Named Concepts in Physics

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Absolute zero measurements

Onnes, H.K.; Crommelin, C.A. *Communic. Phys. Lab. Leiden* **1906**, 95a, 1
Onnes, H.K.; Braak, C.; Clay, J. *Proc. Acad. Amsterdam* **1909**, 10, 422; 429
Onnes, H.K.; Braak, C. *K. Acad. Wetenschappen Amsterdam* **1910**, 11, 333; 344
Onnes, H.K.; Holst, G. *Verslag. Akad. Wetenschappen* **1914**, 23, 175
Gibson, G.E.; Giauque, W.F. *J. Am. Chem. Soc.* **1923**, 45, 93
Giauque, W.F. *J. Am. Chem. Soc.* **1927**, 49, 1864
Giauque, W.F.; Clark, C.W. *J. Am. Chem. Soc.* **1932**, 54, 3135
Giauque, W.F.; MacDougall, D.P. *Phys. Rev.* **1933**, 43, 768
Giauque, W.F.; MacDougall, D.P. *Phys. Rev.* **1933**, 44, 235
Giauque, W.F.; MacDougall, D.P. *Phys. Rev.* **1935**, 47, 885
Giauque, W.F.; MacDougall, D.P. *J. Am. Chem. Soc.* **1935**, 57, 1175
Giauque, W.F. *Ind. Eng. Chem.* **1936**, 28, 743

Action of currents on magnets

Oersted, H.C. *Experimenta circa efficacium conflictus electrici in acum magneticum*, 1820
Oersted, H.C. *Ann. Philos.* **1820**, 16, 273
Kemp, J.E. *J. Telegraph Engineers*, **1876**, 5, 459 (translation)

Alpha particles

Rutherford, E. *Phil. Mag.* **1903**, 5, 177
Rutherford, E.; Royds, T.*Phil. Mag.* **1909**, 17, 281
Bragg, W.H. *Phil. Mag.* **1904**, 8, 719
Geiger, H; Nuttall, J.M.*Phil. Mag.* **1911**, 22, 613

Ampère's law

Ampère, A. *Ann. Chim. Phys. Ser. II* **1822**, 20, 60
Ampère, A. *Ann. Chim. Phys. Ser. II* **1820**, 15, 59
Ampère, A. *Mem. de l'Acad. Roy. Sci. Inst.* **1823**, 6, 175

Atomic force microscopy (AFM)

Binnig, G.; Quate, C.F.; Gerber, C. *Phys. Rev. Lett.* **1986**, 56, 930
Binnig, G.; Gerber, C.; Stoll, E.; Albrecht, T.R.; Quate, C.F. *Europhys. Lett.* **1987**, 3, 1281
Rugar, D.; Hansma, P. *Physics Today* **1990**, 43(10), 23

Atomic nucleus
Rutherford, E. *Phil. Mag.* **1911**, 21, 669

Atomic spectroscopy
Kirchhoff, G. *Pogg. Ann.* **1860**, 109, 275
Kirchhoff, G.; Bunsen, R. *Ann. Chem.* **1861**, 118, 349
Hartley, W.N. *J. Chem. Soc.* **1883**, 43, 390

Auger effect, Auger electron spectroscopy
Auger, P.; Dauvillier, A. *Compt. Rend.* **1923**, 176, 1297
Auger, P. *Compt. Rend.* **1923**, 177, 169
Auger, P. *Compt. Rend.* **1924**, 178, 929
Auger, P. *Compt. Rend.* **1924**, 178, 1535
Auger, P. *Compt. Rend.* **1925**, 180, 65
Auger, P. *Compt. Rend.* **1926**, 182, 773

Babinet's principle
Babinet, J. *Compt. Rend.* **1837**, 4, 638; 758

Barkhausen effect
Barkhausen, H. *Physik. Z.* **1919**, 20, 401

BCS theory of superconductivity
Bardeen, J.; Cooper, L.N.; Schrieffer, J.R. *Phys. Rev.* **1957**, 106, 162
Bardeen, J.; Cooper, L.N.; Schrieffer, J.R. *Phys. Rev.* **1957**, 108, 1175
Bardeen, J. *Physica* **1958**, 24, S27

Beer-Lambert-Bouguer's law
Bouguer, P. *Essai d'optique sur la graduation de la lumière*, Paris, 1729
Lambert , J.H. *Photometrica*, 1760
Beer, A., *Ann. Physik* **1852**, 86, 78

Bell operator
Bell, J. *Physics* **1964**, 1, 195

BET method
Brunauer, S.; Emmett, P.H.; Teller, E. *J. Am. Chem. Soc.* **1938**, 60, 309
Teller, E. *ACS Symp. Ser.* **1983**, 222, 227

Biot-Savart law
Biot, J.B.; Savart, F. *Ann. Chim. Phys.* **1820**, 15, 222

Blackbody radiation
Planck, M. *Ann. Physik* **1901**, 4, 553

Bloch-Siegert effect
Bloch, F.; Siegert, A. *Phys. Rev.* **1940**, 57, 522

Bloch equations
Bloch, F., *Phys. Rev.* **1956**, 102, 104
Bloch, F., *Phys. Rev.* **1946**, 70, 460

Bohr correspondence principle
Bohr, N., *Nature* **1921**, 108, 208

Bohr theory, model of atom
Bohr, N., *Phil. Mag.* **1913**, 26, 1; 476
Bohr, N., *Phil. Mag.* **1913**, 26, 857

Bohr's laws of line spectra of gases
Bohr, N. *Phil. Mag.* **1913**, 26, 1; 476; 857

Born-Oppenheimer approximation
Born, M.; Oppenheimer, R., *Ann. Physik (Leipzig)* **1927**, 84, 457

Bose-Einstein statistics
Bose, S.N*., Z. Physik* **1924**, 26, 178
Einstein, A., *Berliner Ber.* **1924**, 261
Einstein, A., *Berliner Ber.* **1925**, 3

Bragg equation, Bragg angle of diffraction, Bragg planes, Bragg reflection indices
Bragg, W.L., *Proc. Cambridge Phil. Soc.* **1912**, 17, 43

Bragg-Gray equation
Gray, L.H. *Proc. Roy. Soc. London* **1936**, 156A, 578

Brewster's stress birefringence; fringes
Brewster, D. *Phil. Trans.* **1815**, 105, 60
Brewster, D. *Phil. Trans.* **1816**, 106, 156
Brewster, D. *Trans. Roy. Soc. Edinburgh* **1818**, 8, 369

de Broglie's law, de Broglie wavelength
de Broglie, L., *Ann. Physik* **1925**, 3, 22
de Broglie, L., *Nature* **1923**, 112, 540
de Broglie, L., *Ann. Phys.* **1925**, 3, 22
de Broglie, L., *Compt. Rend.* **1923**, 177, 517; 548; 630

Brownian motion

Brown, R., *A Brief Account of Microscopial Observations made in the Months of June, July, and August 1827 on the Particles Contained in the Pollen of Plants; and on the General Existence of Active Molecules in Organic and Inorganic Bodies*, 1827
Brown, R., *Miscellaneous Botanical Works,* Vol. I, **1866**, p. 465
Wiener, J.C. *Ann. Phys.* **1863**, 118, 79
Gouy, L.G. *J. Physique* **1888**, 7, 561
Einstein, A. *Ann. Physik* **1905**, 17, 549
Einstein, A. *Ann. Physik* **1906**, 19, 371
Langevin, P. *Compt. Rend.* **1908**, 146, 530
Perrin, J. *Atoms*, Constable: London, 1916

Carr-Purcell experiment

Carr,H.Y.; Purcell, E.M. *Phys. Rev.* **1954**, 94, 630

Casimir effect

Casimir, H.B.G.; Polder, D. *Phys. Rev.* **1948**, 73, 360
Casimir, H.B.G. *Proc. K. Ned. Akad. Wettensch.* **1948**, 60, 793

Casimir operator

Casimir, H.B.G. *Proc. Roy. Acad. Amsterdam* **1931**, 34, 844

Chain reacting atomic pile

Fermi, E.; Segre, E. *Phys. Rev.* **1941**, 59, 680
Fermi, E. *Proc. Am. Phil. Soc.* **1946**, 90, 20

Cherenkov effect

Cherenkov, P.A. *Compt. Rend. Acad. Sci. USSR* **1934**, 2, 451
Cherenkov, P.A. *Dokl. Akad. Nauk SSSR* **1934**, 2, 451
Tamm, I.E.; Frank, I.M. *Compt. Rend. Acad. Sci. USSR* **1937**, 14, 107
Tamm, I.E.; Frank, I.M. *Dokl. Akad. Nauk SSSR* **1934**, 14, 107
Vavilov, S.I. *Compt. Rend. Acad. Sci. USSR* **1934**, 2, 457
Vavilov, S.I. *Dokl. Akad. Nauk SSSR* **1934**, 2, 457

Clausius statement of second law of thermodynamics

Clausius, R., *Ann. Physik Chem.* **1850**, 79, 368
Clausius, R., *Ann. Physik Chem.* **1850**, 79, 500

Clusius-Dickel thermal diffusion column

Clusius, K; Staveley, L.; Dickel, G. *Z. Physik. Chem.* **1941**, 50B, 403
Clusius, K.; Dickel, G. *Naturwiss.* **1940**, 28, 711
Dickel, G.; Clusius, K. *Naturwiss.* **1940**, 28, 461
Dickel, G.; Clusius, K. *Z. Physik. Chem.* **1940**, B48, 50
Clusius, K.; Dickel, G. *Naturwiss.* **1941**, 29, 560
Clusius, K.; Dickel, G. *Z. Physik. Chem.* **1942**, 52B, 348
Clusius, K.; Dickel, G. *Z. Physik. Chem.* **1943**, 53B, 178
Müller, G.; Vasaru, G. *Isotopenpraxis* **1988**, 24, 455

Compton effect, Compton wavelength

Compton, A.H., *Phys. Rev*. **1923**, 21, 409
Compton, A.H., *Phys. Rev*. **1923**, 21, 483

Concept of D(Dirichlet)-branes

Polchinski, J. *Phys. Rev. Lett.* **1995**, 75, 4724
Horowitz, G.T.; Polchinski, J. *Phys. Rev. D* **1997**, 55, 6189; 6423

Concept of laser

Schawlow, A.R.; Townes, C.H. *Phys. Rev.* **1958**, 112, 1940
Solon, L.R.; Aronson, R.; Gould, G. *Science* **1961**, 134, 1506
Rabinowitz, P.; Jacobs, S.; Gould, G. *Appl. Opt.* **1962**, 1, 513
Jacobs, S.; Gould, G.; Rabinowitz, P. *Phys. Rev. Lett.* **1961**, 7, 415
Gould, G. *Appl. Opt. Suppl.* **1965**, 2, 59
Jarrett, S.M.; Nunez, J.; Gould, G. *Appl. Phys. Lett.* **1965**, 7, 294
Piltch, M.; Gould, G. *Rev. Sci. Instrum.* **1966**, 37, 925
Piltch, M.; Walter, W.T.; Solimene, N.; Gould, G.; Bennett, W.R. Jr. *Appl. Phys. Lett.* **1965**, 7, 309
Jarrett, S.M.; Nunez, J.; Gould, G. *Appl. Phys. Lett.* **1966**, 8, 150
Walter, W.T.; Solimene, N.; Piltch, M.; Gould, G. *IEEE J. Quant. Electronics* **1966**, 2, 474
Gould, G. US Pat. 4,053,845 (1977/10/11) Optically pumped laser amplifiers

Concept of overvoltage

Caspari, W.A. *Z. Physik. Chem.* **1899**, 30, 89

Concept of quarks

Gell-Mann, M. *Phys. Lett.* **1964**, 8, 214
Feynman, R.P.; Gell-Mann, M.; Zweig, G. *Phys. Rev. Lett.* **1964**, 13, 678
Zweig, G. *CERN Report No. 8419/TH412*, February 21, 1964

Concepts in condensed matter physics

Landau, L.D. *Phys. Z. Sowjet.* **1937**, 11, 26; 129; 545
Landau, L.D.; Pomeranchuk, I. *Phys. Z. Sowjet.* **1936**, 10, 649
Landau, L.D. *J. Phys. USSR* **1941**, 5, 71
Landau, L.D. *J. Phys. USSR* **1946**, 11, 91
Landau, L.D. *J. Phys. USSR* **1943**, 7, 99
Landau, L.D. *J. Phys. USSR* **1944**, 8, 1
Landau, L.D.; Khalatnikov, I.M. *JETP* **1949**, 19, 637; 709
Landau, L.D.; Ginzburg, V.L. *JETP* **1950**, 20, 1064
Landau, L.D. *JETP* **1956**, 30, 1058
Landau, L.D. *JETP* **1957**, 32, 59
Landau, L.D. *JETP* **1958**, 35, 97

Conservation of energy

Helmholtz, H. *Ueber die Erhaltung der Kraft*, 1847
Tyndall, J. *Sci. Memoirs Natural Philosophy*, **1853**, 114 (translation)

Continuous wavelet transform (cochlear transform)
Zweig, G.; Lipes, R.; Pierce, J.R. *J. Acoustical Soc. Am.* **1976**, 59, 975
Zweig, G. *Cold Spring Harbor Symp. Quant. Biol.* **1976**, 40, 619

Cooley-Tukey algorithm
Cooley, J.W.; Tukey, J.W. *Math. Comput.* **1965**, 19, 297

Coriolis force
Coriolis, G.G. *J. Ecole Polytechn.* **1832**, 13, 228; 265
Coriolis, G.G. *Compt. Rend.* **1836**, 2, 85

Coulomb's law
Coulomb, C.A. *Mem. de l'Acad. Roy. Sci.* **1788**, 569; 578

Curie unit of radiation
Curie, P; Desains, P., *Compt. Rend*. **1880**, 90, 1506
Curie, M. *Compt. Rend.* **1898**, 126, 1101
Curie, M.S., Curie, P., *Compt. Rend.* **1898**, 127, 175
Curie, M.S.; Curie, P.; Bémont, G., *Compt. Rend.* **1898**, 127, 1215

Curie-Weiss law, Curie temperature, Curie point
Curie, P.; Curie, J., *Compt. Rend.* **1880**, 91, 294
Curie, P. *Ann. Chim. Phys*. **1895**, 5[7], 289
Weiss, P. *J. Physique* **1905**, 4, 469; 829
Weiss, P.; Kunz, J. *J. Physique* **1905**, 4, 847
Weiss, P. *Compt. Rend.* **1906**, 144, 25
Weiss, P. *Compt. Rend.* **1906**, 143, 1136

Debye-Hückel law
Debye, P.; Huckel, E., *Physik. Z*. **1923**, 24, 185; 334
Debye, P.; Huckel, E., *Physik. Z*. **1924**, 25, 97

Debye equation for polarization
Debye T^3 law, Debye-Einstein law, Debye temperature
Debye, P., *Ann. Physik* **1912**, 39, 789

Debye-Waller factor
Waller, I. *Z. Physik* **1923**, 17, 398
Waller, I. *Z. Physik* **1926**, 38, 635
Waller, I. *Ann. Physik* **1926**, 79, 261
Waller, I. *Ann. Physik* **1927**, 83, 153
Waller, I. *Phil. Mag.* **1927**, 4[7], 1228

Density functional theory

Hohenberg, P.; Kohn, W. *Phys. Rev.* **1964**, 136, B864
Kohn, W.; Sham, L.J. *Phys. Rev.* **1965**, 140, A1133
Merwin, N.D. *Phys. Rev.* **1965**, 137A, 1441
Schlüter, M.; Sham, L.J. *Physics Today* **1982**, 35(2), 36
Becke, A.D., *Phys. Rev. A* **1988**, 38, 3098
Lee, C.; Yang, W.; Parr. R.G., *Phys. Rev. B* **1988**, 37, 785

Density matrix concept for energy

Landau, L.D.

Determination of e/m ratio for cathode rays deflected in magnetic field

Schuster, A. *Proc. Roy. Soc. London* **1884**, 37, 317
Schuster, A. *Proc. Roy. Soc. London* **1887**, 42, 371
Schuster, A. *Proc. Roy. Soc. London* **1890**, 47, 526

Development of the cyclotron

Lawrence, E.O.; Livingston, M.S. *Science* **1930**, 72, 376
Lawrence, E.O.; Livingston, M.S. *Phys. Rev.* **1931**, 38, 834
Lawrence, E.O.; Livingston, M.S. *Phys. Rev.* **1932**, 40, 19
Lawrence, E.O.; Livingston, M.S. *Phys. Rev.* **1934**, 45, 608
Lawrence, E.O.; Cooksey, D. *Phys. Rev.* **1936**, 50, 1131
Lawrence, E.O. *Prix Nobel* **1951**, 127

Diamagnetism

Faraday, M. *Phil. Trans.* **1846**, 136, 21
Faraday, M. *Phil. Trans.* **1846**, 136, 41
Weber, M.W. *Ann. Pogg.* **1852**, 87, 145

Diffraction of light

Fresnel, A. *Mem. de l'Acad. Sci.* **1826**, 5, 339

Dirac bra-ket ("bra" and "ket") notation

Dirac, P.A.M., *The Principles of Quantum Mechanics*, Clarendon Press: Oxford, 1958

Discovery of antideuteron

Massam, T.; Muller, T.; Righini, B.; Schneegans, M.; Zichichi, A. *Nuovo Cimento* **1965**, 39, 10
Dorfan, D.E.; Eades, J.; Lederman, L.M.; Lee, W.; Ting, C.C. *Phys. Rev. Lett.* **1965**, 14, 1003

Discovery of antineutron

Cork, B.; Lamberston, G.R.; Piccioni, O.; Wenzel, W.A. *Phys. Rev.* **1956**, 104, 1193

Discovery of antiproton

Chamberlain, O.; Segre, E.; Wiegand, C.; Ypsilantis, T. *Phys. Rev.* **1955**, 100, 947
Chamberlain, O.; Segre, E.; Wiegand, C.; Ypsilantis, T. *Nature* **1956**, 177, 11

Discovery of cathode rays

Plücker, J. *Ann. Physik* **1859**, 107, 497; 638
Plücker, J. *Ann. Chim. Phys.* **1859**, 57, 497
Plücker, J. *Proc. Roy. Soc. London* **1959 - 1860**, 10, 256
Plücker, J. *Nuovo Cimento* **1860**, 11, 66
Plücker, J. *Ann. Physik* **1862**, 116, 27
Hittorf, W. *Ann. Physik* **1869**, 136, 1; 197
Hittorf, W. *Ann. Chim. Phys.* **1869**, 17, 487
Goldstein, E. *Sitzungsber. Konigl. Akad. Wissensch. Berlin* **1886**, 39, 691

Discovery of cosmic ray sources

Fiorini, E.; Giacconi, R.; Succi, C. *Nuovo Cimento* **1957**, 6, 963

Discovery of dark matter

Zwicky, F. *Physics Today* **1953**, 6(4), 7

Discovery of electron

Thomson, J.J. *Phil. Mag.* **1897**, 44, 293
Wiechert, J.E. *Ann. Phys.* **1897**, 61, 544

Discovery of field particles W and Z

Cline, D.; Mann, A.K.; Rubbia, C. *Phys. Rev. Lett.* **1970**, 25, 1309
Cline, D.; Rubbia, C. *Physics Today* **1980**, 33(8), 50
Cline, D.; Rubbia, C.; van der Meer, S. *Sci. Amer.* **1982**, 246(3), 48

Discovery of magnetic properties of crystals (tourmaline)

Plücker, J. *Ann. Physik* **1847**, 72, 315

Discovery of neutrino

Fermi, E. *Z. Physik* **1934**, 89, 522 (hypothesis)
Gamow, G. *Physik. Blaetter* **1949**, 5, 108 (hypothesis)
Reines, F.; Cowan, C.L. Jr. *Phys. Rev.* **1953**, 90, 492
Reines, F.; Cowan, C.L. Jr. *Phys. Rev.* **1953**, 92, 830
Cowan, C.L. Jr.; Reines, F.; Harrison, F.B.; Kruse, H.W.; McGuire, A.D. *Science* **1956**, 124, 103
Reines, F.; Cowan, C.L. Jr. *Nature* **1956**, 178, 446
Reines, F.; Cowan, C.L. Jr. *Physics Today* **1957**, 10(8), 12

Discovery of neutron

Chadwick, J. *Nature* **1932**, 129, 312
Chadwick, J. *Proc. Roy. Soc. London A* **1932**, 136, 692
Chadwick, J. *Z. Elektrochem.* **1932**, 38, 546
Chadwick, J. *Brit. J. Radiol.* **1933**, 6, 24
Chadwick, J. *Proc. Roy. Soc. London A* **1933**, 142, 1

Discovery of non-conservation parity laws

Wu, C.S. *Proc. Inter. School Physics Enrico Fermi* **1966**, 32, 52
Wu, C.S. *Alpha-, Beta-, and Gamma-ray Spectr.* **1965**, 2, 1313; 1365; 1415

Discovery of parahydrogen

Bonhoeffer, K.F.; Harteck, P. *Naturwiss.* **1929**, 17, 182

Discovery of plane polarized light

Malus, E.L. *Mem. Soc. d'Arceuil* **1809**, 2, 143

Discovery of positron

Anderson, C.D. *Phys. Rev.* **1933**, 43, 491
Anderson, C.D.; Neddermeyer, S.H. *Phys. Rev.* **1933**, 43, 1034
Neddermeyer, S.H.; Anderson, C.D. *Phys. Rev.* **1934**, 45, 498
Anderson, C.D.; Neddermeyer, S.H. *Phys. Rev.* **1934**, 45, 653
Anderson, C.D. *Naturwiss.* **1934**, 22, 293

Discovery of pulsars

Hewish, A.; Bell, S.J.; Pilkington, J.D.H.; Scott, P.F.; Collins, R.A. *Nature* **1968**, 217, 709
Pilkington, J.D.H.; Hewish, A.; Bell, S.J.; Cole, T.W. *Nature* **1968**, 218, 126

Discovery of rotation of plane polarized light due to optically active solutions (discovery of optical activity)

Biot, J.B. *Mem. Acad. Sci. Inst.* **1819**, 2, 41

Disintegration of the elements

Rutherford, E. *Phil. Mag.* **1900**, 49, 1
Rutherford, E.; Soddy, F. *Phil. Mag.* **1903**, 5, 576
Rutherford, E. *Phil. Mag.* **1911**, 21, 669
Rutherford, E. *Radio-activity*, Cambridge University Press: Cambridge, 1904
Rutherford, E. *Radioactive Substances and their Radiations*, Cambridge University Press: Cambridge, 1913
Rutherford, E. *Radioactive Transformations*, Yale University Press: New Haven, 1906

Dispersion of light into component colours

Newton, I. *Phil. Trans.* **1672**, 80, 3075
Newton, I. *Phil. Trans. Abridged* **1672**, 1, 128
Newton, I. *Treatise on Optics*, 1704

Doppler effect

Doppler, C. *Abhand. Köngl. Böhm. Gesellsch.* **1842**, 2(5), 465
Doppler, C. *Ann. Physik Chem.* **1846**, 68, 1

Drude equations

Drude, P. *Ann. Physik* **1889**, 36, 532; 865

Drude, P. *Ann. Physik* **1890**, 39, 481
Drude, P. *The Theory of Optics*, Longmans: London, 1902
Drude, P. *Ann. Physik* **1904**, 14, 677; 936
Airy, G.B. *Phil. Mag.* **1833**, 2, 20
Airy, G.B. *Trans. Cambridge Phil. Soc.* **1833**, 4, 279; 313

Dye laser

Schaefer, F.P.; Schmidt, W. *Z. Naturforch. A* **1964**, 19A, 1019
Marowsky, G.; Ringwelski, L.; Schaefer, F.P. *Z. Naturforch. A* **1972**, 27A, 711
Schaefer, F.P.; Ringwelski, L. *Z. Naturforch. A* **1973**, 28A, 792
Schaefer, F.P. *Trends Phys. Plenary Lect. Gen. Conf. Eur. Phys. Soc.* **1973**, 287
Basting, D.; Schaefer, F.P.; Steyer, B. *Appl. Phys. (Berlin)* **1974**, 3, 81
Schaefer, F.P. *Top. Curr. Chem.* **1976**, 61, 1
Schaefer, F.P. *Lect. Notes Physics* **1975**, 43, 39
Schaefer, F.P. *Springer Ser. Optical Science* **1976**, 3, 50
Schaefer, F.P. *Laser Chemistry* **1983**, 3, 265
Schaefer, F.P. *Top. Appl. Phys.* **1992**, 70, 19
Schaefer, F.P. *EPA Newsletter* **1993**, 47, 33

Ehrenfest equation, Ehrenfest theorem

Ehrenfest, P., *Z. Physik* **1927**, 45, 455

Ehrenfest adiabatic law

Ehrenfest, P., *Ann. Physik* **1916**, 51, 327
Ehrenfest, P., *Phil. Mag.* **1917**, 33, 500

Ehrenfest symmetry factor

Ehrenfest, P.; Trkal, V. *Ann. Physik* **1921**, 65, 609

Eight-fold way

Gell-Mann, M. *California Institute of Technology Synchrotron Laboratory*, Report CTSl-20, 1961
Ne'eman, Y. *Nuclear Physics* **1961**, 26, 222
Gell-Mann, M. *Phys. Rev.* **1962**, 125, 1067

Einstein mass-energy equation

Einstein, A., *Ann. Physik* **1905**, 17, 891
Einstein, A., *Ann. Physik* **1916**, 49, 769
Einstein, A., *Berlin Sitzber.* **1915**, 778; 799; 831; 844

Einstein equation for specific heat, Einstein law, Einstein temperature

Einstein, A., *Ann. Physik* **1907**, 22, 180

Einstein-Smoluchowski equation

Einstein, A., *Z. Elektrochem.* **1908**, 14, 235
Smoluchowski, M., *Ann. Physik* **1908**, 25, 205

Electromagnetic radiation

Hertz, H. *Sitzber. Berlin Akad. Wiss. Wiedem. Ann.* **1888**, 34, 551
Hertz, H. *Electric Waves*, Macmillan: London, 1893

Electromotive force, potential, unit of volts, principle of batteries

Volta, A., *Phil. Trans.* **1800**, 90, 403

Electron configuration of atoms (Aufbau principle)

Bohr, N. *Z. Physik* **1922**, 9, 1
Stoner, E.C.*Phil. Mag.* **1924**, 48, 719

Electron diffraction by crystals

Davisson, C.J.; Germer, L.H. *Phys. Rev.* **1920**, 15, 330
Davisson, C.J.; Pidgeon, H.A. *Phys. Rev.* **1920**, 15, 553
Davisson, C.J.; Kunsman, C.H. *Science* **1921**, 54, 522
Davisson, C.J.; Kunsman, C.H. *Phys. Rev.* **1922**, 19, 534
Davisson, C.J.; Kunsman, C.H. *Phys. Rev.* **1922**, 20, 110
Davisson, C.J.; Kunsman, C.H. *Phys. Rev.* **1923**, 22, 242
Davisson, C.J. *Phys. Rev.* **1923**, 21, 637
Davisson, C.J.; Germer, L.H. *Nature* **1927**, 119, 558
Davisson, C.J.; Germer, L.H. *Phys. Rev.* **1927**, 30, 705
Davisson, C.J.; Germer, L.H. *Proc. Natl. Acad. Sci. USA* **1928**, 14, 317; 619
Davisson, C.J. *J. Franklin Inst.* **1928**, 205, 597
Davisson, C.J.; Germer, L.H. *Phys. Rev.* **1928**, 31, 155
Thomson, G.P. *Proc. Roy. Inst. Gt. Brit.* **1928**, 122, 470
Thomson, G.P. *Phil. Mag.* **1928**, 6[7], 939
Thomson, G.P. *Nature* **1929**, 123, 912
Thomson, G.P. *Proc. Roy. Soc. London* **1929**, A125, 352
Thomson, G.P. *Proc. Roy. Soc. London* **1930**, A128, 649
Thomson, G.P. *Nature* **1930**, 126, 55
Thomson, G.P. *Proc. Roy. Soc. London* **1931**, A133, 1
Davisson, C.J.; Germer, L.H. *Phys. Rev.* **1931**, 38, 124
Thomson, G.P. *Nature* **1935**, 135, 492

Electron microscopy

Muller, K.; Ruska, E. *Mikroscopie* **1969**, 23, 197
Riecke, W.D.; Ruska, E. *Z. Wiss. Mikr.* **1957**, 63, 288
Ruska, E. *Rev. Mod. Phys.* **1987**, 59 (Pt. 1), 627
Ruska, E. *Bioscience Rep.* **1987**, 7, 607
Ruska, E. *Phys. Bl.* **1987**, 43, 271
Nordgren, J.; Agren, H.; Werme, L.O.; Nordling, C.; Siegbahn, K.
J. Phys. B. **1976**, 9, 295

Electron spin resonance

Zavoiskii, E.K. *Zh. Eksptl. Teoret. Fiz.* **1947**, 17, 155
Zavoiskii, E.K. *Zh. Eksptl. Teoret. Fiz.* **1947**, 17, 883
Zavoiskii, E.K. *J. Phys. (USSR)* **1947**, 11(2)

Zavoiskii, E.K. *Doklady Akad. Nauk SSSR* **1947**, 57, 887
Zavoiskii, E.K. *Chem. Zentr. (Russian Zone Ed.)* **1949**, 1, 170
Wertz, J.E. *Chem. Rev.* **1955**, 55, 829
Ayscough, P. *Electron Spin Resonance in Chemistry*, London, 1967

Faraday's law, Faraday effect

Faraday, M., *Phil. Trans.* **1833**, 123, 23
Faraday, M., *Phil. Trans.* **1834**, 124, 77
Faraday, M., *Experimental Researches in Electricity*, 1859

Fermi-Dirac distribution

Dirac, P.A.M., *Proc. Roy. Soc. London Ser. A.,* **1926**, 112, 661
Fermi, E., *Z. Physik* **1926**, 36, 902

Fick's first law of diffusion, Fick's second law of diffusion

Fick, A., *Ann. Physik* **1855**, 94, 59

Franck-Condon transition, Franck-Condon factor, Franck-Condon principle

Franck, J., *Trans. Faraday Soc.* **1925**, 21, 536
Condon, E.U., *Phys. Rev.* **1928**, 32, 858
Condon, E.U., *Am. J. Phys.* **1947**, 15, 365

Fabry-Pérot interferometer

Fabry, C.; Pérot, A. *Compt. Rend.* **1896**, 123, 802
Fabry, C.; Pérot, A. *Compt. Rend.* **1898**, 126, 34

Faraday effect

Faraday, M. *Phil. Mag.* **1846**, 28, 294
Faraday, M. *Phil. Mag.* **1846**, 29, 153

Fermat's principle of least time

Fermat, P. *Oeuvres de Fermat (Paris)* **1891**, 2, 354

Ferromagnetism theory

Heisenberg, W. *Z. Physik* **1928**, 49, 619

Feynman diagram

Feynman, R.P. *Phys. Rev.* **1948**, 74, 939; 1430
Feynman, R.P. *Phys. Rev.* **1949**, 76, 769
Feynman, R.P. *Phys. Rev.* **1950**, 80, 440
Dyson, F.J. *Phys. Rev.* **1949**, 75, 486; 1736

Feynman ratchet and pawl

Feynman, R.P.; Leighton, R.B.; Sands, M. *The Feynman Lectures on Physics*, Addison-Wesley: Reading, MA, 1966, Vol. 1, p. 46.1-46.9

Fluorescence

Stokes, G. *Proc. Roy. Soc. London* **1852**, 6, 195

Fraunhofer lines

Fraunhofer, J. *Gilberts Ann.* **1817**, 56, 264

Fredericksz (Frederiks, Fredericks) effect

Frederiks, V.; Zolina, V. *Trans. Faraday Soc.* **1933**, 29, 919
Frederiks, V.; Zvetkoff, V. *Sov. Phys.* **1934**, 6, 490
Zwetkoff, V. *Acta Phys. Chim. USSR* **1937**, 6, 865
Tsvetkov, V.N.; Sosnovskii, A. *Acta Phys. Chim. USSR* **1943**, 18, 358
Fredericks, V.K.; Zolina, V. *J. R. F. (Kharkov) Phys.* **1969**, 62, 457

Fresnel rhombs

Fresnel, A. *Ann. Chim. Phys.* **1825**, 28, 147

Fresnel laws

Fresnel, A. *Mem. de l'Acad.* **1832**, 11, 393
Fresnel, A. *Oeuvres* 1, 767

Foucault's pendulum

Foucault, J. *Compt. Rend.* **1862**, 55, 501

Fourier heat theorem

Fourier, J. *Théore Analytique de la Chaleur*, 1822

Gamow-Condon-Gurney law

Gamow, G. *Z. Physik* **1928**, 51, 204
Condon, E.U.; Gurney, R.W. *Phys. Rev.* **1929**, 33, 127

Gamow-Teller selection rule

Gamow, G.; Teller, E. *Phys. Rev.* **1936**, 49, 895

Gauss' law

Gauss, C.F. "*Werke", Königlichen Gesell. Wissen. Göttingen,* Göttingen, 1877, Vol. 5

Geiger counter

Rutherford, E.; Geiger, H. *Proc. Roy. Soc. London A*, **1908**, 81, 612
Geiger, H.; Marsden, E. *Proc. Roy. Soc. London A* **1909**, 82, 495

Geiger, H.; Marsden, E. *Proc. Roy. Soc. London A* **1910**, 83, 492
Geiger, H.; Marsden, E. *Phil. Mag.* **1913**, 25, 605

Geiger-Nuttall law
Geiger, H.; Nuttall, J.M. *Phil. Mag*. **1911**, 22, 613
Geiger, H.; Nuttall, J.M. *Phil. Mag*. **1912**, 24, 647

General theory of relativity
Einstein, A. *Berl. Sitz.* **1915**, 778; 799; 831; 844
Einstein, A. *Ann. Physik* **1916**, 49, 769

Glan prism
Glan, P. *Ann. Physik Chem.* **1877**, 1, 351

Hahn spin echoes
Hahn, E.L. *Phys. Rev.* **1950**, 80, 580

Hall effect
Hall, E.H. *Am. J. Math.* **1879**, 2, 287
Hall, E.H. *Phil. Mag.* **1880**, 9(Ser. 5), 225

Hamiltonian operator
Hamilton, W.R., *Trans. Roy. Irish Acad.* **1828**, 15, 69
Hamilton, W.R., *Trans. Roy. Irish Acad.*. **1830**, 16, 1
Hamilton, W.R., *Trans. Roy. Irish Acad.*. **1831**, 16, 93
Hamilton, W.R., *Trans. Roy. Irish Acad.*. **1837**, 17, 1

Hanle effect
Hanle, W. *Z. Physik* **1924**, 30, 93
Hanle, W. *Z. Physik* **1926**, 35, 346
Hanle, W.; Larche, K. *Z. Physik* **1933**, 85, 548

Hartmann-Hahn experiment
Hartmann, S.R.; Hahn, E.L. *Phys. Rev.* **1962**, 128, 2042

Hartree-Fock-Roothaan method
Roothaan, C.C.J., *Rev. Mod. Phys.* **1951**, 23, 69
Roothaan, C.C.J., *Rev. Mod. Phys.* **1951**, 23, 80
Roothaan, C.C.J., *Rev. Mod. Phys*. **1960**, 32, 179
Fock, V., *Z. Physik* **1930**, 61, 126
Fock, V., *Z. Physik* **1926**, 39, 226
Fock, V., *Z. Physik* **1926**, 38, 242
Hartree, D.R., *Proc. Cambridge Phil. Soc.* **1928**, 24, 111
Hartree, D.R., *Proc. Cambridge Phil. Soc.* **1928**, 24, 426
Hartree, D.R., *Proc. Cambridge Phil. Soc.* **1929**, 25, 225
Hartree, D.R., *Proc. Cambridge Phil. Soc.* **1929**, 25, 310

Heisenberg uncertainty principle
Heisenberg, W., *Z. Physik* **1927**, 43, 172

Heitler-London treatment
Heitler, W.; London, F., *Z. Physik* **1927**, 44, 455

Hellman-Feynman theorem
Hellmann, H. *Z. Physik* **1933**, 85, 180
Hellmann, H. *Einführung in die Quantenchemie*, Franz Deuticke & Co.: Leipzig, 1937
Feynman, P. *Phys. Rev.* **1939**, 56, 340

Helmholtz equation
Helmholtz, H. *Sitzber. Berlin Akad. Wissen. Abh.* **1882**, 1, 21; 825
Helmholtz, H. *Sitzber. Berlin Akad. Wissen. Abh.* **1883**, 2, 958; 1895
Helmholtz, H. *Sitzber. Berlin Akad. Wissen. Abh.* **1883**, 3, 92

Higgs boson

Higgs field

Hubble's law
Hubble, E.P. *Proc. Natl. Acad. Sci. USA* **1929**, 15, 168
Hubble, E.P. *Science* **1930**, 72, 407
Hubble, E.; Humason, M.L. *Astrophys. J.* **1931**, 74, 43
Hubble, E.; Tolman, R.C. *Astrophys. J.* **1935**, 82, 302
Hubble, E. *Astrophys. J.* **1936**, 84, 517
Hubble, E.P. *Proc. Natl. Acad. Sci. USA* **1936**, 22, 621
Hubble, E.P. *Monthly Not. Roy. Astron. Soc.* **1937**, 97, 506
Hubble, E.P. *Monthly Not. Roy. Astron. Soc.* **1953**, 113, 658

Hückel's Rules
Hückel, E., *Z. Physik* **1931**, 70, 204
Hückel, E., *Z. Physik* **1932**, 76, 628
Hückel, E., *Z. Elektrochem.* **1937**, 43, 752

Hund's Rules
Hund, F., *Z. Physik* **1925**, 33, 345
Hund, F., *Z. Physik* **1925**, 34, 296

Huygen's principle (wave nature of light)
Huygen, C. *Traité de la lumière*, Leyden, 1690

Hydrogen spectrum transitions
Balmer series

Balmer, J.J., *Ann. Physik Chem.* **1885**, 25, 80

Brackett series

Brackett, F., *Nature* **1922**, 109, 209

Lyman series

Lyman, T., *Phys. Rev.* **1914**, 3, 504

Paschen series

Paschen, F., *Ann. Physik* **1908**, 27, 537

Pfund series

Pfund, A.H., *J. Opt. Soc. Am.* **1924**, 9, 193

Humphreys series

Humphreys, C.J., *J. Research Natl. Bur. Standards* **1953**, 50, 1

Induced currents

Faraday, M. *Phil. Trans.* **1822**, 122, 125
Faraday, M. *Phil. Trans.* **1835**, 125, 41
Faraday, M. *Phil. Mag.* **1843**, 22, 200

Inflationary cosmology

Guth, A. *Phys. Rev. D* **1981**, 23, 347
Blau, S.; Guth, A. *Inflationary Cosmology* , in 300 Years of Gravitation, (S. Hawking, W. Israel, eds.) 1987

Insulation

Faraday, M. *Phil. Trans.* **1838**, 128, 83

Interference of light

Young, T. *Phil. Trans.* **1804**, 94, 1

Ising model

Ising, E., *Z. Physik* **1925**, 31, 253

Jahn-Teller effect

Jahn, H.A.; Teller, E., *Proc. Roy. Soc. London Ser. A.,* **1937**, 161, 220
Jahn, H.A.; Teller, E., *Proc. Roy. Soc. London Ser. A*., **1938**, 164, 117
Jahn, H.A., *Phys. Rev*. **1936**, 49, 874

Johnson noise

Johnson, J.B. *Phys. Rev.* **1928**, 32, 97

Jones effect

Jones, R.C. *J. Opt. Soc. Am.* **1948**, 38, 671

Joule's first law, Joule's second law

Joule, J.P., *Phil. Mag.* **1841**, 19, 260

Josephson effect
Josephson, B.D. *Phys. Lett.* **1962**, 1, 251

Kepler's first law
Kepler, J. *Astronomica Nova*, (1609)

Kepler's second law
Kepler, J. *Epitome Astronomiae Copernicanae*, Book V (1621)

Kepler's third law
Kepler, J. *Harmonice Mundi* (1619)

Kerr magneto-optic effect
Kerr, J. *Phil. Mag.* **1875**, 50, 337; 446
Kerr, J. *Phil. Mag.* **1877**, 3(Ser. 5), 321
Kerr, J. *Phil. Mag.* **1878**, 5(Ser. 5), 161
Kerr. J. *Phil. Mag.* **1880**, 9(Ser. 5), 157

Kirchhoff's circuit laws
Kirchhoff, G. *Ann. Physik Chem.* **1845**, 64, 497
Kirchhoff, G. *Ann. Physik Chem.* **1847**, 72, 497
Kirchhoff, G. *Ann. Physik Chem.* **1848**, 75, 189
Kirchhoff, G. *Phil. Mag.* **1857**, 13, 393
Kirchhoff, G. *Ann. Physik* **1857**, 102, 529

Kirchhoff's diffraction theory
Kirchhoff, G. *Berlin Ber.* **1882**, 641
Kirchhoff, G. *Ann. Physik* **1883**, 18, 663

Kirchhoff's laws (electrolytes)
Kirchhoff, G.R., *Ann. Physik* **1858**, 103, 206
Kirchhoff, G.R., *Ann. Physik* **1858**, 104, 612
Kirchhoff, G.R., *Ann. Physik* **1859**, 106, 322

Kirchhoff’s law of heat radiation
Kirchhoff, G.R., *Ann. Physik* **1858**, 103, 177

Kohlrausch relaxation function, Kohlrausch square root law
Kohlraush, F., *Ann. Physik* **1863**, 119, 337

Kohlrausch law of independent migration of ions
Kohlrausch, F., *Ann. Physik* **1880**, 11, 653
Kohlrausch, F., *Ann. Physik* **1885**, 26, 161
Kohlrausch, F.; Grotrian, O., *Ann. Physik* **1875**, 154, 1
Kohlrausch, F., *Ann. Physik* **1879**, 6, 145

Kohlrausch current theory
Kohlrausch, R. *Ann. Physik* **1848**, 75, 220

Koopmans theorem
Koopmans, T., *Physica* **1933**, 1, 104

Lamb shift

Landé g-factor (splitting factor)
Landé, A., *Verh. Deut. Physik. Gesall*. **1919**, 21, 585
Landé, A., *Physik. Z.* **1921**, 22, 417
Landé, A., *Z. Physik* **1921**, 5, 231
Landé, A., *Z. Physik* **1921**, 7, 398
Landé, A., *Z. Physik* **1923**, 15, 189
Landé, A., *Z. Physik* **1923**, 19, 112
Landé, A., *Z. Physik* **1922**, 11, 353

Langevin equation
Langevin, P., *Compt. Rend.* **1904**, 139, 1204
Langevin, P., *J. Phys. Radium* **1905**, 4, 678

Laporte rule for dipole radiation
Laporte, O.; Meggers, W.F., *J. Opt. Soc. Am*. **1925**, 11, 459

Larmor precession, Larmor frequency
Larmor, J., *Phil. Mag.* **1897**, 44, 503
Larmor, J. *Trans. Cambridge Phil. Soc.* **1900**, 18, 380

Laser spectroscopy
Bloembergen, N. *Comments Solid State Phys.* **1969**, 2, 119
Bloembergen, N. *Lect. Notes Phys.* **1975**, 43, 31
Bloembergen, N. *Ann. N.Y. Acad. Sci.* **1976**, 267, 51
Haensch, T.W.; Shahin, I.S.; Schawlow, A.L. *Phys. Rev. Lett.* **1971**, 27, 707
Haensch, T.W.; Shahin, I.S.; Schawlow, A.L. *Nature* **1972**, 235, 63
Sorem, M.S.; Levenson, M.D.; Schawlow, A.L. *Phys. Lett. A* **1971**, 37, 33
Schawlow, A.L. *Science* **1978**, 141
Schawlow, A.L. *Science* **1982**, 217, 9
Schawlow, A.L. *Rev. Mod. Phys.* **1982**, 54, 697
Schawlow, A.L. *Prix Nobel* **1981**, 88
Schawlow, A.L. *Proc. Int. Conf. Lasers* **1982**, 1
Schawlow, A.L. *AIP Conf. Proc.* **1988**, 169, 26

Laue equations
Friedrich, W.; Knipping, P.; v. Laue, M., *Sitzber. Math.-Phys. Klasse Bayer. Akad. Wissen. Munchen* **1912**, 303

Law of conservation of parity
Landau, L.D.; Lifshitz, L.D. *Quantum Mechanics*, Pergamon Press: Oxford, 1977

Laws of electrolysis
Faraday, M. *Phil. Trans.* **1834**, 124, 77

Lenz's law
Lenz, H.F.E. *Ann. Physik Chem.* **1834**, 31, 483
Lenz, H.F.E. *Mem. Acad. Imp. Sci. (St. Petersbourg)*, **1833**, 2, 427

Light quanta; photons concept
Einstein, A. *Ann. Physik* **1905**, 17, 132
Einstein, A. *Ann. Physik* **1906**, 20, 199

Light scattering
Clausius, R. *Ann. Pogg.* **1849**, 76, 161; 188

Lissajous figures
Lissajous, J.A. *Compt. Rend.* **1855**, 41, 93; 814
Lissajous, J.A. *Ann. Chim.* **1857**, 51, 147
Lissajous, J.A. *Compt. Rend.* **1873**, 76, 878

London equations
London, F.; London, H. *Physica*, **1935**, 2, 341

London dispersion forces
London, F., *Z. Physik* **1930**, 63, 245
London, F., *Z. Physik. Chem*. **1930**, 11, 222
London, F. *Trans. Faraday Soc.* **1936**, 33, 1

Lorentz transformation
Lorentz, H.A. *Versuch einer Theorie der elektrischen und optischen Erscheinungen in bewegten Korpen*, E.J. Brill: Leiden, 1895

Lorenz-Lorentz equation
Lorentz, H.A. *Ann. Physik* **1880**, 9[3], 641

Löwdin orthogonalization
Löwdin, P.O. *J. Chem. Phys.* **1950**, 18, 367

Mach angle
Mach, E.; Salcher, P. *Sitzungsber. Akad. Wissen. Wien* **1887**, 95, 764

Mach number

Mach, E. *Die Mechanik in ihrer Entwicklung*, 1883 (transl. *The Science of Mechanics*, 1893)
Popularized by aerodynamicist Jakob Ackeret (17.3.1898 Zurich - 26.3.1981; PhD 1930 ETH (Ludwig Prandtl at Goettingen) in a lecture at the ETH, Zurich in 1929.
Reference: Flax, A.; Rott, N. *National Academy of Engineering (USA) Memorial Tributes* **1996**, 8, 3)

Madelung series, Madelung constant

Madelung, E., *Physik. Z.* **1910**, 11, 898
Madelung, E., *Physik. Z.* **1918**, 19, 524

Malus theorem

Malus, E. *Traité d'optique, Mem. présent. à l'Institut par divers savants*, **1811**, 2, 214

Massieu functions

Massieu, M.F. *Compt. Rend.* **1869**, 69, 858; 1057

Maxwell's equations

Maxwell, J.C., *Phil. Trans*. **1865**, 155, 459
Maxwell, J.C., *Treatise on Electricity and Magnetism*, Oxford Clarendon Press: Oxford: 1892

Maxwell's thermodynamic equations

Maxwell, J.C., *Theory of Heat*, 1871

Maxwell distribution

Maxwell, J.C., *Phil. Mag.* **1860**, 19, 22

Maxwell-Boltzmann distribution, Maxwell-Boltzmann statistics

Boltzmann, L., *Sitzungsberichte der Akademie Wissenschaften in Wien: Mathematisch-Naturwissenschafliche Klasse* **1871**, 63(II), 679
Boltzmann, L., *Sitzungsberichte konigl. Akademie Wissenschaften in Wien: Mathematisch-Naturwissenschafliche Klasse* **1877**, 76(II), 373
Maxwell, J.C., *Phil. Mag. Ser. 4* **1860**, 19, 19

Meissner effect

Meissner, W.; Ochsenfeld, R. *Naturwiss.* **1933**, 21, 787

Michelson-Morley experiment

Michelson, A.A. *Am. J. Sci.* **1881**, 22, 20
Michelson, A.A.; Morley, E.W. *Am. J. Sci.* **1887**, 34, 333
Michelson, A.A.; Morley, E.W. *Phil. Mag.* **1887**, 24, 449

Millikan oil drop experiment

Millikan, R.A. *Phil. Mag.* **1910**, 19, 209

Millikan, R.A., *Phys. Rev*. **1913**, 2, 109
Millikan, R.A., *Phys. Rev*. **1913**, 2, 122
Fletcher, H. *Phys. Rev.* **1911**, 33, 81
Millikan, R.A. *The Electron* University of Chicago, 1917

Morse potential

Morse, P.M., *Phys. Rev*. **1929**, 34, 57
Rosen, N.; Morse, P.M., *Phys. Rev.* **1932**, 42, 210

Moseley's law

Moseley, H.G.F., *Phil. Mag*. **1913**, 26, 1024
Moseley, H.G.F., *Phil. Mag*. **1914**, 27, 703

Mössbauer effect

Mössbauer, R. *Z. Physik* **1958**, 151, 124
Mössbauer, R. *Naturwiss.* **1958**, 45, 538

Néel temperature

Néel, L. *Ann. Phys. (Paris)* **1932**, 18(12), 1
Néel, L. *Ann. Phys. (Paris)* **1936**, 5(11), 232
Néel, L. *J. Phys. Radium* **1944**, 5, 241

Newton's laws of motion; gravitation

Newton, I. *Principia Mathematica Philosophiae Naturalis*, 1687

Newton's rings

Hooke, R. *Micrographica*, 1665, p. 47

Nicol prism

Nicol, W. *Edinburgh New Philos. J.* **1828**, 6, 83
Nicol, W. *Edinburgh New Philos. J.* **1834**, 16, 372

Non-equilibrium thermodynamics

Prigogine, I. *Introduction to Thermodynamics of Irreversible Processes*, Wiley: New York, 1962
Glansdorff, P; Prigogine, I. *Thermodynamic Theory of Structure, Stability and Fluctuations*, Wiley-Interscience: New York, 1971
Nicolis, G.; Prigogine, I. *Self-organization in Non-equilibrium Systems*, Wiley: New York, 1977
Prigogine, I. *Non-equilibrium Statistical Mechanics*, Interscience: New York, 1962

Nuclear fission

Meitner, L. *Naturwissenschaften* **1934**, 22, 759
Hahn, O.; Meitner, L. *Naturwissenschaften* **1935**, 23, 37; 230; 320
Hahn, O.; Meitner, L.; Strassmann, F. *Naturwissenschaften* **1935**, 23, 544
Hahn, O.; Meitner, L.; Strassmann, F. *Chem. Ber.* **1936**, 69B, 905

Meitner, L.; Hahn, O. *Naturwissenschaften* **1936**, 24, 158
Hahn, O.; Meitner, L.; Strassmann, F. *Chem. Ber.* **1937**, 70B, 1374
Meitner, L.; Hahn, O.; Strassmann, F. *Z. Physik* **1937**, 106, 249
Hahn, O.; Meitner, L.; Strassmann, F. *Naturwissenschaften* **1938**, 26, 475
Hahn, O.; Meitner, L. *Scientia* **1938**, 63, 12
Hahn, O. *Ann. Physik* **1939**, 36, 368
Hahn, O.; Strassmann, F. *Naturwissenschaften* **1939**, 27, 11; 89; 163
Hahn, O.; Strassmann, F. *Physik. Z.* **1939**, 40, 673

Nuclear magnetic resonance

Purcell, E.M.; Torrey, H.C.; Pound, R.V. *Phys. Rev*. **1946**, 69, 37
Bloch, F.; Hansen, W.W.; Packard, M. *Phys. Rev*. **1946**, 69, 127

Nuclear Overhauser effect (NOE)

Overhauser, A.W., *Phys. Rev.* **1955**, 92, 411

Nuclear shell model

Mayer, M.G. *Phys. Rev.* **1949**, 75, 1969
Mayer, M.G. *Phys. Rev.* **1950**, 78, 16
Mayer, M.G. *Phys. Rev.* **1950**, 78, 22
Mayer, M.G.; Moszkowski, S.A.; Nordheim, L.W. *Rev. Modern Phys.* **1951**, 23, 315
Mayer, M.G.; Jensen, J.H.D. *Elementary Theory of Nuclear Shell Structure* , Wiley: New York, 1955
Mayer, M.G. *Angew. Chem.* **1964**, 76, 729
Mayer, M.G.; Jensen, J.H.D. *Alpha-, Beta-, Gamma-Ray Spectrosc..* **1965**, 1, 557

Nyquist stability theorem

Nyquist, H. *Phys. Rev.* **1928**, 32, 110

Ohm's law

Ohm, G.S. *J. Chem. Physik (Schweigger's J.)* **1826**, 46, 137
Ohm, G.S. *Die Galvinische Kette Mathematisch Gearbeitet*, Berlin, 1827
Kirchhoff, G. *Phil. Mag.* **1850**, 37, 463

Operators in physical mathematics

Heaviside, O. *Proc. Roy. Soc. London A* **1893**, 52, 504
Heaviside, O. *Proc. Roy. Soc. London A* **1893**, 54, 105

Pariser-Parr-Pople method

Pariser, R.; Parr, R.G. *J. Chem. Phys.* **1953**, 21, 466
Pariser, R.; Parr, R.G. *J. Chem. Phys.* **1953**, 21, 767
Pariser, R. *J. Chem. Phys.* **1953**, 21, 568

Pauli exclusion principle

Pauli, W., *Naturwiss.* **1924**, 12, 741

Pauli principle

Pauli, W., *Phys. Rev*. **1940**, 58, 716

Photoelectric effect

Einstein, A. *Ann. Physik* **1905**, 17, 132
Hertz, H.*Ann. Physik* **1887**, 31, 983
Lenard, P. *Ann. Physik* **1902**, 8, 149
Richardson, O.W.; Compton, K.T. *Phil. Mag.* **1912**, 24, 575
Hughes, L. *Phil. Trans. Roy. Soc. London* **1912**, 212, 205
Millikan, R.A.*Phys. Rev.* **1916**, 7, 362

Photovoltaic effect

Becquerel, E. *Compt. Rend.* **1839**, 9, 561

Piezoelectricity

Curie, P.; Curie, J. *Compt. Rend.* **1880**, 91, 294; 383
Curie, P.; Curie, J. *Compt. Rend.* **1881**, 92, 186; 350
Curie, P.; Curie, J. *Compt. Rend.* **1880**, 93, 204; 1137
Curie, P.; Curie, J. *Compt. Rend.* **1882**, 95, 914

Pockels effect, Pockels cell

Pockels, F. *Ann. Physik* **1889**, 37, 144
Pockels, F. *Physik. Z.* **1901-2**, 22

Potential difference

Kirchhoff, G. *Ann. Physik* **1849**, 68, 506
Kirchhoff, G. *Phil. Mag.* **1850**, 37, 463

Poynting vector

Poynting, J.H. *On the Transfer of Energy in the Electromagnetic Field*, 1884
Poynting, J.H. *Phil. Trans.* 1884**, 175,** 343

Prevost theory of exchanges (dynamic equilibrium between cold and hot bodies)

Prevost, P. *Journal de Physique* **1791**, 38, 314

Principle of least action (1746)

Maupertuis, P.L.M. *Oeuvres,* Vol. 2, Lyons: 1756, p. 328

Quantum concept

Planck, M. *Ann. Physik* **1900**, 1, 69

Quantum dot

Reed, M.A.; Bate, R.T.; Bradshaw, K.; Duncan, W.M.; Frensley, W.R.; Lee, J.W.; Shih, H.D. *J. Vacuum Sci. Tech. B* **1986**, 4, 358

Quantum mechanical tunnelling
Wigner, E.P. *Z. Physik. Chem.* **1932**, B19, 203

Quantum teleportation
Bennett, C.H.; Brassard, G.; Crepeau, C.; Josza, R.; Peres, A.; Wootters, W.K. *Phys. Rev. Lett.* **1993**, 70, 1895

Quantum theory of electron
Dirac, P.A.M. *Proc. Roy. Soc.* **1927**, 117A, 610
Dirac, P.A.M. *Proc. Roy. Soc.* **1928**, 118A, 351

Raman spectroscopy
Raman, C.V. *Nature* **1922**, 109, 42
Raman, C.V. *Nature* **1923**, 112, 281
Raman, C.V. *J. Opt. Soc. Am.* **1927**, 15, 185
Raman, C.V.; Krishnan, K.S. *Nature* **1928**, 121, 501; 619
Landsberg, G.; Mandelstam, L. *Naturwiss.* **1928**, 16, 557
Landsberg, G.; Mandelstam, L. *Z. Physik* **1928**, 50, 769
Raman, C.V., *Indian J. Phys*. **1928**, 2, 387

Rayleigh afterglow
Lord Rayleigh *Proc. Roy. Soc. London A* **1930**, 129, 458

Rayleigh scattering
Strutt, J.W. *Phil. Mag.* **1871**, 41, 107; 274

Rayleigh-Jeans law
Jeans, J.H. *Phil. Mag.* **1905**, 10, 91

Renner-Teller effect
Renner, R., *Z. Physik* **1934**, 92, 172

Reynold's number
Reynolds, O. *Phil. Trans.* **1883**, 174, 935
Reynolds, O. *Phil. Trans.* **1886**, 177, 157

Richardson's law
Richardson, O.W. *Phys. Rev.* **1924**, 23, 153

Rijke acoustic tubes
Rijke, P.L. *Ann. Physik* **1859**, 107, 339

Ritz procedure, Ritz principle
Ritz, W., *Physik. Z*. **1908**, 9, 521

Ritz, W., *Astrophys. J.* **1908**, 28, 237

Roentgen X-ray

Roentgen, W.C. *Ann. Physik* **1898**, 64, 1
Stanton, A. *Science* **1896**, 3, 227; 726 (translation)

Rotation of light by magnetism

Faraday, M. *Phil. Trans.* **1846**, 136, 21

Rotatory polarization

Fresnel, A. *Ann. Chim. Phys.* **1825**, 28, 147
Fresnel, A. *Ann. Physik* **1831**, 21, 276

Russell-Saunders coupling

Russell, H.N.; Saunders, F.A., *Astrophys. J*. **1925**, 61, 38
Russell, H.N.; Saunders, F.A., *Astrophys. J.* **1925**, 62, 1

Rutherford scattering

Rutherford, E. *Phil. Mag.* **1911**, 21, 669
Rutherford, E. *Phil. Mag.* **1914**, 27, 488

Rydberg formula, Rydberg transition, Rydberg orbital

Schuster, A. *Proc. Roy. Soc. London* **1880 - 1881**, 31, 337
Rydberg, J.R., *Phil. Mag.* **1890**, 29, 331
Rydberg, J.R., *Compt. Rend.* **1890**, 110, 394
Rydberg, J.R., *Z. Physik. Chem.* **1890**, 5, 227
Rydberg, J.R., *Astrophys. J.* **1897**, 6, 233
Rydberg, J.R., *Wied. Ann. Physik* **1896**, 58, 674

Scaling laws

Brochard, F.; de Gennes, P.G. *Macromolecules* **1977**, 10, 1157
de Gennes, P.G. *J. Polym. Sci., Polym. Phys. Ed.* **1978**, 16, 1883
de Gennes, P.G. *Physica A (Amsterdam)* **1986**, 138A, 206
Daoud, M.; de Gennes, P.G. *J. Phys. (Paris)* **1977**, 38, 85
de Gennes, P.G. *Phys. Lett. A* **1968**, 26, 313

Scanning tunnelling microscopy (STM)

Binnig, G.; Rohrer, H. *Eur. Pat. Appl.* **1981** (IBM Corp., USA); EP 27517 (1981/04/29); U.S. 4,343,993 (1982/08/10)
Sheel, H.J.; Binnig, G.; Rohrer, H. *J. Crystal Growth* **1982**, 60, 199
Binnig, G.; Rohrer, H. *Phys. Bl.* **1983**, 39, 16
Binnig, G.; Rohrer, H. *Surf. Sci.* **1983**, 126, 236
Binnig, G.; Rohrer, H. *Helv. Phys. Acta* **1982**, 55, 726
Binnig, G.; Rohrer, H. *Ultramicroscopy* **1983**, 11, 157
Binnig, G.; Rohrer, H. *Scanning Electron Microsc.* **1983**, 1079
Binnig, G.; Rohrer, H. *Physica B & C* **1984**, 127, 37

Binnig, G.; Rohrer, H. *Surf. Sci.* **1985**, 152-153, 17
Baro, A.M.; Miranda, R.; Alaman, J.; Garcia, N.; Carrascosa, J.L. *Nature* **1985**, 315, 253

Schottky barrier junction

Schottky, W. *Naturwiss.* **1939**, 26, 843

Schrödinger equation

Schrödinger, E., *Ann. Physik* **1926**, 79, 361
Schrödinger, E., *Ann. Physik* **1926**, 79, 489
Schrödinger, E., *Ann. Physik* **1926**, 80, 437
Schrödinger, E., *Ann. Physik* **1926**, 81, 109

Schumann-Runge absorption bands

Runge, C. *Brit. Assoc. Rep.* **1888**, 576
Runge, C. *Nature* **1892**, 45, 607
Runge, C. *Nature* **1892**, 46, 100; 200; 247
Runge, C. *Nature* **1895**, 52, 106
Runge, C. *Astr. Astrophys.* **1894**, 13, 128
Runge, C. *Astrophys. J.* **1896**, 4, 317
Kayser, H.G.; Runge, C. *Astr. Astrophys.* **1893**, 12, 802
Schumann, V. *Wien Photogr. Correspond.* **1886**, 23, 305
Schumann, V. *Chemical News* **1891**, 63, 97
Schumann, V. *Chemical News* **1891**, 64, 275
Schumann, V. *Chemical News* **1895**, 71, 238
Schumann, V. *Smithson. Contrib. Knowledge* **1903**, "Absorption and emission of air and its ingredients for light of wavelengths from 250 μμ to 100 μμ", 30 pp.
Schumann, V. *Wien Photogr. Correspond.* **1899**, 26, 218

Self-induction

Henry, J. *Am. J. Sci.* **1832**, 22, 403
Henry, J. *J. Franklin Institute* **1835**, 15, 169

Shannon-Jaynes maximum entropy function

Shannon, C.E. *Bell System Tech. J.* **1948**, 27, 379; 623
Shannon, C.E.; Weaver, W. *The Mathematical Theory of Communication*, University of Illinois Press: Urbana, 1949.
Jaynes, E.T. *Phys. Rev.* **1957**, 106, 620
Jaynes, E.T. *Phys. Rev.* **1957**, 108, 171

Slater determinant

Slater, J.C., *Phys. Rev.* **1929**, 34, 1293

Slater orbital

Slater, J.C., *Phys. Rev.* **1930**, 36, 57

Smoluchowski equation

Smoluchowski, M., *Z. Physik. Chem*. **1917**, 92, 129

Snell's law

Descartes, R. *Dioptiques, Météores*, Leyden, 1637

Sommerfeld model of atom

Sommerfeld, A., *Ann. Physik* **1916**, 51, 1
Sommerfeld, A., *Atombau und Spektrallinen, Wellenmechanischer Erganzungsband*, Braunschweig, 1929

Special theory of relativity

Einstein, A. *Ann. Physik* **1905**, 17, 891

Spectra of gases

Plücker, J. *Ann. Physik* **1858**, 103, 88; 151
Plücker, J. *Ann. Physik* **1858**, 104, 113
Plücker, J. *Ann. Physik* **1858**, 105, 67
Plücker, J. *Ann. Physik* **1859**, 106, 77
Plücker, J. *Ann. Chim. Phys.* **1858**, 54, 243
Plücker, J. *Phil. Mag.* **1858**, 16, 119; 408
Plücker, J. *Phil. Mag.* **1858**, 18, 1; 7
Plücker, J. *Ann. Physik* **1859**, 107, 497; 638
Plücker, J. *Ann. Chim. Phys.* **1859**, 57, 497
Plücker, J. *Proc. Roy. Soc. London* **1959 - 1860**, 10, 256
Plücker, J. *Nuovo Cimento* **1860**, 11, 66
Plücker, J. *Ann. Physik* **1862**, 116, 27
Hittorf, W. *Ann. Physik* **1869**, 136, 1; 197
Hittorf, W. *Ann. Chim. Phys.* **1869**, 17, 487

Spin concept

Uhlenbeck, G.; Goutsmit, S.A. *Naturwiss.* **1925**, 13, 953
Uhlenbeck, G.; Goutsmit, S.A. *Nature* **1926**, 117, 264

Stark effect

Stark, J. *Physik. Z.* **1905**, 6, 892
Stark, J. *Ann. Physik* **1906**, 21, 401
Stark, J. *Physik. Z.* **1907**, 8, 913
Stark, J. *Ann. Physik* **1914**, 43, 965
Stark, J. *Ann. Physik* **1915**, 48, 193

Stark-Einstein law of photochemical equivalence

Einstein, A., *Ann. Physik* **1912**, 37, 832

Stern-Gerlach experiment

Stern, O.; Gerlach, W. *Z. Physik* **1922**, 8, 110

Stokes law of fluorescence, Stokes lines, anti-Stokes lines Stokes shifts

Stokes, G.G., *Proc. Roy. Soc.* **1852**, 6, 195

Stokes law

Stokes, G.G., *Proc. Camb. Phil. Soc.* **1856**, 9, 5

String theory

Green, M.B.; Schwarz, J.H. *Phys. Rev. Lett B* **1982**, 109B, 444
Green, M.B.; Schwarz, J.H. *Nucl. Phys. B* **1982**, 198B, 441; 474
Green, M.B.; Schwarz, J.H. *Nucl. Phys. B* **1983**, 218B, 43
Green, M.B.; Schwarz, J.H.; Brink, L. *Nucl. Phys. B* **1983**, 219B, 437
Green, M.B.; Schwarz, J.H. *Phys. Lett. B* **1984**, 136B, 367
Green, M.B.; Schwarz, J.H. *Phys. Lett. B* **1984**, 140B, 33
Green, M.B.; Schwarz, J.H. *Nucl. Phys. B* **1983**, 243B, 475
Witten, E. *Prog. Physics* **1983**, 9, 395
Witten, E. *Phys. Lett. B* **1984**, 149B, 351
Witten, E. *Nucl. Phys. B* **1985**, 249B, 557
Witten, E. *Phys. Lett. B* **1985**, 153B, 243
Witten, E. *Phys. Lett. B* **1985**, 155B, 151
Witten, E. *Nucl. Phys. B* **1985**, 258B, 75
Wen, X.G.; Witten, E. *Nucl. Phys. B* **1985**, 261B, 651
Witten, E. *Nucl. Phys. B* **1986**, 268B, 253
Witten, E. *Physica Scripta* **1987**, T15, 70
Witten, E. *Phil. Trans. Roy. Soc. A* **1989**, 329A, 349
Witten, E. *Phys. Rev. D* **1991**, 44, 314
Witten, E. *Nucl. Phys. B* **1995**, 443B, 85
Witten, E. *Nucl. Phys. B, Proc. Suppl.* **1998**, 62, 463

Superconductivity at low temperatures

Onnes, H.K. *Electrician* **1911**, 67, 657
Onnes, H.K. *Electrician* **1913**, 71, 855
Onnes, H.K. *Verslag. Akad. Wetenschappen* **1913**, 20, 1284; 1388
Onnes, H.K. *Proc. K. Akad. Wetenschappen* **1914**, 16, 673; 987
Onnes, H.K. *J. Chem. Soc.* **1914**, 106, 163
Onnes, H.K. *Proc. K. Akad. Wetenschappen* **1914**, 22, 1027
Onnes, H.K. *Verslag. Akad. Wetenschappen* **1914**, 22, 1413
Onnes, H.K. *Verslag. Akad. Wetenschappen* **1914**, 23, 167
Onnes, H.K. *Compt. Rend.* **1914**, 159, 34
Onnes, H.K.; Beckman, B. *Verslag. Akad. Wetenschappen* **1914**, 21, 263; 478; 881; 888
Onnes, H.K.; Hof, K. *Verslag. Akad. Wetenschappen* **1914**, 23, 493
Onnes, H.K.; Holst, G. *Verslag. Akad. Wetenschappen* **1914**, 23, 506

Surface charge

Faraday, M. *Phil. Trans.* **1838**, 128, 1

Synthesis of radioactive elements

Joliot, F.; Joliot-Curie, I. *Compt. Rend. Acad. Sci.* **1934**, 198, 254
Joliot-Curie, I.; von Halban, H.; Prieswerk, P.
J. Phys. Radium (France) **1925**, 6

Synthesis of new radioactive elements using slow neutrons

Fermi, E. *Nature* **1934**, 133, 757; 898
Fermi, E.; Pontecorvo, B.; Rasetti, F. *Ricerca Sci.* **1934**, 5(II), 380
Fermi, E.; Amaldi, E.; D'Agostino, O.; Rasetti, F.; Segre, E. *Proc. Roy. Soc. London* **1934**, 146A, 483
Amaldi, E.; Fermi, E. *Ricerca Sci.* **1935**, 6, 344; 443
Amaldi, E.; D'Agostino, O.; Fermi, E.; Pontecorvo, B.; Rasetti, F.; Segre, E. *Proc. Roy. Soc. London* **1935**, 149A, 522
Fermi, E.; Amaldi, E. *Phys. Rev.* **1936**, 50, 899
Amaldi, E.; Fermi, E. *Ricerca Sci.* **1936**, 7(I), 310; 393
Amaldi, E.; Fermi, E.; Rasetti, F. *Ricerca Sci.* **1937**, 8(II), 40
Fermi, E.; Amaldi, E.; Wick, G.C. *Phys. Rev.* **1938**, 53, 493
Fermi, E.; Amaldi, E. *Phys. Rev.* **1938**, 53, 493
Anderson, H.L.; Fermi, E.; Hanstein, H.B. *Phys. Rev.* **1939**, 55, 797
Anderson, H.L.; Fermi, E.; Szilard, L. *Phys. Rev.* **1939**, 56, 284
Fermi, E. *Science* **1940**, 92, 269
Fermi, E. *Nature* **1940**, 146, 640

Szilard-Chalmers effect

Szilard, L.; Chalmers, T.A. *Nature* **1934**, 134, 494; 462
Szilard, L.; Chalmers, T.A. *Nature* **1935**, 135, 98

Theory of electric and magnetic susceptibilities

Van Vleck, J.H. *The Theory of electric and magnetic susceptibilities*, Oxford, 1932
Van Vleck, J.H. *J. Chem. Phys.* **1937**, 5, 556
Van Vleck, J.H. *J. Chem. Phys.* **1941**, 9, 85

Thomson model of atom

Thomson, J.J. *Phil. Mag.* **1903**, 6, 673
Thomson, J.J. *Phil. Mag.* **1904**, 7, 237

Townsend effect

Townsend, J.S.; Bailey, V.A. *Phil. Mag.* **1922**, 43, 593

Transmutation of the elements (radon from radium)

Brooks, H. *Nature* **1904**, 70, 270
Brooks, H.; Rutherford, E. *Phil. Mag.* **1902**, 4[6], 1
Brooks, H.; Rutherford, E. *Trans. Roy. Soc. Canada* **1901**, [3], 21

Turner-Czerny optical arrangement

Czerny, M.; Turner, A.F. *Z. Physik* **1930**, 61, 792

Tyndall effect

Tyndall, J. *Heat: a mode of motion*, 1869, p. 491
Tyndall, J. *Proc. Roy. Soc. London* **1868-69**, 17, 223
Tyndall, J. *Phil. Mag.* **1869**, 37, 384

Van Allen belts

Van Allen, J.A. *Sci. Am.* **1959**, 200, 39

Van de Graaff electrostatic generator

Van de Graaff, R.J. *Phys. Rev.* **1931**, 38, 1919

Velocity of light measurement

Fizeau, A. *Compt. Rend.* **1849**, 29, 90

Verdet constant

Verdet, M.E. *Ann. Chim.* **1854**, 41, 370
Verdet, M.E. *Ann. Chim.* **1855**, 43, 37
Verdet, M.E. *Ann. Chim.* **1858**, 52, 129
Verdet, M.E. *Ann. Chim.* **1863**, 69, 415

Verlet algorithm in reaction dynamics

Verlet, L. *Phys. Rev.* **1967**, 153, 250
Lebowitz, J.L.; Percus, J.K.; Verlet, L. *Phys. Rev.* **1967**, 159, 98

Virial equation of state for non-ideal gases

Virial theorem

Clausius, R.J.E. *Phil. Mag.* **1870**, 40, 122
Clausius, R.J.E. *Compt. Rend.* **1870**, 70, 1314
Clausius, R.J.E. *Ann. Physik* **1870**, 141, 124

First tensor form of virial theorem:
Maxwell, J.C. *Trans. Roy. Soc. Edinburgh* **1870**, 26, 14
Maxwell, J.C. *Nature* **1874**, 10, 477
Rayleigh, Lord *Phil. Mag.* **1900**, 50, 210
Rayleigh, Lord *Phil. Mag.* **1905**, 9, 494
Rayleigh, Lord *Phil. Mag.* **1905**, 10, 364

Application to hydrogenic wavefunctions:
Hirschfelder, J.O.; Kincaid, J.F. *Phys. Rev.* **1937**, 52, 658
Coulson, C.A.; Bell, R.P. *Trans. Faraday Soc.* **1945**, 41, 141

Generalization to polyatomic molecules:
Hurley, A.C. *J. Chem. Phys.* **1962**, 37, 449

Hypervirial theorem:
Hirschfelder, J.O. *J. Chem. Phys.* **1960**, 30, 1462
Hirschfelder, J.O.; Coulson, A.C. *J. Chem. Phys.* **1962**, 36, 941

Wave nature of electron
Davisson, C.J.; Germer, L.H. *Nature* **1927**, 119, 558

Wheatstone bridge
Christie, S.H. *Phil. Trans.* **1833**, 123, 95
Wheatstone, C. *Phil. Trans.* **1843**, 133, 303
Wheatstone, C. *Ann. Physik* **1844**, 62, 499

Wien displacement law
Wien, W. *Ann. Physik* **1896**, 58, 662

Wigner's Rules
Wigner, E., *Z. Physik* **1927**, 40, 883
Wigner, E., *Z. Physik* **1926**, 40, 492
Wigner, E., *Z. Physik* **1927**, 43, 624
Wigner, E., *Nachr. Ges. Wissen. Gottingen Math. Physik. Klasse* **1927**, 375

Wigner tunneling correction
Wigner, E., *Z. Physik. Chem. B* **1932**, 19, 203

Wilson cloud chamber
Wilson, C.T.R. *Phil. Trans.* **1899**, 192, 403
Wilson, C.T.R. *Proc. Roy. Soc. London A* **1911**, 85, 285
Wilson, C.T.R. *Proc. Roy. Soc. London A* **1912**, 87, 277
Wilson, C.T.R. *Proc. Roy. Soc. London A* **1923**, 104, 1

Wilson-Sommerfeld quantization rules
Wilson, W. *Phil. Mag.* **1915**, 29, 795
Sommerfeld, A. *Ann. Phys.* **1916**, 51, 1

WKB (Wentzel-Kramers-Brillouin) or JWKB (Jeffreys- Wentzel-Kramers-Brillouin) method
Wentzel, G., *Z. Physik* **1926**, 38, 519
Brillouin, L., *Compt. Rend*. **1926**, 183, 24
Kramers, H.A., *Z. Physik* **1926**, 39, 828
Jeffreys, H., *Proc. London Math. Soc*. **1925**, 23, 428

X-ray diffraction
Friedrich, W.; Knipping, P.; Laue, M. *Sitzungsber. Bayer. Akad. Wiss. (Math. Phys. Klasse)* **1912**, 303
Friedrich, W.; Knipping, P.; Laue, M. *Ann. Physik* **1913**, 41, 971
Bragg, W.H.; Bragg, W.L. *X-Rays and Crystal Structure*, London, 1915

Young's modulus of elasticity
Young, T. *Lectures on Natural Philosophy*, 1807

Zeeman effect
Zeeman, P., *Verhandlungen der Physikalischen Gesellschaft zu Berlin* **1896**, 7, 128
Zeeman, P., *Nature* **1897**, 55, 347 (translation by A. Stanton)

Zeleny electroscope
Zeleny, J. *Phys. Rev.* **1911**, 32, 581
Zeleny, J. *Phys. Rev.* **1911**, 33, 70

Zener diode
Zener, C. *Proc. Roy. Soc. London A* **1934**, 145, 523

NAMED THINGS IN PHYSICS TIMELINE
CONCEPTS NAMED AFTER PEOPLE

YEAR	CONCEPT
1609	Kepler's first law
1619	Kepler's third law
1621	Kepler's second law
1637	Snell's law
1665	Newton's rings
1687	Newton's laws of motion and gravitation
1690	Huygen's principle
1729	Bouguer's law
1760	Lambert's law
1780	watt unit of energy
1788	Coulomb's law
1791	Prevost theory of exchanges
1807	Young's modulus of elasticity
1809	Discovery of plane polarized light (Malus, E.L.)
1811	Malus theorem
1815	Brewster's stress birefringence
1817	Fraunhofer lines

1820	Biot-Savart law
1821	Navier-Stokes equations
1822	Ampere's law
1822	Fourier heat theorem
1825	Fresnel rhombs
1826	Ohm's law
1827	Brownian motion
1828	Hamilton operator
1828	Nicol prism
1832	Coriolis force
1832	Fresnel laws
1833	Faraday law and effect
1833	Wheatstone bridge
1834	Lenz's law
1837	Babinet principle
1840	Poiseuille's law
1841	Joule's laws
1842	Doppler effect
1845	Kirchhoff's circuit laws
1846	Faraday effect
1848	Kohlrausch current theory
1848	weber unit of magnetic flux
1850	Clausius statement of second law of thermodynamics
1852	Beer's law
1852	Stokes lines and laws of fluorescence
1854	Verdet constant
1855	Fick's laws of diffusion
1855	Lissajous figures
1856	Stokes law
1858	Kirchhoff's laws of electrolytes
1858	Kirchhoff's law of heat radiation
1858	Kohlrausch relaxation function
1859	Rijke acoustic tubes
1860	Maxwell distribution
1860	Siemens unit of conductance
1862	Foucault pendulum
1865	Maxwell's equations
1869	Massieu functions
1869	Tyndall effect
1871	Maxwell's thermodynamic equation
1871	Maxwell-Boltzmann distribution
1871	Rayleigh scattering
1875	Kerr magneto-optic effect
1877	Gauss's law

1877	Glan prism
1879	Hall effect
1880	Curie unit of radiation
1880	Kohlrausch law of independent migration of ions
1880	Lorenz-Lorentz equation
1881	Michelson-Morley experiment
1882	Helmholtz equation
1882	Kirchhoff's diffraction theory
1883	Reynold's number
1884	Poynting vector
1885	Balmer series
1887	Mach angle
1889	Pockel's effect
1889	Drude equations
1890	Rydberg formula
1891	Fermat principle of least time
1893	Mach number
1895	Curie-Weiss law
1895	Lorentz transformation
1896	Fabry-Perot interferometer
1896	Wien displacement law
1897	Larmor precession and frequency
1897	Zeeman effect
1898	Roentgen x-ray
1899	Wilson cloud chamber
1899	Concept of overvoltage (Caspari, W.A.)
1903	Thomson model of atom
1904	Langevin equation
1904	Drude equations
1905	Einstein mass-energy equation
1905	Rayleigh-Jeans law
1905	Stark effect
1907	Einstein equation for specific heat
1908	Einstein-Smoluchowski equation
1908	Geiger counter
1908	Paschen series
1908	Ritz procedure and principle
1910	Madelung series and constant
1910	Millikan oil drop experiment
1911	Geiger-Nutall law
1911	Rutherford scattering
1911	Zeleny electroscope
1912	Debye equation for polarization
1912	Debye-Einstein law
1912	Debye T3 law
1912	Laue equations

1912	Stark-Einstein law of photochemical equilibrium
1912	Bragg equation and angle of diffraction
1913	Bohr model of atom
1913	Bohr's laws of line spectra of gases
1913	Moseley's law
1914	Lyman series
1915	Wilson-Sommerfeld quantization rules
1916	Ehrenfest adiabatic law
1916	Sommerfeld model of atom
1917	Smoluchowski equation
1919	Lande g factor
1919	Barkhausen effect
1921	Bohr correspondence principle
1921	Ehrenfest symmetry factor
1922	Brackett series
1922	Stern-Gerlach experiment
1922	Townsend effect
1923	Auger effect
1923	Compton effect
1923	Debye-Huckel law
1923	Debye-Waller factor
1924	Richardson's law
1924	Bose-Einstein statistics
1924	Hanle effect
1924	Pfund series
1924	Pauli exclusion principle
1925	de Broglie's law
1925	Franck-Condon transition and principle
1925	Hund's rules
1925	Ising model
1925	Laporte rule for dipole radiation
1925	Russell-Saunders coupling
1925	Svedberg unit of time
1926	Fermi-Dirac distribution
1926	Schrodinger equation
1926	Wentzel-Kramers-Brillouin-Jeffreys method
1927	Born-Oppenheimer approximation
1927	Ehrenfest equation and theorem
1927	Heisenberg uncertainty principle
1927	Heitler-London treatment
1927	Wigner's rules
1928	Gamow-Condon-Gurney law
1928	Johnson noise
1928	Nyquist stability theorem
1928	Raman spectroscopy
1929	Hubble's law
1929	Morse potential
1929	Slater determinant
1930	London dispersion forces

1930	Rayleigh afterglow
1930	Slater orbital
1930	Turner-Czerny optical arrangement
1931	Casimir operator
1931	Huckel's rules
1931	van de Graaff electrostatic generator
1931	Brillouin scattering
1932	Neel temperature
1932	Wigner tunnelling correction
1933	Hellmann-Feyman theorem
1933	Koopmans theorem
1933	Meissner effect
1933	Fredericksz (Frederiks, Fredericks) effect
1934	Cherenkov effect
1934	Renner-Teller effect
1934	Szilard-Chalmers effect
1934	Zener diode
1935	London equations
1935	Richter scale
1936	Gamow-Teller selection rule
1936	Bragg-Gray equation
1937	Jahn-Teller effect
1938	BET method
1939	Schottky barrier junction
1940	Bloch-Siegert effect
1940	Pauli principle
1948	Jones effect
1948	Shannon-Jaynes maximum entropy function
1948	Casimir effect
1949	Feynman diagrams
1950	Hahn spin echoes
1950	Lowdin orthogonalization
1951	Hartree-Fock-Roothaan method
1953	Humphreys series
1953	Pariser-Parr-Pople method
1954	Carr-Purcell experiment
1955	nuclear Overhauser effect
1956	Bloch equations
1957	BCS theory of superconductivity
1958	Dirac bra-ket notation
1958	Mössbauer effect
1959	van Allen belts
1962	Hartmann-Hahn experiment
1962	Josephson effect
1964	Bell operator
1965	Cooley-Tukey algorithm

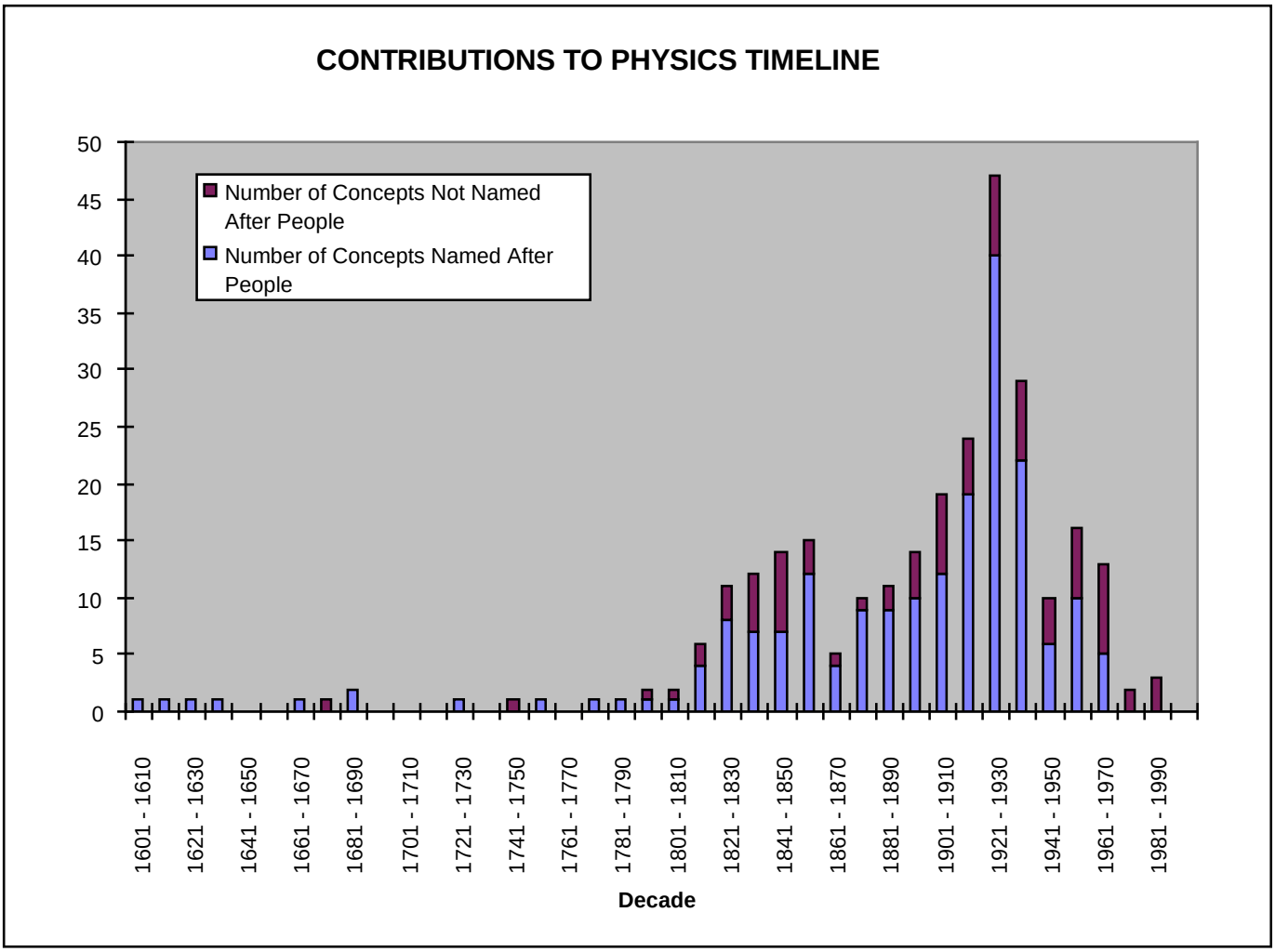
1966	Feynman ratchet and pawl
1967	Verlet algorithm in reaction dynamics

CONCEPTS NOT NAMED AFTER PEOPLE

YEAR	CONCEPT
1672	dispersion of light into colours (Newton, I.)
1800	electromotive force (Volta, A.)
1804	interference of light (Young, T.)
1819	discovery of optical activity (Biot, J.B.)
1820	action of currents on magnets (Oersted, H.C.)
1822	induced currents (Faraday, M.)
1825	rotatory polarization (Fresnel, A.)
1826	diffraction of light (Fresnel, A.)
1832	self-induction (Henry, J.)
1834	laws of electrolysis (Faraday, M.)
1838	insulation (Faraday, M.)
1838	surface charge (Faraday, M.)
1839	photovoltaic effect (Becquerel, E.)
1846	diamagnetism (Faraday, M.)
1846	rotation of light by magnetic field (Faraday, M.)
1847	conservation of energy (Helmholtz, H.)
1847	Discovery of magnetic properties of crystals (Plücker, J.)
1849	light scattering (Clausius, R.)
1849	potential difference (Kirchhoff, G.)
1849	velocity of light measurement (Fizeau, A.)
1852	discovery of fluorescence (Stokes, G.)
1859	Spectra of gases (Plücker, J./Hittorf, W.)
1859	Discovery of cathode rays (Plücker, J./Hittorf, W.)
1860	atomic spectroscopy (Kirchhoff, G.)
1870	Virial theorem (Clausius, R.J.E.)
1880	Piezoelectricity (Curie, P.; Curie, J.)
1884	Determination of e/m ratio for cathode rays deflected in magnetic field (Schuster, A.)
1888	electromagnetic radiation (Hertz, H.)
1893	operators in physical mathematics (Heaviside, O.)
1897	discovery of electron (Thomson, J.J.)
1900	disintegration of the elements (Rutherford, E.)
1900	quantum concept (Planck, M.)

1901	blackbody radiation (Planck, M.)
1903	alpha particles (Rutherford, E.)
1904	transmutation of the elements (Brooks, H.)
1905	light quanta and photon concept (Einstein, A.)
1905	photoelectric effect (Einstein, A.)
1905	special theory of relativity (Einstein, A.)
1906	absolute zero measurements (Onnes, H.K./Giauque, W.)
1911	atomic nucleus (Rutherford, E.)
1911	superconductivity at low temperatures (Onnes, H.K.)
1912	x-ray diffraction (Laue, M.)
1915	general theory of relativity (Einstein, A.)
1920	electron diffraction by crystals (Davisson, C.J./Thomson, G.P.)
1922	Aufbau principle (Bohr, N.)
1925	spin concept (Uhlenbeck, G.; Goutsmit, S.A.)
1925	synthesis of radioactive elements (Joliot-Curie, I.; Joliot, F.)
1927	quantum theory of electron (Dirac, P.)
1927	wave nature of electron (Davisson , G.J.)
1928	Ferromagnetism theory (Heisenberg, W.)
1929	discovery of parahydrogen (Harteck, P.)
1930	development of the cyclotron (Lawrence, E.)
1932	discovery of neutron (Chadwick, J.)
1932	quantum mechanical tunnelling (Wigner, E.P.)
1932	theory of electric and magnetic susceptibility (van Vleck, J.H.)
1933	Discovery of positron (Anderson, C.D.)
1934	nuclear fission (Meitner, L./Strassmann, F./Hahn, O.)
1934	synthesis of new radioactive elements using slow neutrons (Fermi, E.)
1936	concepts in condensed matter physics (Landau, L.D.)
1941	chain reacting atomic pile (Fermi, E.)
1946	nuclear magnetic resonance (Purcell, E.M./Bloch, F.)
1947	electron spin resonance (Zavoiskii, E.K.)
1949	nuclear shell model (Mayer, G.P.)
1953	Discovery of neutrino (Reines, F.)
1953	Discovery of dark matter (Zwicky, F.)
1955	discovery of antiproton (Segre, E.)
1956	Discovery of antineutron (Cork, B.; Lamberston, G.R.; Piccioni, O.; Wenzel, W.A.)
1957	discovery of cosmic ray sources (Giacconi, R.)
1957	electron microscopy (Ruska, E.)

1961	Eight-fold way (Gell-Mann, M.)
1962	non-equilibrium thermodynamics (Prigogine, I.)
1964	density functional theory (Kohn, W.)
1964	dye laser (Schaefer, F.P.)
1964	Concept of quark (Gell-Mann, M./Zweig, G.)
1965	Discovery of antideuteron (Zichichi, A.; Lederman, L.M.)
1966	discovery of non-conservation parity laws (Wu, C.)
1968	discovery of pulsars (Hewish, A./Pilkington, J.D.H.)
1969	laser spectroscopy (Bloembergen, N./Schawlow, A.L.)
1970	discovery of field particles W and Z (Rubbia, C.)
1976	Continuous wavelet transform (Zweig, G.)
1977	scaling laws (de Gennes, P.G.)
1977	Law of conservation of parity (Landau, L.D.; Lifshitz, L.D.)
1981	scanning tunnelling microscopy (STM) (Binnig, G.)
1981	Inflationary cosmology (Guth, A.)
1984	String theory (Witten, E./Green, M.B.)
1986	Quantum dot (Reed, M.A.)
1986	atomic force microscopy (Binnig, G.)
1993	Quantum teleportation (Bennett, C.H./Brassard, G./Crepeau, C./Josza, R./Peres, A./Wootters, W.K.)
1995	Concept of D(Dirichlet)-branes (Polchinski, J.)


CONTRIBUTIONS TO PHYSICS TIMELINE
Number of Concepts Not Named After People
Number of Concepts Named After People
50
45
40
35
30
25
20
15
10
5
0
1601 - 1610
1621 - 1630
1641 - 1650
1661 - 1670
1681 - 1690
1701 - 1710
1721 - 1730
1741 - 1750
1761 - 1770
1781 - 1790
1801 - 1810
1821 - 1830
1841 - 1850
1861 - 1870
1881 - 1890
1901 - 1910
1921 - 1930
1941 - 1950
1961 - 1970
1981 - 1990
Decade