**Newtonian Gravity**

Isaac Newton published in 1687 in London his famous Principia (*Philosophiae Naturalis Principia Mathematica*), which gave a theoretical basis for the mechanics of motion of bodies and forces between bodies, and which became in the following centuries the basis for modern science. Only in the twentieth century were extensions (not corrections) found necessary for the cases that velocities are large (Special Relativity of 1905 and General Relativity of 1915) or distances small (the Quantum Mechanics of 1925 and 1926 for particles inside atoms).

Copernicus (1543) rediscovered that the Sun, and not the Earth, is at the center of the then-known universe, and the careful astronomical measurements of Tycho Brahe had been summarized by Kepler into his 3 laws, also shown on the wall: planets go around the Sun in ellipses (1609), the area swept out by a line from the Sun to a planet in a time interval is proportional to that time interval (1609), and the periods of different planets are proportional to the 3/2 power of the major axis of their ellipses (1619).

In his path of the law of gravitation force, Newton made two key discoveries: equal areas in equal times means that the forces acting on planets are directed towards the Sun, and the changes in the velocity of a planet at two times, t and t + ∆t, were also directed to the Sun. Taking the special case of circular orbits of planets, Newton could derive Kepler's 3/2 law by assuming that the force of gravity falls off with distance as 1/r 2. He generalized these insights into a “universal” law of gravitation, acting between all points of matter, and proportional to each. This brought the laws of planetary motion down to earth, and the laws of motion to the heavens, an essential step toward the unity of science.