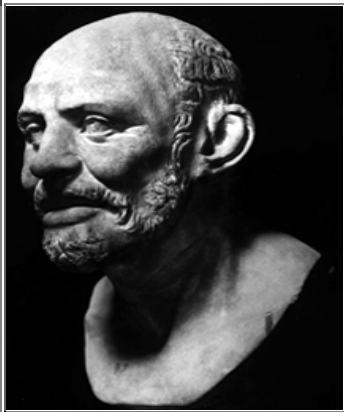
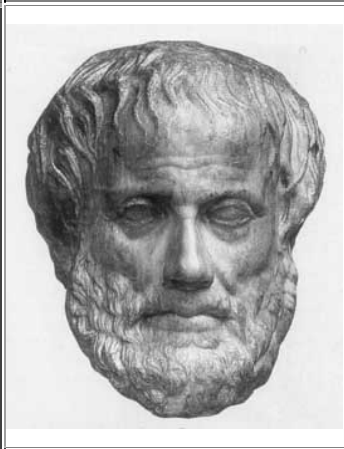
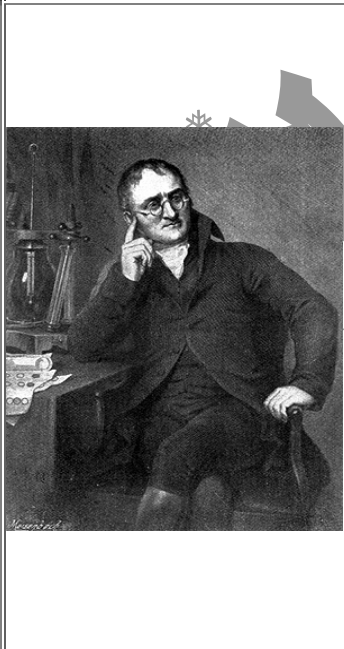


## History of the Atom

	<p><b>Democritus</b> <b>470-380</b> <b>B.C.</b></p>	<ul style="list-style-type: none"><li>• Known as the "Laughing Philosopher" because of his joyous spirit.</li><li>• First to suggest the idea of atoms (<i>atomos</i> - Greek "a" meaning "not" &amp; <i>tomos</i> meaning "cut"). He thought matter was composed of tiny indivisible particles - atomos.</li></ul>
	<p><b>Aristotle</b> <b>384-322</b> <b>B.C.</b></p>	<ul style="list-style-type: none"><li>• Spoke out against Democritus and atomism. Aristotle felt matter was continuous.</li><li>• The Catholic Church accepted Aristotle's position and came to equate atomistic ideas with Godlessness.</li><li>• In 1624, the Parliament of Paris had issued a decree that anyone holding or teaching a position opposed to Aristotle (including atomism) was liable to be put to death (needless to say, atomism didn't have a chance).</li></ul>
	<p><b>John Dalton</b> <b>1766-1844</b></p>	<ul style="list-style-type: none"><li>• English school teacher (started teaching when he was only 12 years old) who became known as Father of the Atomic Theory.</li><li>• Dalton's Atomic Theory :<ul style="list-style-type: none"><li>• All matter is composed of indivisible particles called atoms.</li><li>• Atoms of the same element have the same physical &amp; chemical properties.</li><li>• Atoms of different elements have different physical &amp; chemical properties.</li><li>• Two or more atoms of different elements can chemically combine in simple whole number ratios to form compounds.</li><li>• Atoms cannot be subdivided, created or destroyed when involved in a chemical reaction.</li></ul></li></ul>



**J. J.  
Thomson  
1856-1940**

- English physicist.
- Discovered the electron in 1897 after observing that the beam of light in a cathode ray tube is attracted to a positive charge and repelled by a negative charge. The electron was named years earlier by G. Johnston Stoney but not detected until Thomson.
- His model of the atom is called the Plum Pudding Model.
- In Thomson's model electrons have a negative charge but the overall charge of the atom is neutral.



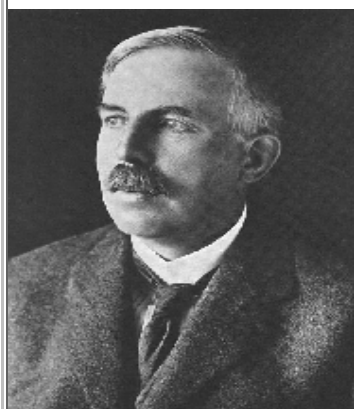
**Max Planck  
1858-1947**

- Planck was able to deduce the relationship between the energy and the frequency of radiation.
- In 1900, he announced that the energy (E) emitted by a resonator could only take on discrete values or quanta.
- $E = h\nu$  (E- energy,  $\nu$  - the frequency of the radiation, h- constant called Planck's constant,  $(6.6262 \times 10^{-34} \text{ J s})$ )



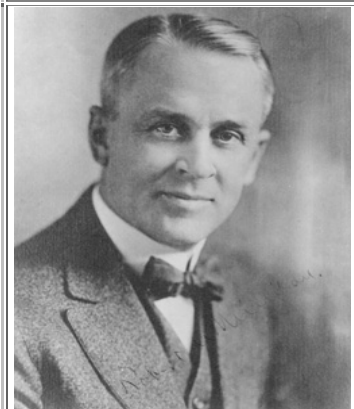
**Albert  
Einstein  
1879-1955**

- In 1905 used Planck's constant and proposed that light could be described as quanta of energy that behave as particles.
- Einstein used Planck's particle theory of light to explain the photoelectric effect (the release of electrons from metal when light shines on it).
- This was the first use of the Planck's theory by someone other than Planck.



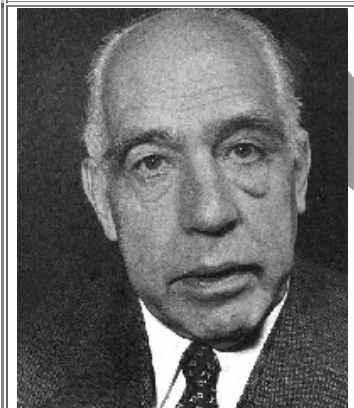
**Ernest Rutherford**  
1871-1937

- Student of J.J. Thomson.
- Conducted the gold foil experiment in 1909 when he shot alpha particles at a sheet of gold foil only 1/3000 of an inch thick.
- Rutherford expected the positively charged alpha particles to pass right through the gold foil, and most did. However, a small number of particles were deflected off at an angle and some even bounced straight back.
- Rutherford discovered that that the atom is mostly empty space and there is a small positively charged core where the bulk of its mass is located. Rutherford named this small positively charged core, nucleus (Latin, "little nut").



**Robert Millikan**  
1868-1953

- Determined the charge of the electron with his oil drop experiment in 1913.



**Niels Bohr**  
1891-1973

- Student of Ernest Rutherford
- In 1913 Bohr proposed a revised atomic model. He used Planck's work to correct a flaw in Rutherford's model.
- He placed electrons into paths of definite energy circling the nucleus.
- Modeled his atomic structure after the solar system.



**Louis de Broglie**  
1892-1987

- In 1924 de Broglie discovered the wave nature of electrons.
- De Broglie solved the electrodynamic problems with Bohr's model of the atom in his 3 page Phd. submission that set out a relationship between mass velocity and wavelength.
- During World War I de Broglie served in the army. He was attached to the wireless telegraphy section for the whole of the war and served in the station at the Eiffel Tower.



**Erwin Schrödinger**  
1887-1961

- Schrödinger wrote and solved a mathematical equation describing the location and energy of an electron in a hydrogen atom in 1926.
- Schrödinger's equation is the current description of the electron in the atom. This mathematical model is called the quantum mechanics model or electron cloud model.



**Werner Heisenberg**  
1901-1976

- In 1927 Heisenberg developed his uncertainty principle which explains that it is physically impossible to measure both the exact position and the exact momentum of a particle at the same time. The more precisely one of the quantities is measured, the less precisely the other is known.
- Heisenberg's principle proved that Bohr's model of the atom is incorrect.



**James Chadwick**  
1891-1974

- Student of Ernest Rutherford.
- In 1932 Chadwick proved the existence of neutrons.