting the planet Jupiter. In Galileo's time, educated people subscribed to the **Aristotelian** view that Earth lay fixed in the center of a more or less unchanging universe. Thus the discovery of moons orbiting Jupiter (now called the Galilean satellites) and revelation that Venus must orbit the Sun, not the Earth, were considered heresy by the Roman Inquisition. In 1633, the Inquisition forced Galileo to recant. He spent the rest of his life under house arrest.

Afterwards, famously, he's said to have said:

E pur si muove (and yet it moves).

The phrase is still used today as a retort, implying it doesn't matter what you believe; these are the facts.



Portrait of Galileo by Justus Sustermans. Image via Wikimedia Commons

Galileo grew up in a musical family. In 1574, the family moved to Florence where 18-year-old Galileo began his education in a monastery. He was very successful in his studies, and began studying medicine at the University of Pisa. Due to financial problems, he was unable to finish his degree, but his years at the university were priceless. They introduced him to mathematics and physics, but most importantly, they introduced him to Aristotle's philosophy. Back then, if somebody wished to know about the universe, the way to do it was to read Aristotle's works. He was able to get a few minor teaching positions for a living. Galileo's reputation was bruised after the publication of his *Du Motu* (On Motion), a study of falling objects, which showed his disagreement with the Aristotelian view about the subject.

In 1609, he heard word that in the Netherlands, an instrument had been invented that showed distant objects as if they were close by. Like many others, Galileo quickly figured out the mechanics of the spyglass, and later on he greatly improved the original design. He presented the Venetian State with an eight-powered telescope – a telescope that magnifies normal vision by eight times. His telescope earned him a doubling of his salary and a life tenure at Padua University. Over the years, Galileo improved his telescope to magnify up to 20 times.

With his telescope, he made many astronomical discoveries. Galileo observed that Venus went through phases, just as the Moon does. And he was the first to view the moon magnified 20 times, showing that its surface is bumpy and rocky, contrary to the popular belief of the time.

In January 1610, he discovered four moons orbiting Jupiter. Today, they are referred to as the Galilean moons: Io, Europa, Ganymede, and Callisto. He laid out all of his findings in his book *Siderus Nuncius* (The Sidereal Messenger).

Galileo was a very respected man by 1610, but his increasingly public acceptance of the heliocentric system of **Copernicus** began to cause him trouble with the Roman Catholic Church. In 1618, Galileo was dragged into a controversy about the nature of comets, which was again of no help to his social position. His work kept defying the accepted Aristotelian view, and earned him the anger of the Roman Catholic Church, and the Inquisition – whose aim was to combat heresy. In 1633, the Inquisition summoned Galileo to Rome. He was declared a suspect of heresy, was punished with life house arrest imprisonment, and was made to abjure formally. Nevertheless, Galileo never stopped working. Galileo died on January 8, 1642. He was one of the first to free science from philosophy and inspired countless others to pursue the freedom of scientific enquiry.



Image showing spacecraft views of the four largest moons of Jupiter. Known as the Galilean satellites, Shown from left to right in order of increasing distance from Jupiter. Io is closest, followed by Europa, Ganymede, and Callisto.