Physics from [Ancient Greek](https://en.wikipedia.org/wiki/Ancient_Greek) knowledge of nature. Physics is the [natural science](https://en.wikipedia.org/wiki/Natural_science) that involves the study of [matter](https://en.wikipedia.org/wiki/Matter)and its [motion](https://en.wikipedia.org/wiki/Motion_(physics)) through [space and time](https://en.wikipedia.org/wiki/Spacetime), along with related concepts such as [energy](https://en.wikipedia.org/wiki/Energy) and [force](https://en.wikipedia.org/wiki/Force). One of the most fundamental scientific disciplines, the main goal of physics is to understand how the [universe](https://en.wikipedia.org/wiki/Universe) behaves.

Physics is one of the oldest [academic disciplines](https://en.wikipedia.org/wiki/Academic_discipline), perhaps the oldest through its inclusion of [astronomy](https://en.wikipedia.org/wiki/Astronomy). Over the last two millennia, physics was a part of [natural philosophy](https://en.wikipedia.org/wiki/Natural_philosophy) along with [chemistry](https://en.wikipedia.org/wiki/Chemistry), [biology](https://en.wikipedia.org/wiki/Biology), and certain branches of [mathematics](https://en.wikipedia.org/wiki/Mathematics), but during the [scientific revolution](https://en.wikipedia.org/wiki/Scientific_revolution) in the 17th century, the [natural sciences](https://en.wikipedia.org/wiki/Natural_science) emerged as unique [research](https://en.wikipedia.org/wiki/Research) programs in their own right. Physics intersects with many [interdisciplinary](https://en.wikipedia.org/wiki/Interdisciplinary) areas of research, such as [biophysics](https://en.wikipedia.org/wiki/Biophysics) and [quantum chemistry](https://en.wikipedia.org/wiki/Quantum_chemistry), and the boundaries of physics are not [rigidly defined](https://en.wikipedia.org/wiki/Demarcation_problem). New ideas in physics often explain the fundamental mechanisms of other sciences while opening new avenues of research in areas such as mathematics and [philosophy](https://en.wikipedia.org/wiki/Philosophy).

Physics also makes significant contributions through advances in new [technologies](https://en.wikipedia.org/wiki/Technology) that arise from theoretical breakthroughs. For example, advances in the understanding of [electromagnetism](https://en.wikipedia.org/wiki/Electromagnetism) or [nuclear physics](https://en.wikipedia.org/wiki/Nuclear_physics) led directly to the development of new products that have dramatically transformed modern-day [society](https://en.wikipedia.org/wiki/Society), such as [television](https://en.wikipedia.org/wiki/Television), [computers](https://en.wikipedia.org/wiki/Computer), [domestic appliances](https://en.wikipedia.org/wiki/Domestic_appliance), and [nuclear weapons](https://en.wikipedia.org/wiki/Nuclear_weapon); advances in [thermodynamics](https://en.wikipedia.org/wiki/Thermodynamics) led to the development of [industrialization](https://en.wikipedia.org/wiki/Industrialization), and advances in [mechanics](https://en.wikipedia.org/wiki/Mechanics) inspired the development of [calculus](https://en.wikipedia.org/wiki/Calculus).

Ancient astronomy

[Astronomy](https://en.wikipedia.org/wiki/Astronomy) is the oldest of the [natural sciences](https://en.wikipedia.org/wiki/Natural_science). The earliest civilizations dating back to beyond 3000 BCE, such as the [Sumerians](https://en.wikipedia.org/wiki/Sumer), [ancient Egyptians](https://en.wikipedia.org/wiki/Ancient_Egypt), and the [Indus Valley Civilization](https://en.wikipedia.org/wiki/Indus_Valley_Civilization), all had a predictive knowledge and a basic understanding of the motions of the [Sun](https://en.wikipedia.org/wiki/Sun), [Moon](https://en.wikipedia.org/wiki/Moon), and [stars](https://en.wikipedia.org/wiki/Star). The stars and planets were often a target of worship, believed to represent their gods. While the explanations for these phenomena were often unscientific and lacking in evidence, these early observations laid the foundation for later astronomy.

According to [Asger Aaboe](https://en.wikipedia.org/wiki/Asger_Aaboe), the origins of [Western](https://en.wikipedia.org/wiki/Western_world) astronomy can be found in [Mesopotamia](https://en.wikipedia.org/wiki/Mesopotamia), and all Western efforts in the [exact sciences](https://en.wikipedia.org/wiki/Exact_science) are descended from late [Babylonian astronomy](https://en.wikipedia.org/wiki/Babylonian_astronomy). [Egyptian astronomers](https://en.wikipedia.org/wiki/Egyptian_astronomy) left monuments showing knowledge of the constellations and the motions of the celestial bodies, while [Greek poet](https://en.wikipedia.org/wiki/Ancient_Greek_poetry) [Homer](https://en.wikipedia.org/wiki/Homer) wrote of various celestial objects in his [Iliad](https://en.wikipedia.org/wiki/Iliad) and [Odyssey](https://en.wikipedia.org/wiki/Odyssey); later [Greek astronomers](https://en.wikipedia.org/wiki/Greek_astronomy) provided names, which are still used today, for most constellations visible from the [northern hemisphere](https://en.wikipedia.org/wiki/Northern_hemisphere).[[12]](https://en.wikipedia.org/wiki/Physics#cite_note-thurston1994-14)

Classical physics

Physics became a separate science when [early modern Europeans](https://en.wikipedia.org/wiki/Early_modern_Europe) used experimental and quantitative methods to discover what are now considered to be the [laws of physics](https://en.wikipedia.org/wiki/Laws_of_physics).

Major developments in this period include the replacement of the [geocentric model](https://en.wikipedia.org/wiki/Geocentric_model) of the [solar system](https://en.wikipedia.org/wiki/Solar_system) with the heliocentric [Copernican model](https://en.wikipedia.org/wiki/Copernican_model), the [laws governing the motion of planetary bodies](https://en.wikipedia.org/wiki/Kepler%27s_laws) determined by [Johannes Kepler](https://en.wikipedia.org/wiki/Johannes_Kepler) between 1609 and 1619, pioneering work on [telescopes](https://en.wikipedia.org/wiki/Telescope) and [observational astronomy](https://en.wikipedia.org/wiki/Observational_astronomy) by [Galileo Galilei](https://en.wikipedia.org/wiki/Galileo_Galilei) in the 16th and 17th Centuries, and Isaac's discovery and unification of the [laws of motion](https://en.wikipedia.org/wiki/Newton%27s_laws_of_motion) and [universal gravitation](https://en.wikipedia.org/wiki/Newton%27s_law_of_universal_gravitation) that would come to bear his name. Newton also developed [calculus](https://en.wikipedia.org/wiki/Calculus), the mathematical study of change, which provided new mathematical methods for solving physical problems.

The discovery of new laws in [thermodynamics](https://en.wikipedia.org/wiki/Thermodynamics), [chemistry](https://en.wikipedia.org/wiki/Chemistry), and [electromagnetics](https://en.wikipedia.org/wiki/Electromagnetics) resulted from greater research efforts during the [Industrial Revolution](https://en.wikipedia.org/wiki/Industrial_Revolution) as energy needs increased. The laws comprising classical physics remain very widely used for objects on everyday scales travelling at non-relativistic speeds, since they provide a very close approximation in such situations, and theories such as [quantum mechanics](https://en.wikipedia.org/wiki/Quantum_mechanics) and the [theory of relativity](https://en.wikipedia.org/wiki/Theory_of_relativity) simplify to their classical equivalents at such scales. However, inaccuracies in classical mechanics for very small objects and very high velocities led to the development of modern physics in the 20th century.

Modern physics

[Modern physics](https://en.wikipedia.org/wiki/Modern_physics) began in the early 20th century with the work of [Max Planck](https://en.wikipedia.org/wiki/Max_Planck) in [quantum theory](https://en.wikipedia.org/wiki/Quantum_mechanics) and [Albert Einstein](https://en.wikipedia.org/wiki/Albert_Einstein)'s [theory of relativity](https://en.wikipedia.org/wiki/Theory_of_relativity). Both of these theories came about due to inaccuracies in classical mechanics in certain situations. [Classical mechanics](https://en.wikipedia.org/wiki/Classical_mechanics) predicted a varying [speed of light](https://en.wikipedia.org/wiki/Speed_of_light), which could not be resolved with the constant speed predicted by [Maxwell's equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) of electromagnetism; this discrepancy was corrected by Einstein's theory of [special relativity](https://en.wikipedia.org/wiki/Special_relativity), which replaced classical mechanics for fast-moving bodies and allowed for a constant speed of light. [Black body radiation](https://en.wikipedia.org/wiki/Black_body_radiation) provided another problem for classical physics, which was corrected when Planck proposed that the excitation of material oscillators is possible only in discrete steps proportional to their frequency; this, along with the [photoelectric effect](https://en.wikipedia.org/wiki/Photoelectric_effect) and a complete theory predicting discrete [energy levels](https://en.wikipedia.org/wiki/Energy_levels) of [electron orbitals](https://en.wikipedia.org/wiki/Atomic_orbital), led to the theory of quantum mechanics taking over from classical physics at very small scales.

[Quantum mechanics](https://en.wikipedia.org/wiki/Quantum_mechanics) would come to be pioneered by [Werner Heisenberg](https://en.wikipedia.org/wiki/Werner_Heisenberg), [Erwin Schrödinger](https://en.wikipedia.org/wiki/Erwin_Schr%C3%B6dinger) and [Paul Dirac](https://en.wikipedia.org/wiki/Paul_Dirac). From this early work, and work in related fields, the [Standard Model of particle physics](https://en.wikipedia.org/wiki/Standard_Model_of_particle_physics) was derived. Following the discovery of a particle with properties consistent with the [Higgs boson](https://en.wikipedia.org/wiki/Higgs_boson) at [CERN](https://en.wikipedia.org/wiki/CERN) in 2012, all [fundamental particles](https://en.wikipedia.org/wiki/Fundamental_particles) predicted by the standard model, and no others, appear to exist; however, [physics beyond the Standard Model](https://en.wikipedia.org/wiki/Physics_beyond_the_Standard_Model), with theories such as [supersymmetry](https://en.wikipedia.org/wiki/Supersymmetry), is an active area of research. Areas of [mathematics](https://en.wikipedia.org/wiki/Mathematics) in general are important to this field, such as [study of probabilities](https://en.wikipedia.org/w/index.php?title=Study_of_probabilities&action=edit&redlink=1).