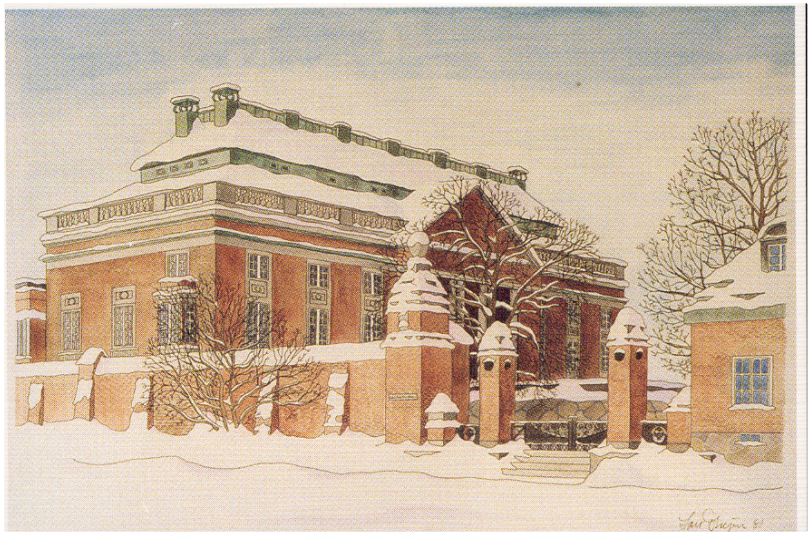
Alfred Nobel
and
the Nobel Prizes



Lars Brink
Chalmers Univ. of Tech.
Gothenburg, Sweden

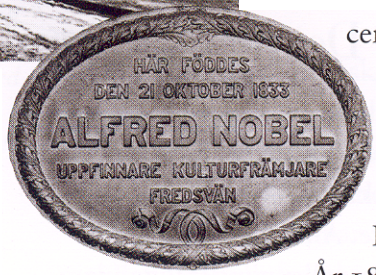
Alfred Bernhard Nobel

Born October 21, 1833
in Stockholm,
Died December 10, 1896
in San Remo

Chemist, engineer, innovator, armaments manufacturer and the inventor of dynamite.

102
No
Nobelium

Norrlandsgatan 11



Andriette

Immanuel

In 1838 Immanuel moved to St. Petersburg. The family came in 1842. He was successful with *Fondéries & Atéliers Mécaniques Nobel (& Fils)*

This house on 24 Petrogradskaya Embankment was where the Nobel family lived until 1859.

Alfred had private tutors. He became fluent in Swedish. French, Russian, English and German. Later he learnt Italian. He was very interested in literature but studied also chemistry.

In 1850 at the age of 17 he was sent out to Paris and also to USA to study chemistry.

He learnt about nitroglycerin that had been invented in 1847. He took this knowledge with him back to Russia.

After the Crimean war his father got broke again and the family except two brothers went back to Sweden.

1864

Nitroglycerin incorporated in kiselguhr (diatomaceous earth) becomes safer and more convenient to handle. This mixture was patented in 1867 as

DYNAMITE

He moved around in the world but settled in Paris.

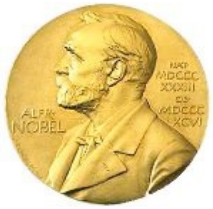
1873

PARIS

Over the years he founded factories and laboratories in some 90 different places in more than 20 countries.

Although he lived in Paris much of his life he was constantly travelling. Victor Hugo at one time described him as "Europe's richest vagabond". When he was not travelling or engaging in business activities Nobel himself worked intensively in his various laboratories.

Intensive work and travel did not leave much time for a private life. At the age of 43 he was feeling like an old man. He advertised for a secretary and supervisor of household.



1905

Bertha (Kinsky) von Suttner

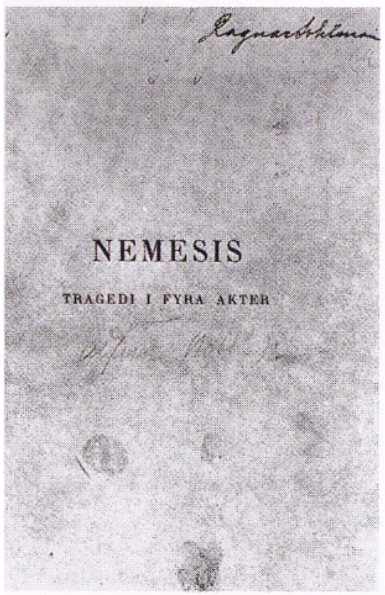
Sofie Hess

SAN REMO

1890

BOFORS

1893
Björkborn



Published in Sweden, 2003

My dynamite will sooner lead to peace than a thousand world conventions. As soon as men will find that in one instant, whole armies can be utterly destroyed, they surely will abide by golden peace.

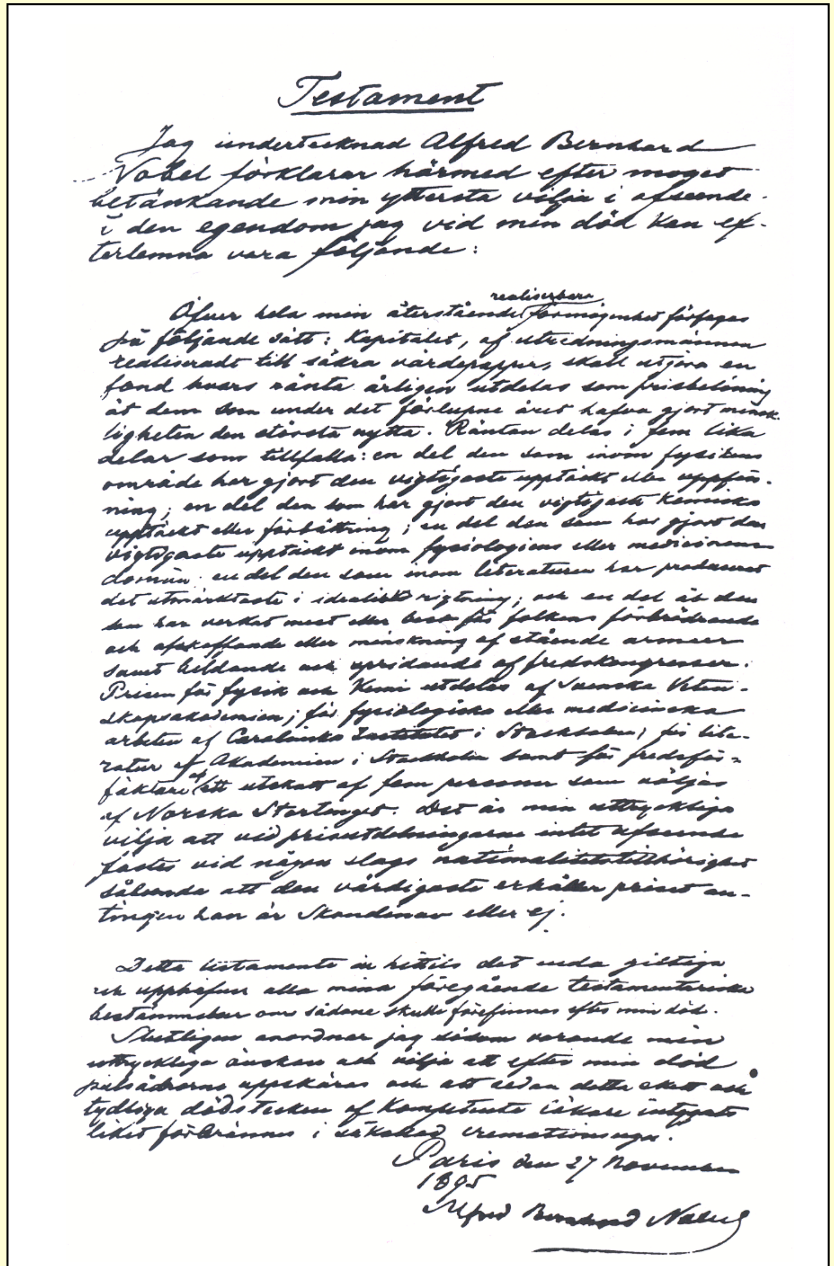
Alfred Nobel - The Inventor

Awarded 350 Patents…

…best invention……

the Nobel Prize !

ALFRED Nobel's Will
Signed in Paris
November 27, 1895



Testament

Jag undertecknad Alfred Bernhard Nobel förklarar härmed efter moget betänkande min yttersta vilja i afseende i den egendom jag vid min död kan efterlemna vara följande:

Öfver hela min återstående realiserbara förmögenhet förfogas på följande sätt: Kapitalet, af utredningsmännen realiseradt till säkra värdepapper, skall utgöra en fond hvars ränta årligen utdelas som prisbelöning åt dem som under det förlupna året hafva gjort menskligheten den största nytta. Räntan delas i fem lika delar som tillfalla: en del den som inom fysikens område har gjort den vigtigaste upptäckt eller uppfinning; en del den som har gjort den vigtigaste kemiska upptäckt eller förbättring; en del den som har gjort den vigtigaste upptäckt inom fysiologiens eller medicinens domän; en del den som inom literaturen har producerat det utmärktaste i idealisk rigtning; och en del åt den som har verkat mest eller bäst för folkens förbrödrande och afskaffande eller minskning af stående armeer samt bildande och spridande af fredskongresser. Prisen för fysik och kemi utdelas af Svenska Vetenskapsakademien; för fysiologiska eller medicinska arbeten af Carolinska Institutet i Stockholm; för literatur af Akademien i Stockholm samt för fredsförfäktare af ett utskott af fem personer som väljas af Norska Stortinget. Det är min uttryckliga vilja att vid prisutdelningarne intet afseende fästes vid någon slags nationalitetstillhörighet sålunda att den värdigaste erhåller priset antingen han är Skandinav eller ej.

Detta testamente är hittills det enda gilltiga och upphäfver alla mina föregående testamentariska bestämmelser om sådana skulle förefinnas efter min död.

Slutligen anordnar jag såsom varande min uttryckliga önskan och vilja att efter min död pulsådrorna uppskäras och att sedan detta skett och tydliga dödstecken af kompetente läkare intygats liket förbrännes i så kallad crematorium.

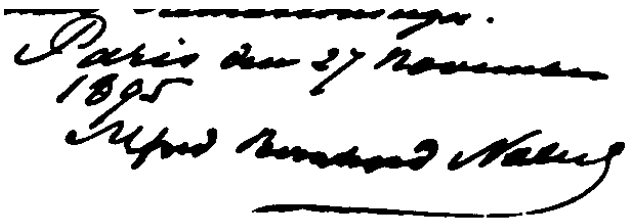
Paris den 27 November 1895

Alfred Bernhard Nobel

……The whole of my remaining realizable estate shall be dealt with in the following way: the capital, invested in safe securities by my executors, shall constitute a fund, the interest on which shall be annually distributed in the form of prizes to those who, during the preceding year, shall have conferred the greatest benefit on mankind. The said interest shall be divided into five equal parts, which shall be apportioned as follows:

one part to the person who shall have made the most important *discovery or invention* within the field of physics;

one part to the person who shall have made the most important chemical *discovery or improvement*; one part to the person who shall have made the most important *discovery* within the domain of physiology or medicine; one part to the person who shall have produced in the field of literature the most outstanding work in an ideal direction; and one part to the person who shall have done the most or the best work for fraternity between nations, for the abolition or reduction of standing armies and for the holding and promotion of peace congresses. The prizes for physics and chemistry shall be awarded by the Swedish Academy of Sciences; that for physiological or medical work by the Caroline Institute in Stockholm; that for literature by the Academy in Stockholm, and that for champions of peace by a committee of five persons to be elected by the Norwegian Storting. It is my express wish that in awarding the prizes no consideration whatever shall be given to the nationality of the candidates, but that the most worthy shall receive the prize, whether he be Scandinavian or not.



Ragnar Sohlman

Engineer and assistant to Nobel.

He was the one to execute the will of Nobel.

Nobel Foundation

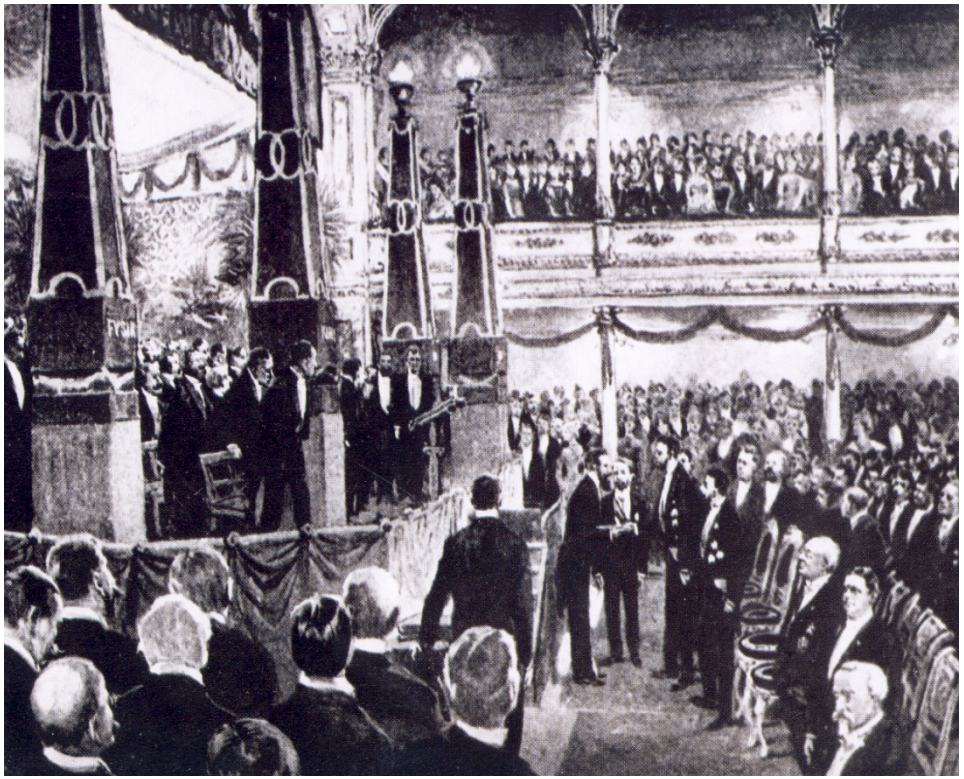
Prize-Awarding Institutions:

Physics	Royal Academy of Sciences
Chemistry	Royal Academy of Sciences
Medicine	Karolinska Institute
Literature	Swedish Academy
Peace	Norwegian Parliament

1901

"in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him"

Wilhelm Conrad Röntgen



one part to the person who shall have made the most important *discovery or invention* within the field of physics;

Most important discovery

- *not life-time achievement*
- *not the second discoverer who did it much better*
- *not the one who did the most beautiful experiment*
- *not a theoretical discovery that has not been experimentally verified*

Not always the best physicist who gets the prize

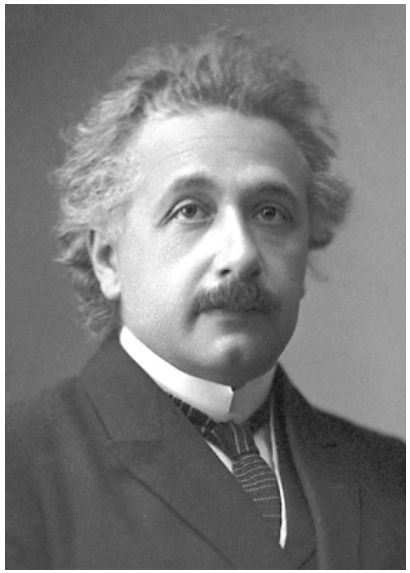
Not development

Arnold Sommerfeld
pioneer in the early quantum physics
advisor to a number of laureates
leader for a whole generation of German physicists

John Wheeler
pioner in nuclear, particle physics, gravitation..
advisor to many american physicists

Leaders but not Laureates

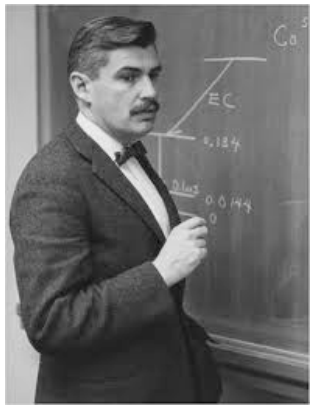
not collected work

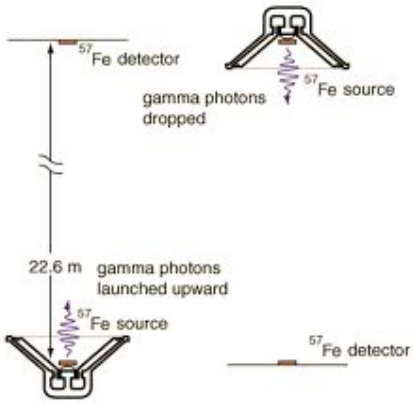


Albert Einstein 1921
for his services to Theoretical Physics
and especially for his discovery of
the law of the photoelectric effect

Hans Bethe 1967
for his contributions to the theory
of nuclear reactions, especially his
discoveries concerning the energy
production in stars

not for the most beautiful experiment





Phys. Rev. Letters
VOLUME APRIL 1, 1960

APPARENT WEIGHT OF PHOTONS

R. V. Pound and G. A. Rebka, Jr.
Lyman Laboratory of Physics,
Harvard University, Cambridge,
Massachusetts

Confirmed the equivalence principle.
(few mistrusted it)

not a theoretical discovery that has not been experimentally verified

Stephen Hawking

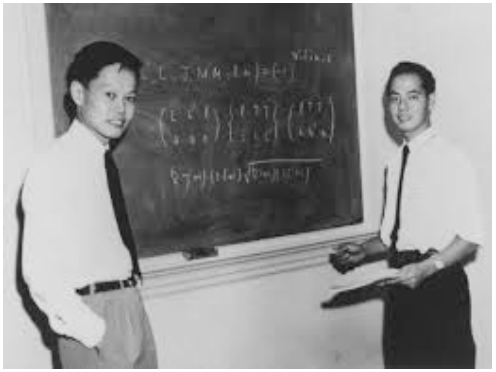
Communications in Mathematical Physics
25. VIII. 1975, Volume 43, Issue 3, pp 199-220

Particle creation by black holes

A fantastic discovery which obviously is correct.
Has not been experimentally verifed.

A discovery should have scientific height

It should be a water shed



Chen Ning Yang och
Tsung-Dao Lee 1957

for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles

We like to point to one paper

Hannes Alfvén 1970

for fundamental work and discoveries in magnetohydro-dynamics with fruitful applications in different parts of plasma physics

Nature **150,** 405–406 (1942)

Existence of Electromagnetic-Hydrodynamic Waves

IF a conducting liquid is placed in a constant magnetic field, every motion of the liquid gives rise to an E.M.F. which produces electric currents. Owing to the magnetic field, these currents give mechanical forces which change the state of motion of the liquid.

Thus a kind of combined electromagnetic-hydrodynamic wave is produced which, so far as I know, has as yet attracted no attention.

The phenomenon may be described by the electrodynamic equations

$$\text{rot } H = \frac{4\pi}{c} i$$

$$\text{rot } E = -\frac{1}{c}\frac{dB}{dt}$$

$$B = \mu H$$

$$i = \sigma(E + \frac{v}{c} \times B);$$

together with the hydrodynamic equation

$$\partial \frac{dv}{dt} = \frac{1}{c}(i \times B) - \text{grad } p,$$

where σ is the electric conductivity, μ the permeability, ∂ the mass density of the liquid, i the electric current, v the velocity of the liquid, and p the pressure.

Consider the simple case when $\sigma = \infty$, $\mu = 1$ and the imposed constant magnetic field H_0 is homogeneous and parallel to the z-axis. In order to study a plane wave we assume that all variables depend upon the time t and z only. If the velocity v is parallel to the x-axis, the current i is parallel to the y-axis and produces a variable magnetic field H' in the x-direction. By elementary calculation we obtain

$$\frac{d^2H'}{dz^2} = \frac{4\pi\partial}{H_0^2}\frac{d^2H'}{dt^2},$$

which means a wave in the direction of the z-axis with the velocity

$$V = \frac{H_0}{\sqrt{4\pi\partial}}.$$

Waves of this sort may be of importance in solar physics. As the sun has a general magnetic field, and as solar matter is a good conductor, the conditions for the existence of electromagnetic-hydrodynamic waves are satisfied. If in a region of the sun we have $H_0 = 15$ gauss and $\partial = 0{\cdot}005$ gm. cm.$^{-3}$, the velocity of the waves amounts to

$$V \sim 60 \text{ cm. sec.}^{-1}.$$

This is about the velocity with which the sunspot zone moves towards the equator during the sunspot cycle. The above values of H_0 and ∂ refer to a distance of about 10^{10} cm. below the solar surface where the original cause of the sunspots may be found. Thus it is possible that the sunspots are associated with a magnetic and mechanical disturbance proceeding as an electromagnetic-hydrodynamic wave.

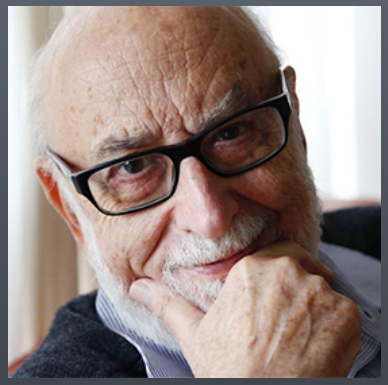
The matter is further discussed in a paper which will appear in *Arkiv för matematik, astronomi och fysik*.

H. ALFVÉN.

Kgl. Tekniska Högskolan,
Stockholm.
Aug. 24.

The Nobel Prize in Physics 2013

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

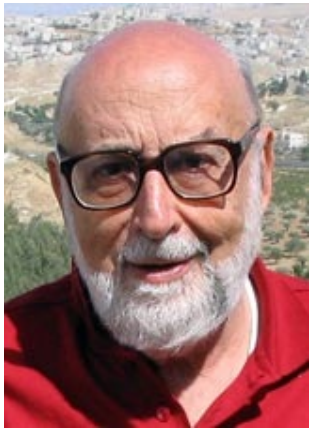


François Englert
Université libre de Bruxelles, Belgium

Peter W. Higgs
University of Edinburgh, UK

”För den teoretiska upptäckten av en mekanism som bidrar till förståelsen av massans ursprung hos subatomära partiklar, och som nyligen, genom upptäckten av den förutsagda fundamentala partikeln, bekräftats av ATLAS- och CMS-experimenten vid CERN:s accelerator LHC.”

“For the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN’s Large Hadron Collider.”



François Englert

Peter Higgs

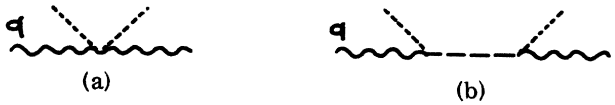


FIG. 1. Broken-symmetry diagram leading to a mass for the gauge field. Short-dashed line, $\langle\varphi_1\rangle$; long-dashed line, φ_2 propagator; wavy line, A_μ propagator. (a) $\rightarrow (2\pi)^4 ie^2 g_{\mu\nu}\langle\varphi_1\rangle^2$, (b) $\rightarrow -(2\pi)^4 ie^2(q_\mu q_\nu/q^2)\times\langle\varphi_1\rangle^2$.

$$B_\mu = A_\mu - (e\varphi_0)^{-1}\partial_\mu\Delta\phi_1, \qquad G_{\mu\nu} = \partial_\mu B_\nu - \partial_\nu B_\mu$$

$$\partial_\nu G^{\mu\nu} + e^2{\varphi_0}^2 B^\mu = 0, \qquad \partial_\mu B^\mu = 0$$

HOW ?

Nobel Committee for Physics

- 5 regular members (3-year periods, max 9 y)
- Chairperson, max 3 y
- Adjoint members (1-4, change each year)
- Secretary (no time limit)

Nobel committee for physics 2013

Lars Brink, chairman
Olga Botner
Per Delsing
Olle Inganäs
Anne L'Huillier
Mats Jonson
Mats Larsson
Lars Bergström, secretary

September 2012

Nomination for the Nobel Prizes

Each year the respective Nobel Committees send individual invitations to thousands of members of academies, university professors, scientists from numerous countries, previous Nobel Laureates, members of parliamentary assemblies and others, asking them to submit candidates for the Nobel Prizes for the coming year. These nominators are chosen in such a way that as many countries and universities as possible are represented over time.

The Process

- Invitation to nominate (before February 1):
  - Royal Academy members
  - Members of the Nobel Committee
  - Previous Nobel laureates
  - Nordic physics professors
  - Physics professors at selected universities (change every year)

How the Committee works:

Evaluation (by committee members and assessment by external experts):

Prize-worthiness, possible citation for Prize

Yearly statement from the Committee:

Review of all fields of physics

Committee proposal by end of August, can be accepted or rejected by the KVA Physics Class, which meets twice in September

Recommendation to the Academy

Final selection in Academy plenary session - Press conference first Tuesday in October: www.kva.se, www.nobelprize.org

Prize Award Ceremony, December 10

Regulations

Maximum 3 laureates

Divided Prize, or joint Prize

Full Prize: 8 MSEK ≈ 0,9 M€ ≈ 1,3 M$

Deliberations secret for 50 y

In physics and chemistry, no Prize to organizations or large collaborations (yet). However, this can be decided by the Academy itself (as has been done in Norway for the Peace Prize).

As of 2013,

47 Physics Prizes have been given to one Laureate only.
31 Physics Prizes have been shared by two Laureates.
29 Physics Prizes have been shared between three Laureates.

2013

- September 11

  First meeting with and presentation of the "Kapprock" for Class 3 of the Royal Academy.

- September 25

  Final meeting with Class 3.

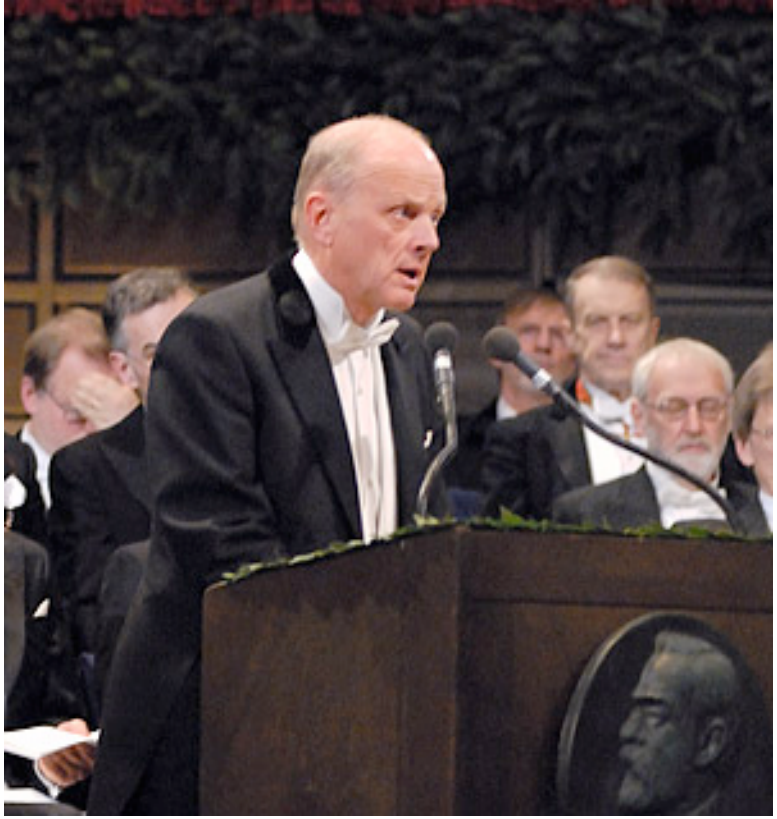
Total silence

- October 8, 09:30

Presentation of the proposal from the Committee and Class 3 to all members of the Academy. Voting.

…This is a very important telephone call to you from Stockholm, Sweden. Please do not hang up....

Dec 10, 2008



Your Majesties, Your Royal Highnesses, Ladies and Gentlemen,
"The Earth is round." This simple sentence contains so much. It shows how we human beings see the objects around us in symmetric shapes.....

小林先生、益川先生、

あなた方お二人、および南部先生は、 素粒子物理学理論に取って不可欠である対称性の破れに関する画期的な業績によって２００８年度のノーベル物理学賞を受賞されました。ここにスウェーデン王立科学アカデミーを代表して心からお喜び申し上げます。それでは、国王陛下よりノーベル賞の授与がありますので、前にお進みください

Professor Kobayashi, Professor Maskawa,
Together with Professor Nambu you have been awarded the 2008 Nobel Prize in Physics for your seminal works on broken symmetries, which have been instrumental for the modern theories of elementary particles. It is an honour for me to convey the warmest congratulations of the Royal Swedish Academy of Sciences. I now ask you to step forward to receive your Nobel Prizes from the hands of His Majesty the King.

Kungliga
Svenska Vetenskapsakademien
har den 7 oktober 2008 beslutat
att med det

NOBELPRIS

som detta år tillerkänns den
som inom fysikens område gjort den
viktigaste upptäckten eller uppfinningen
gemensamt belönad

Makoto Kobayashi

av Toshihide Maskawa

för upptäckten av ursprunget till det
symmetribrott som förutsäger att naturen
måste ha minst tre familjer av kvarkar

STOCKHOLM DEN 10 DECEMBER 2008

Front

Back

The Banquet - City Hall of Stockholm

Kungliga
Svenska Vetenskapsakademien
har den 8 oktober 2013 beslutat att meddela

NOBELPRIS

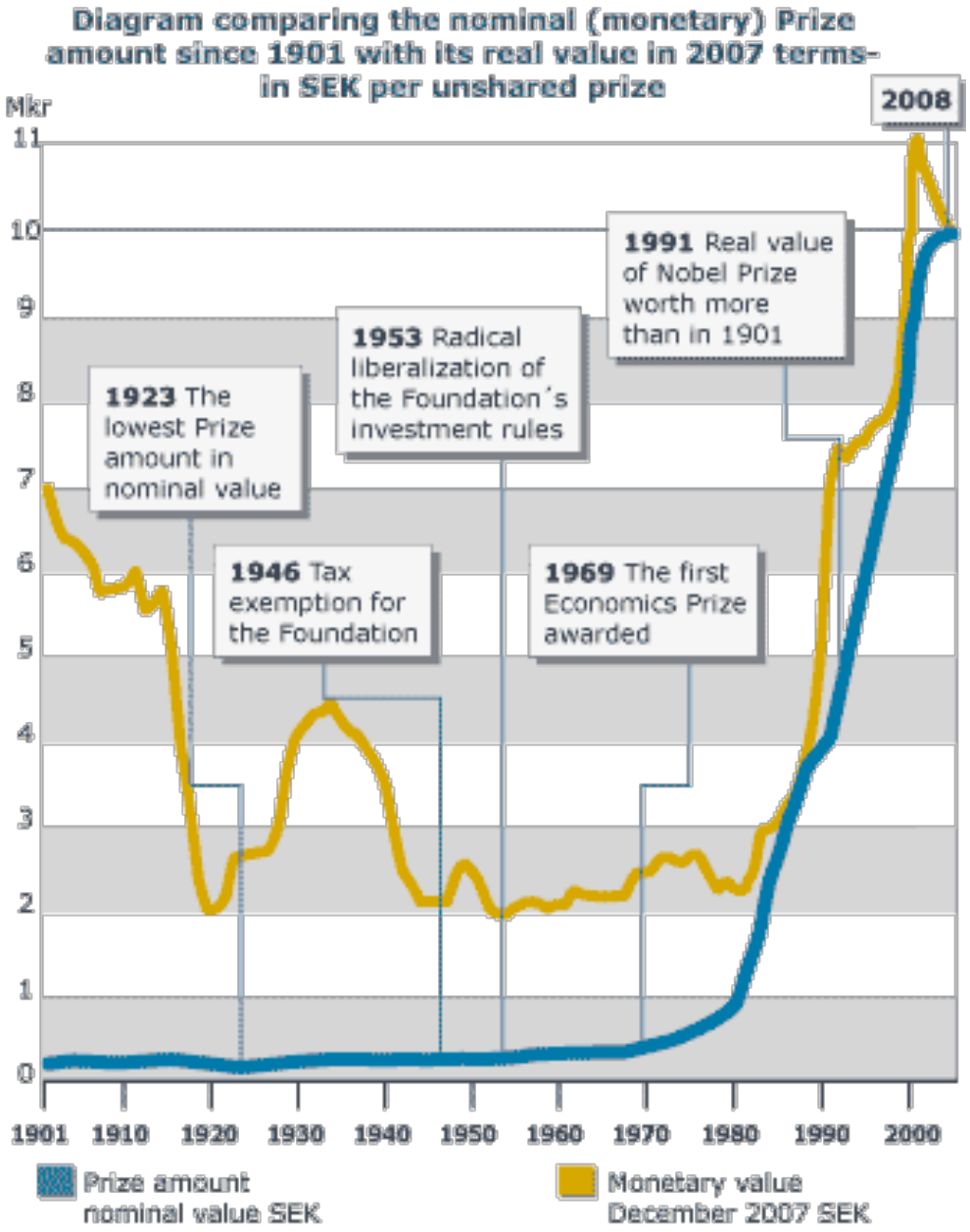
som detta år tillerkännes den
som inom fysikens område gjort den
viktigaste upptäckten eller uppfinningen
gemensamt belöna

François Englert

och Peter W. Higgs

för den teoretiska upptäckten av en mekanism som
bidrar till förståelsen av massans ursprung hos
subatomära partiklar, och som nyligen genom upp-
täckten av den förutsagda fundamentala partikeln,
bekräftats av ATLAS- och CMS-experimenten
vid CERN:s accelerator LHC

STOCKHOLM DEN 10 DECEMBER 2013



10 000 000 SEK =

1 065 200 EUR

106 473 594 JPY

1 339 100 USD

851 476 GBP

1 284 538 CHF

40 551 500 RUB

4 965 736 ILS

KUNGLIGA SVENSKA VETENSKAPS-AKADEMIEN

har vid sitt sammanträde den 9 November 1922 i enlighet med föreskrifterna i det av

ALFRED NOBEL

den 27 November 1895 upprättade testamente beslutat att tillerkänna det pris som för 1921 bortgicks åt den som inom fysikens område har gjort den viktigaste upptäckt eller uppfinning till

ALBERT EINSTEIN

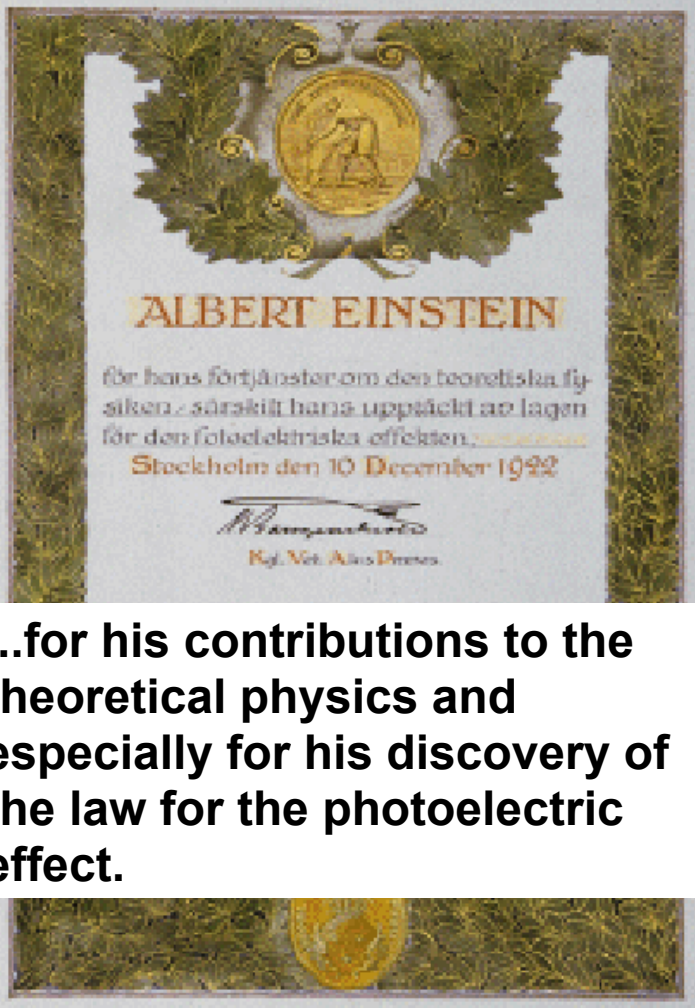
för hans förtjänster om den teoretiska fysiken och särskilt hans upptäckt av lagen för den fotoelektriska effekten.

Stockholm den 10 December 1922

Kgl. Vet. Akad. Pres.

Kgl. Vet. Akad. Sekreterare

...independent of the value which, after a possible confirmation, may be attributed to the theory of relativity and gravitation give the prize, which for 1921.....



...for his contributions to the theoretical physics and especially for his discovery of the law for the photoelectric effect.


11 July 1923