

Solvay Conference

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The **International Solvay Institutes for Physics and Chemistry**, located in Brussels, were founded by the Belgian industrialist Ernest Solvay in 1912, following the historic invitation-only 1911 *Conseil Solvay*, considered a turning point in the world of physics. The Institutes coordinate conferences, workshops, seminars, and colloquia.^[1]

Following the initial success of 1911, the **Solvay Conferences** (*Conseils Solvay*) have been devoted to outstanding preeminent open problems in both physics and chemistry. The usual schedule is every three years, but there have been larger gaps.

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Photograph of the first conference in 1911 at the Hotel Metropole. *Seated* (L-R): W. Nernst, M. Brillouin, E. Solvay, H. Lorentz, E. Warburg, J. Perrin, W. Wien, M. Skłodowska-Curie, and H. Poincaré. *Standing* (L-R): R. Goldschmidt, M. Planck, H. Rubens, A. Sommerfeld, F. Lindemann, M. de Broglie, M. Knudsen, F. Hasenöhr, G. Hostelet, E. Herzen, J.H. Jeans, E. Rutherford, H. Kamerlingh Onnes, A. Einstein and P. Langevin.

Notable Solvay Conferences

First Conference

Hendrik A. Lorentz was chairman of the first Solvay Conference held in Brussels in the autumn of 1911. The subject was *Radiation and the Quanta*. This conference looked at the problems of having two approaches, namely the classical physics and quantum theory. Albert Einstein was the second youngest physicist present (the youngest one was Lindemann). Other members of the *Solvay Congress* included such luminaries as Marie Skłodowska-Curie and Henri Poincaré. (See image for attendee list.)

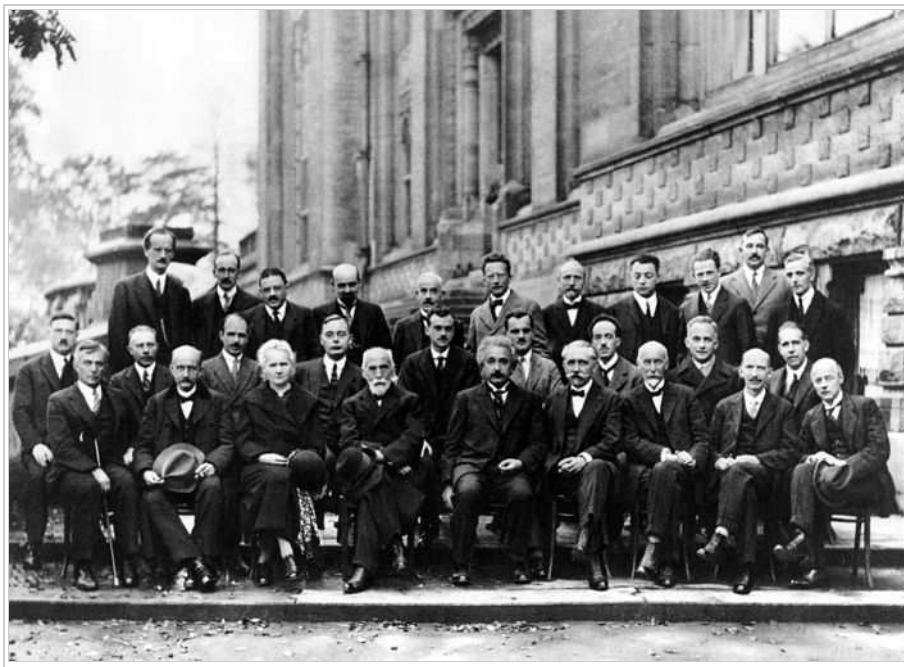
Third Conference

The first Solvay Conference following World War I was held in April 1921. Most German scientists were barred from attending. In protest at this action, Albert Einstein, himself a citizen and a vocal supporter of the infant Weimar Republic, declined his invitation to attend the conference where most of his countrymen were barred.

Fifth Conference

Perhaps the most famous conference was the October 1927 Fifth Solvay International Conference on *Electrons and Photons*, where the world's most notable physicists met to discuss the newly formulated quantum theory. The leading figures were Albert Einstein and Niels Bohr. Einstein, disenchanted with Heisenberg's uncertainty principle, remarked "God does not play dice". Bohr replied, "Einstein, stop telling God what to do". (See Bohr–Einstein debates.) 17 of the 29 attendees were or became Nobel Prize winners, including Marie Curie, who alone among them, had won Nobel Prizes in two separate scientific disciplines.^[2]

This conference was also the culmination of the struggle between Einstein and the scientific realists, who wanted strict rules of scientific method as laid out by Charles Peirce and Karl Popper, versus Bohr and the instrumentalists, who wanted looser rules based on outcomes. Starting at this point, the instrumentalists won, instrumentalism having been seen as the norm ever since,^[3] although the debate has been actively continued by the likes of Alan Musgrave.



A. Piccard, E. Henriot, P. Ehrenfest, E. Herzen, Th. de Donder, E. Schrödinger, J.E. Verschaffelt, W. Pauli, W. Heisenberg, R.H. Fowler, L. Brillouin;

P. Debye, M. Knudsen, W.L. Bragg, H.A. Kramers, P.A.M. Dirac, A.H. Compton, L. de Broglie, M. Born, N. Bohr;

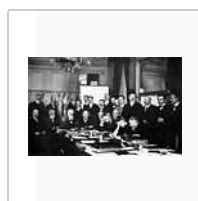
I. Langmuir, M. Planck, M. Skłodowska-Curie, H.A. Lorentz, A. Einstein, P. Langevin, Ch.-E. Guye, C.T.R. Wilson, O.W. Richardson

Fifth conference participants, 1927. Institut International de Physique Solvay in Leopold Park.

Solvay Conferences on Physics

	Year	Title	Translation	Chair
1	1911	La théorie du rayonnement et les quanta	The theory of radiation and quanta	Hendrik Lorentz (Leiden)
2	1913	La structure de la matière	The structure of matter	
3	1921	Atomes et électrons	Atoms and electrons	
4	1924	Conductibilité électrique des métaux et problèmes connexes	Electric conductivity of metals and related problems	
5	1927	Electrons et photons	Electrons and photons	
6	1930	Le magnétisme	Magnetism	
7	1933	Structure et propriétés des noyaux atomiques	Structure & properties of the atomic nucleus	William Lawrence Bragg (Cambridge)
8	1948	Les particules élémentaires	Elementary particles	
9	1951	L'état solide	The solid state	
10	1954	Les électrons dans les métaux	Electrons in metals	
11	1958	La structure et l'évolution de l'univers	The structure and evolution of the universe	
12	1961	La théorie quantique des champs	Quantum field theory	J. Robert Oppenheimer (Princeton)
13	1964	The Structure and Evolution of Galaxies		Christian Møller (Copenhagen)
14	1967	Fundamental Problems in Elementary Particle Physics		Edoardo Amaldi (Rome)
15	1970	Symmetry Properties of Nuclei		Léon van Hove (CERN)
16	1973	Astrophysics and Gravitation		F. W. de Wette (Austin)
17	1978	Order and Fluctuations in Equilibrium and Nonequilibrium Statistical Mechanics		Paul Mandel (Brussels)
18	1984	Higher Energy Physics		Ioannis Antoniou (Brussels)
19	1987	Surface Science		David Gross (Santa Barbara)
20	1991	Quantum Optics		Bertrand Halperin (Harvard)
21	1998	Dynamical Systems and Irreversibility		David Gross
22	2001	The Physics of Communication		Roger Blandford (Stanford)
23	2005	The Quantum Structure of Space and Time		
24	2008	Quantum Theory of Condensed Matter		
25	2011	The theory of the quantum world		
26	2014	Astrophysics and Cosmology		

Conferences on Physics gallery



First Conference, 1911



Second Conference, 1913



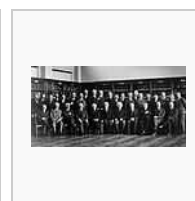
Third Conference, 1921



Fourth Conference, 1924



Fifth Conference, 1927



Sixth Conference, 1930



Seventh Conference, 1933

Solvay Conferences on Chemistry

No	Year	Title	Translation	Chair
1	1922	Cinq Questions d'Actualité	Five topical questions	William Jackson Pope (Cambridge)
2	1925	Structure et Activité Chimique	Structure and Chemical Activity	
3	1928	Questions d'Actualité	Topical Questions	
4	1931	Constitution et Configuration des Molécules Organiques	Constitution and Configuration of Organic Molecules	
5	1934	L'Oxygène, ses réactions chimiques et biologiques	Oxygen, and its chemical and biological reactions.	
6	1937	Les vitamines et les Hormones	Vitamins and Hormones	Frédéric Swarts (Ghent)
7	1947	Les Isotopes	Isotopes	Paul Karrer (Zurich)
8	1950	Le Mécanisme de l'Oxydation	The mechanism of oxidation	
9	1953	Les Protéines	Proteins	
10	1956	Quelques Problèmes de Chimie Minérale	Some Problems of Inorganic Chemistry	
11	1959	Les Nucléoprotéines	Nucleoproteins	Alfred Rene Ubbelohde (London)
12	1962	Transfert d'Energie dans les Gaz	Energy transfer in gases	
13	1965	Reactivity of the Photoexcited Organic Molecule		
14	1969	Phase Transitions		
15	1970	Electrostatic Interactions and Structure of Water		
16	1976	Molecular Movements and Chemical Reactivity as conditioned by Membranes, Enzymes and other Molecules		
17	1980	Aspects of Chemical Evolution		
18	1983	Design and Synthesis of Organic Molecules Based on Molecular Recognition		Ephraim Katchalski (Rehovot) & Vladimir Prelog (Zurich)
19	1987	Surface Science		F. W. de Wette (Austin)
20	1995	Chemical Reactions and their Control on the Femtosecond Time Scale		Pierre Gaspard (Brussels)
21	2007	From Noncovalent Assemblies to Molecular Machines		Jean-Pierre Sauvage (Strasbourg)
22	2010	Quantum Effects in Chemistry and Biology		Graham Fleming (Berkeley)
23	2013	New Chemistry and New Opportunities from the Expanding Protein Universe		Kurt Wüthrich (ETH Zurich)

Conferences on Chemistry gallery



First Conference, 1922

References

- Welcome to the Solvay Institutes (<http://www.solvayinstitutes.be/>)
- Lorentz & the Solvay conferences (<http://www.lorentz.leidenuniv.nl/history/Solvay/solvay.html>), Instituut-Lorentz, Leiden University
- Leplin, J. (1984). *Scientific Realism*. University of California Press. ISBN 978-0-520-05155-3.

Further reading

- Straumann, N. (2011). "On the first Solvay Congress in 1911". *European Physical Journal H*. arXiv:1109.3785. Bibcode:2011EPJH...36..379S. doi:10.1140/epjh/e2011-20043-9.

External links

- International Solvay Institutes (<http://www.solvayinstitutes.be/>) (official website)
- Previous Solvay Conferences on Physics (http://www.solvayinstitutes.be/html/solvayconf_physics.html)
- Previous Solvay Conferences on Chemistry (http://www.solvayinstitutes.be/html/solvayconf_chemistry.html)

Wikimedia Commons has media

- Proceedings 1911 (<https://archive.org/details/lathoriedurayo00inst>)
- Proceedings 1913 (<https://archive.org/details/lastructuredelam00inst>)
- Proceedings 1933 (<http://gallica.bnf.fr/ark:/12148/bpt6k5696894m.r=institut+international+solvay+1933.langEN>)
- Overview of the transcript of the famous Fifth Conference (<http://www.aip.org/history/heisenberg/p09.htm>) — American Institute of Physics
- Bacciagaluppi G., Valentini A. (2009.) *Quantum Theory at the Crossroads: Reconsidering the 1927 Solvay Conference*, Cambridge University Press, Cambridge, U.K. (<http://arxiv.org/abs/quant-ph/0609184>)

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