From ancient Greece to Nobel prize: a Higgs timeline

October 8 2013

A timeline of particle physics up to Tuesday's Nobel nod for the theorists behind the Higgs boson.

5th century BC: Greek philosopher Democritus suggests the Universe consists of empty space as well as invisible and indivisible particles called atoms.

1802: John Dalton, a Quaker-educated English physicist and chemist, lays the groundwork for modern atomic theory.

1897: The electron is discovered by Britain's Joseph Thomson, who later proposes a "plum pudding" model of the atom. He suggests the atom is a slightly positive sphere with raisin-like electrons inside that have a negative charge.

1899-1919: New Zealand physicist Ernest Rutherford identifies the atomic nucleus, the proton, and alpha and beta particles.

1920s: Advances in quantum theory, about the behaviour of matter at the atomic level.

1932: The neutron, similar to the proton but with no electrical charge, is discovered by James Chadwick of Britain. The first antiparticle, the positron (the mirror particle to the electron), is discovered by American Carl Anderson.

1934: Italy's Enrico Fermi postulates the existence of the neutrino (Italian for "little neutral one"), a neutral-charge partner to the electron. The theory is confirmed in 1959.

1950s: The invention of the particle accelerator leads to a surge in discoveries of sub-atomic particles.

1964: Within months of each other, six physicists publish the theory of a subatomic particle providing mass to matter. First to publish were Francois Englert and Robert Brout of the Free University of Brussels, followed by British physicist Peter Higgs, and then the US-British team of Dick Hagen, Gerald Guralnik and Tom Kibble.

- Murray Gell-Mann and George Zweig of the United States propose that protons and neutrons are comprised of quarks.

1974: The Standard Model of physics is devised: a theory that everything in the Universe is made up of 12 building-block particles governed by four fundamental forces. The theory cannot work without the Higgs boson conferring mass on matter, as the fundamental particles by their very nature do not have mass of their own.

1977-2000: A flurry of discoveries strengthens the Standard Model hypothesis, including the existence of several quarks and leptons (the two types of fundamental particles), the tau neutrino and W and Z bosons that help carry the "weak" force.

2008: The European Organisation for Nuclear Research (CERN) starts up the Large Hadron Collider (LHC), the world's biggest particle smasher.

July 4, 2012: CERN announces it has discovered a particle that resembles the Higgs. New data analysed since then has given rise to

increasing scientific certainty that the discovery is indeed the elusive "God particle", as the boson is also known.

October 8, 2013: Higgs and Englert are awarded the Nobel Prize in Physics for their conception of the particle.