History of Science
- Further Background Information -

Some Great Scientists

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104 Great Scientist in Historical Order

Anaximander	611-547 B.C.	Robert Boyle	1627-1691
Pythagoras	581-497 B.C.	Christian Huygens	1629-1695
Hippocrates of Cos	460-377 B.C.	Anton van Leeuwenhoek	1632-1723
Democritus of Abdera	460-370 B.C.	Robert Hooke	1635-1703
Plato	427-347 B.C.	Sir Isaac Newton	1642-1727
Aristotle	384-322 B.C.	Edmund Halley	1656-1742
Euclid	330-260 B.C.	Thomas Newcomen	1663-1729
Aristarchos of Samos	310-230 B.C.	Daniel Fahrenheit	1686-1736
Archimedes	287-212 B.C.	Benjamin Franklin	1706-1790
Hipparchus	170-125 B.C.	Joseph Black	1728-1799
Zhang Heng	78-139 A.D.	Henry Cavendish	1731-1810
Ptolemy	90-168 A.D.	Joseph Priestley	1733-1804
Galen of Pergamum	130-201 A.D.	James Watt	1736-1819
Al-Khwarizmi	800-850	Charles de Coulomb	1736-1806
Johannes Gutenberg	1400-1468	Joseph Montgolfier	1740-1810
Leonardo da Vinci	1452-1519	Karl Wilhelm Scheele	1742-1786
Nicolas Copernicus	1473-1543	Antoine Lavoisier	1743-1794
Andreas Vesalius	1514-1564	Count Alessandro Volta	1745-1827
William Gilbert	1540-1603	Edward Jenner	1749-1823
Tycho Otteson Brahe	1546-1601	John Dalton	1766-1844
Galileo Galileo	1564-1642	Andre-Marie Ampere	1755-1836
Johannes Kepler	1571-1630	Alexander von Humboldt	1769-1859
William Harvey	1578-1657	Amedo Avogadro	1776-1856
Johann van Helmont	1579-1644	Joseph Gay-Lussac	1778-1850
Rene Descartes	1596-1650	Charles Babbage	1791-1871
Blaise Pascal	1623-1662	Michael Faraday	1791-1867

116 Great Scientist in Historical Order

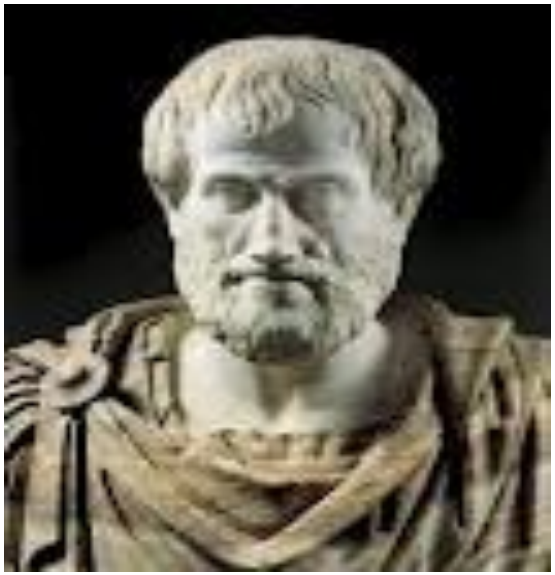
Charles Darwin	1809-1881	Otto Hahn	1879-1968
James Joule	1818-1889	Albert Einstein	1879-1955
Louis Pasteur	1822-1895	Alexander Fleming	1881-1955
Johann Gregor Mendel	1822-1884	Emmi Noether	1882-1935
Rudolf Clausius	1822-1888	Robert Goddard	1882-1945
Jean-Joseph Lenoir	1822-1900	Arthur Stanley Eddington	1882-1944
William Thomson (Lord Kelvin)	1824-1907	Neils Bohr	1885-1962
James Clerk Maxwell	1831-1879	Erwin Schrodinger	1887-1961
Alfred Nobel	1833-1896	Henry Moseley	1887-1915
Wilhelm Gottlieb Daimler	1834-1900	Alexander Friedmann	1888-1925
Dmitri Mendeleev	1834-1907	Edwin Powell Hubble	1889-1953
Wilhelm Conrad Roentgen	1845-1923	Sir James Chadwick	1891-1974
Ludwig Boltzmann	1844-1906	Frederick Banting	1891-1941
Thomas Alva Edison	1847-1931	Louis de Broglie	1892-1987
Alexander Graham Bell	1847-1922	George Lemaitre	1894-1966
Antoine-Henri Becquerel	1852-1908	Leo Szilard	1898-1964
Paul Ehrlich	1854-1915	Enrico Fermi	1901-1954
Nikola Tesla	1856-1943	Werner Heisenberg	1901-1954
Sir John Joseph Thomson	1856-1940	Linus Carl Pauling	1901-1994
Sigmund Freud	1856-1939	Robert Oppenheimer	1904-1967
Heinrich Rudolf Hertz	1857-1894	William Shockley	1910-1989
Max Planck	1858-1947	Alan Turing	1912-1954
Leo Baekeland	1863-1944	Carl Friedrich von Weizsäcker	1912-2007
Walter Nernst	1864-1941	Jonas Salk	1914-1995
Thomas Hunt Morgan	1866-1945	Richard Feynman	1918-1988
Marie Curie	1867-1934	Rosalind Franklin	1920-1958
Ernest Rutherford	1871-1937	Andrej Sacharow	1921-1989
The Wright Brothers, Wilbur	1867-1912	James Dewey Watson	1928-
The Wright Brothers, Orville	1871-1948	Carl Sagan	1934-1996
Ernest Rutherford	1871-1937	Stephen Hawking	1942-2018
Lise Meitner	1878-1968	Shuji Nakamura	1954-

Pythagoras

- 569BC - 475BC
- Greek philosopher
- First pure mathematician
- 5 beliefs
- Secret society
- Pythagorean theorem

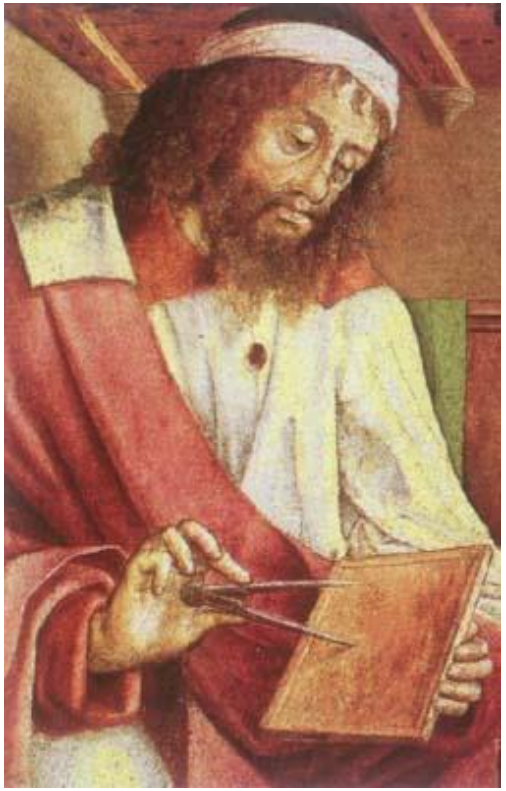
Aristotle

- 384BC - 322BC
- Greek philosopher, a student of Plato and teacher of Alexander, the Great
- His writings cover many subjects, including physics, metaphysics, poetry, theater, music, logic, rhetoric, politics, government, ethics, botanics, and zoology
- A pound of lead falls faster than a gram of fluff



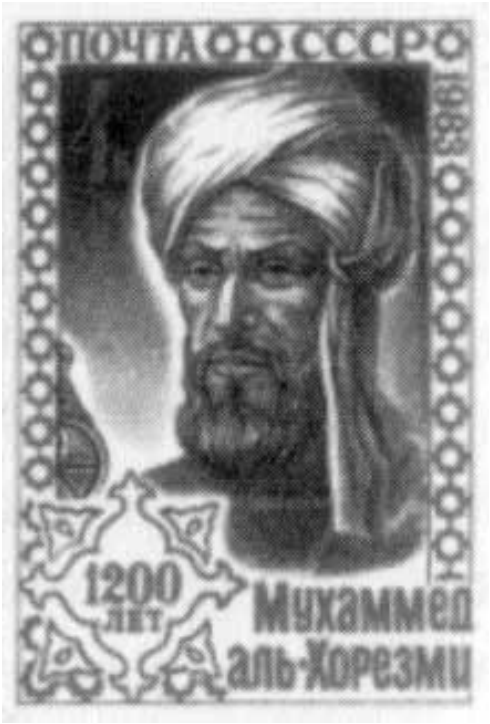
Euclid

- 325BC - 265BC
- Greek philosopher
- Wrote The Elements
- Geometry today



Al-Khwarizmi

- 780 - 850
- Baghdad, Iraq
- 1st book on Algebra
- Algebra
- Natural Numbers
- Equations



Claudius Ptolemaies

- 90AD - 168AD
- Geocentric model
- Published Almagest 139 AD

Inhaltsverzeichnis
des ersten Bandes.

Erstes Buch.

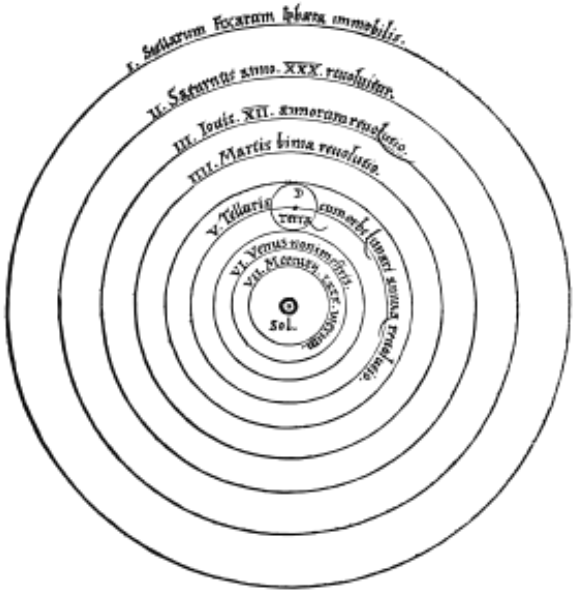
Zweites Buch.

Leonardo da Vinci

- 1452 - 1519
- Italian
- Geometry with mechanical methods
- Painter
- Architect
- Mechanic

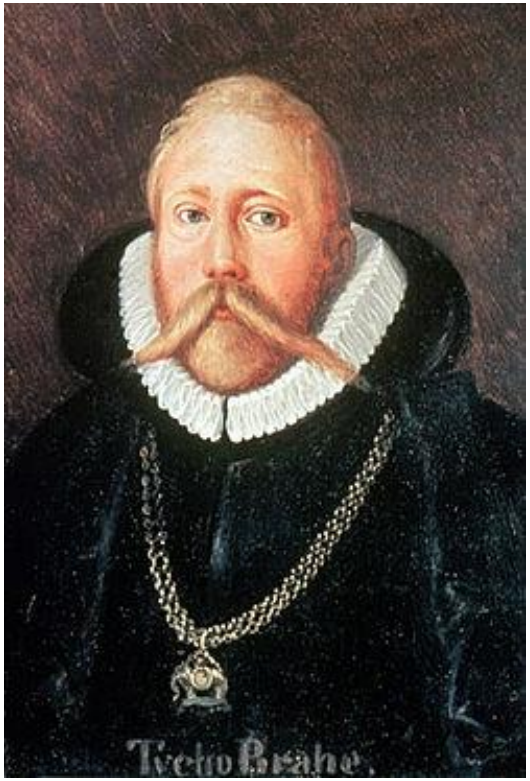
Nicolaus Copernicus

- 1473 - 1543
- Heliocentric model
- Published his ideas in “De revolutionibus orbium coelestium”, Nuremberg 1543



Tycho Ottesen Brahe

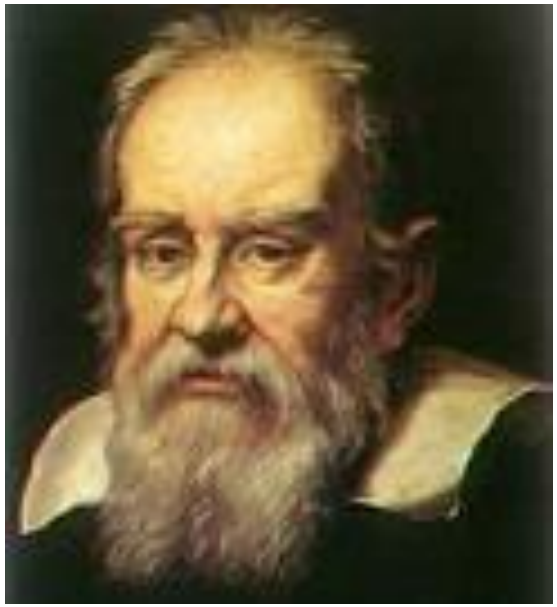
- 1546 - 1601
- Danish nobleman and astronomer
- Observed 1572 supernova
- Built several observatories
- Founder of the “New Astronomy”
- Geo-heliocentrical model:
  - Moon and sun orbit around the earth
  - Planets orbit around the sun



Galileo Galilei

- 1564 - 1642
- Italian physicist, mathematician, astronomer, and philosopher
- Main observation: Acceleration of a falling body does not depend on its weight
- Detected Jupiter moons:

  Callisto, Ganymed, Europa, and Io



Johannes Kepler

- 1571 - 1630
- Proofed that the planets circulating the sun on elliptic orbits
- Described the three Kepler's laws of planet movement
- Determined Mars orbit

Robert Hooke

- 1635 - 1703
- Hooke‘s law: $F = -k \cdot X$
- Used microscope for systematic study of biological matter
- Introduced the term „Cell“
- Detected Great Red Spot (GRS) on Jupiter

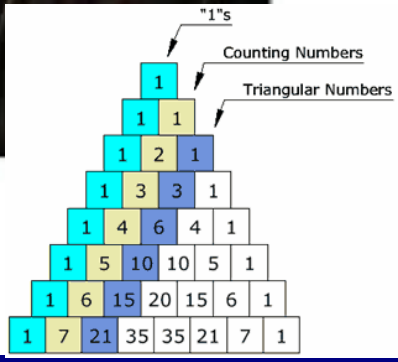
Sir Isaac Newton

- 1643 - 1727
- Binomial theorem
- Law of gravity: $F = Gm_1m_2/r^2$
- Kepler's laws restated:

  1. Planets move in elliptical orbits, the center of mass at the focus.

  2. The radius vector sweeps out equal areas in equal times (unchanged except the radius vector has two sectors, not one)

  3. $p^2(m_s+m_p) = ka^3$ where the masses are given in solar masses, p in earth years and a in astronomical units

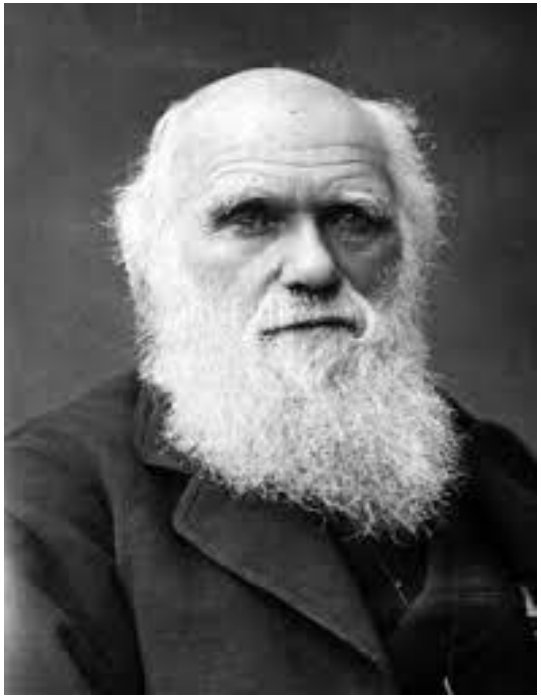


Leonard Euler

- 1707 - 1783
- Switzerland
- Published Mechanica, a book on mathematical analysis
- Calculus of variations
- Analytic geometry
- Trigonometry
- Symbols

Charles Darwin

- 1809 - 1882
- Developed theory of evolution
- Published his conclusions form 20 years evidence collection in "*On the Origin of Species*"



James Prescout Joule

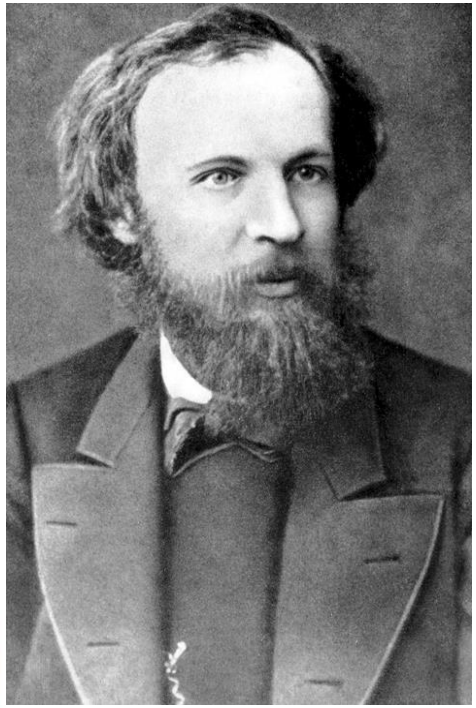
- 1818 - 1889
- English physicist, mathematician and brewer
- Discovered relationship of heat to mechanical work
- Observed magnetostriction
- Joule's first law: $P = I^2 \cdot R$

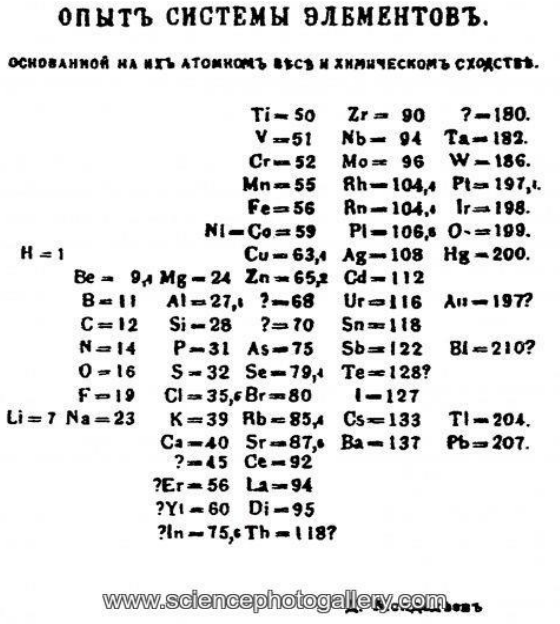
James Clerk Maxwell

- **1831 - 1879**
- **Mathematical unification of electricity and magnetism into what he called electromagnetism**

Dmitri Mendeleev

- 1834 - 1907
- Russian chemist, who was the first to sort elements known those days into a table: The Periodic Table of the Elements (PTOE)





ОПЫТЪ СИСТЕМЫ ЭЛЕМЕНТОВЪ.

ОСНОВАННОЙ НА ИХЪ АТОМНОМЪ ВѢСѢ И ХИМИЧЕСКОМЪ СХОДСТВѢ.

		Ti = 50	Zr = 90	? = 180.
		V = 51	Nb = 94	Ta = 182.
		Cr = 52	Mo = 96	W = 186.
		Mn = 55	Rh = 104,4	Pt = 197,1.
		Fe = 56	Ru = 104,4	Ir = 198.
		Ni = Co = 59	Pl = 106,6	O = 199.
H = 1		Cu = 63,4	Ag = 108	Hg = 200.
	Be = 9,4	Mg = 24	Zn = 65,2	Cd = 112	
	B = 11	Al = 27,4	? = 68	Ur = 116	Au = 197?
	C = 12	Si = 28	? = 70	Sn = 118	
	N = 14	P = 31	As = 75	Sb = 122	Bi = 210?
	O = 16	S = 32	Se = 79,4	Te = 128?	
	F = 19	Cl = 35,5	Br = 80	I = 127	
Li = 7	Na = 23	K = 39	Rb = 85,4	Cs = 133	Tl = 204.
		Ca = 40	Sr = 87,6	Ba = 137	Pb = 207.
		? = 45	Ce = 92		
		?Er = 56	La = 94		
		?Yt = 60	Di = 95		
		?In = 75,6	Th = 118?		

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United Nations
al, Scientific and
ural Organization

2019 IYPT

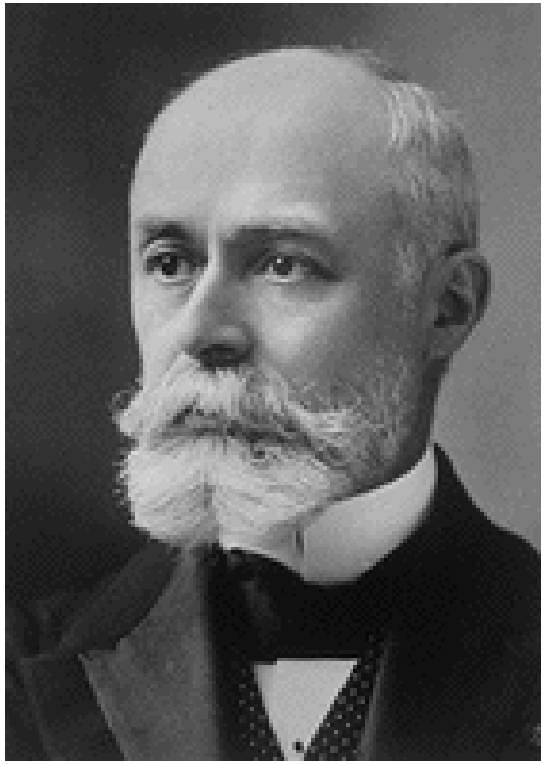
International Year
of the Periodic Table
of Chemical Elements

William Röntgen

- 1845 - 1923
- Worked on thermal conductivity of crystals
- Discovered x-rays in a cathode tube experiment
- Unit of radiation named after him for dose (R)
- Nobel prize in physics in 1901

Henri Becquerel

- 1852 - 1908
- Known for his discovery of natural radiation in uranium in 1896
- Unit of radiation named after him
- 1 disintegration/second = 1 Bq
- Nobel prize together with Marie and Pierre Curie in 1903

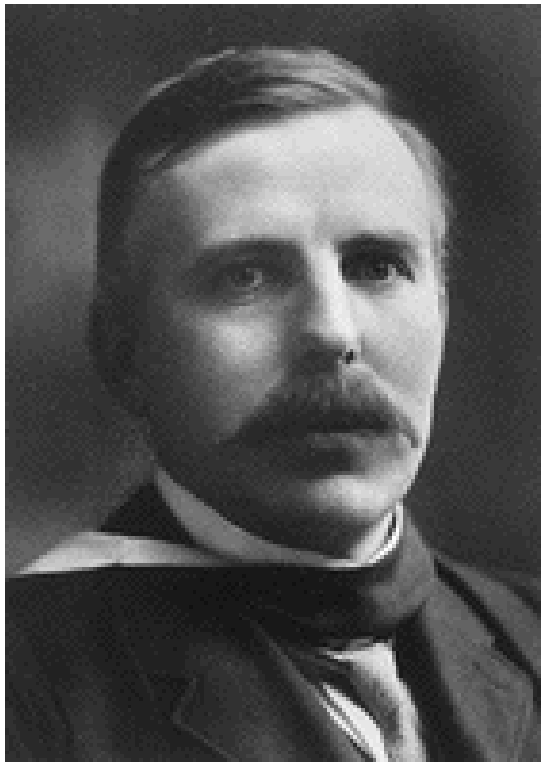


Marie Curie

- 1867 - 1934
- Known for her discovering and separating radium and polonium
- Refused to patent work for money
- Developed unit of radioactivity
- 1 Ci = 37,000,000,000 disintigrations/sec
- Shared Nobel prize in physics in 1903 and full prize in chemistry in 1911 (First to receive two noble prizes!)

Sir Ernest Rutherford

- 1871 - 1937
- Discovered alpha and beta particles in 1898
- Devised method of counting alpha particles with H Geiger
- Investigations of alpha scattering in 1910 led to the discovery of the nucleus
- Nobel prize in chemistry in 1908

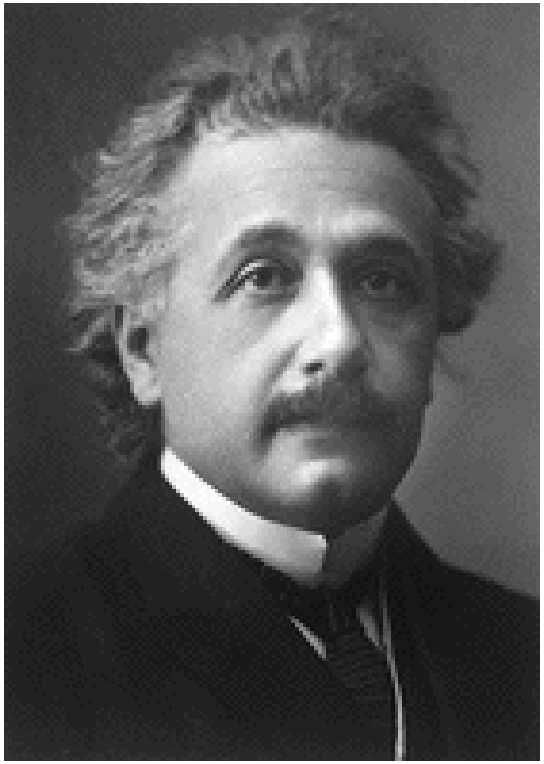


Lise Meitner

- 1878 - 1968
- Spent much of career working with Otto Hahn
- Isolated protactinium with Otto Hahn in 1917
- Worked with Hahn on behavior of beta rays
- Helped discover fission with Hahn and Strassman
- “Meitnerium” named after her (element #109)

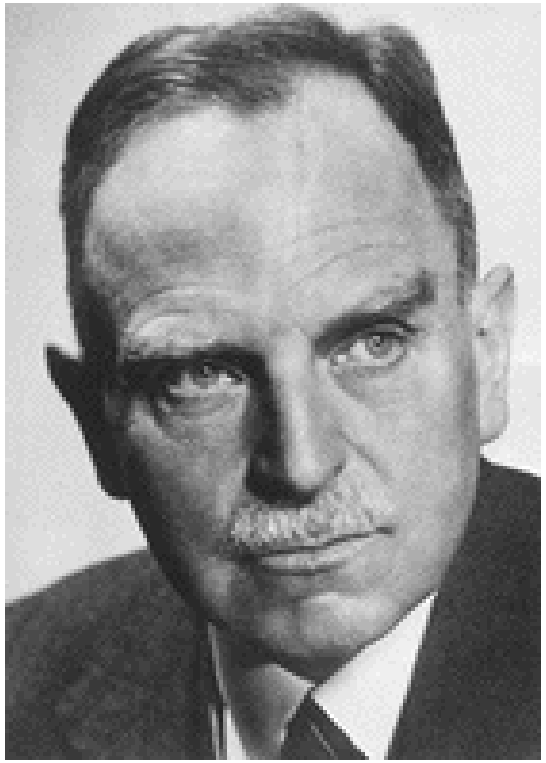
Albert Einstein

- 1879 - 1955
- Postulated photons travel in discrete energy packets (individual photons)
- Theories of special in 1905 and general relativity in 1916
- Nobel prize in physics in 1921



Otto Hahn

- 1879 - 1968
- Discovered radiothorium, radioactinum, and mesothorium
- Developed methods of separating radioactive particles
- Discovered fission by bombarding uranium and thorium with neutrons (including the chain reaction) in 1938 with Strassman
- Nobel prize in chemistry in 1944



Niels Bohr

- 1885 - 1962
- Researched structure of the atom
- Known for the Bohr model of the atom
  - Electrons travel around nucleus in restricted orbits
- Predicted splitting of uranium atoms
- Nobel prize in physics in 1922

Erwin Schrödinger

- 1887 - 1961
- Fundamental works in the field of quantum mechanics
- Schrödinger equation

$$\frac{\delta^2\Psi}{\delta x^2}+\frac{\delta^2\Psi}{\delta y^2}+\frac{\delta^2\Psi}{\delta z^2}+\frac{8\pi^2 m}{h^2}[E-V(x,y,z)]\cdot\Psi(x,y,z)=0$$

- Contributions to color perception and spaces
- Nobel prize in physics in 1933

Edwin Hubble

- 1889 - 1953
- Proofed that milky way is solely one galaxy amongst million others
- Red-shift of galaxy spectra increases with distance
- Hubble constant

  H ~ 74.3 km/s·Mpc

Louis de Broglie

- 1892 - 1987
- Matter and wave-particle duality
- Nobel prize in physics in 1929

$$\lambda = \frac{h}{P}$$

Walter Baade

- 1893 - 1960
- First who proposed with Fritz Zwicky that neutron stars could be formed by supernovae in 1934
- Iron core collapse
- $e^- + p^+ \rightarrow n + \nu$

Enrico Fermi

- 1901 - 1954
- Postulated neutrino and neutron activation
- Contributed to early theory of beta decay
- Demonstrated nuclear transformation with neutrons in elements
- Led experiment that performed first controlled nuclear reaction
- Work led to fission and controlled nuclear reaction
- Nobel prize in physics in 1938

Ernest Lawrence

- 1901 - 1958
- Made vital contributions to atomic bomb
- Invented cyclotron, 1929
  - Accelerated particles to bombard with atoms
    - Made new elements
    - Made anti-matter to study
- Developed e/m ratio of electron
- Nobel prize in physics in 1939

Wolfgang Pauli

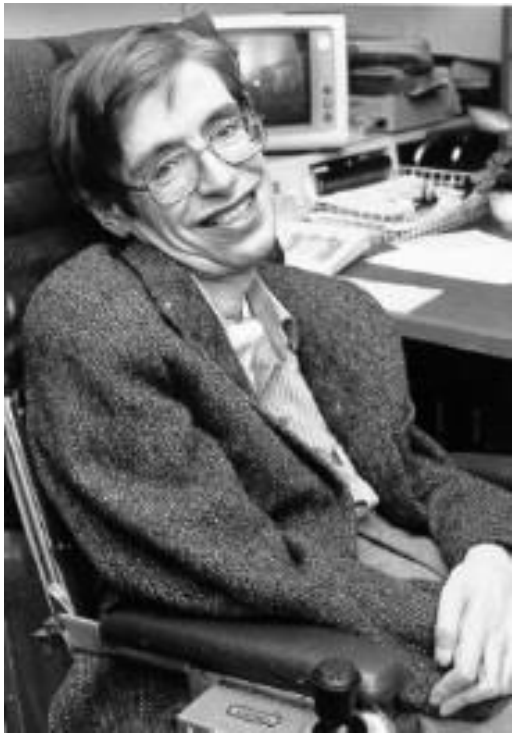
- 1901 - 1958
- Contributions to quantum mechanics
- Formulated the “Exclusion Principle” in 1925: Two electrons in the same atom may not have the same four quantum characteristics
- This is know as the Pauli Principle nowadays

Werner Heisenberg

- 1901 - 1976
- He stated in 1927 that it is impossible to know both the position and speed of an electron at the same time: Heisenberg uncertainty principle
- Nobel prize in physics in 1932

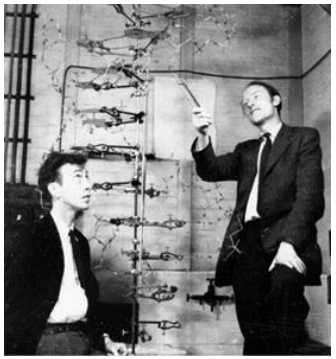
Stephen Hawking

- 1942 - 2018
- Theoretical physicist, cosmologist, author, and Director of Research at the Centre for Theoretical Cosmology
- Postulated the second law of black hole dynamics, i.e. the event horizon of a black hole can never get smaller
- Occupied Lucasian chair of Campbridge University



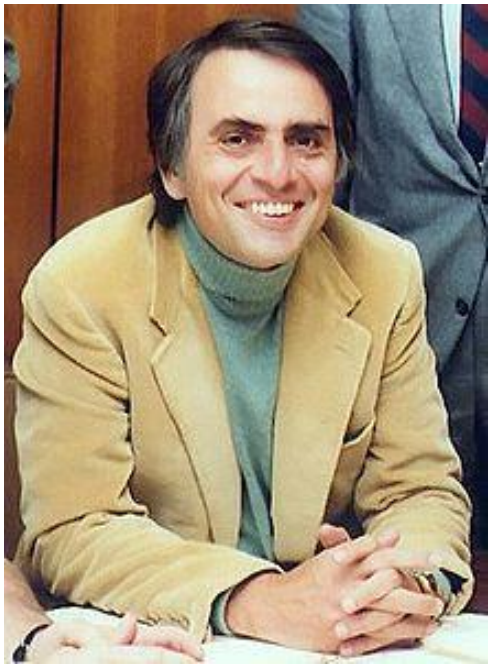
James Dewey Watson

- 1928 -
- American molecular biologist
- Discovered the molecular structure of nucleic acids and its significance for information transfer in living matter
- Nobel prize in medicine or physiology in 1962 together with Francis Crick



Carl Sagan

- 1934 - 1996
- American astronomer, astrophysicist , cosmologist, science populariser, and science communicator in astronomy and natural sciences
- He published more than 600 scientific papers and articles and was author, co-author or editor of more than 20 books. He advocated scientifically skeptical inquiry and the scientific method, pioneered exobiology and promoted the Search for Extra-Terrestrial Intelligence (SETI)
- Sagan is known for his popular science books and for the award-winning 1980 television series Cosmoe: A Personal Voyage. Sagan wrote the novel Contact, the basis for a 1997 movie of the same name



Shuji Nakamura

- 1954 -
- Japanese Electrical Engineer and Material scientist
- Developed the blue LED on the basis of (In,Ga)N, which was patented in 1993
- Nobel prize in physics in 2014 together with I. Akasaki and H. Amano