# Women in STEM - Inspiring Paths for All

Poster exhibition on inspiring paths of women scientists in mathematics, physics and computer science.

## Nobel Prize in Physics awarded women

**1903 Marie Curie**,
née Marie Sklodowska,
born 1867, Poland.
In recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel.

**1963 Maria Goeppert Mayer**
born 1906, Poland.
For their discoveries concerning nuclear shell structure.

**2018 Donna Strickland**
born 1959, Canada.
For groundbreaking inventions in the field of laser physics and for their method of generating high-intensity, ultra-short optical pulses.

**2020 Andrea Ghez**
born 1965, USA.
For the discovery of a supermassive compact object at the centre of our galaxy.

## Turing Award awarded women

**2006 Frances Elizabeth Allen**
born 1932, USA.
For pioneering contributions to the theory and practice of optimizing compiler techniques that laid the foundation for modern optimizing compilers and automatic parallel execution.

**2008 Barbara Liskov,**
née Barbara Jane Huberman,
born 1939, USA.
For contributions to practical and theoretical foundations of programming language and system design, especially related to data abstraction, fault tolerance, and distributed computing.

**2012 Shafi Goldwasser**
born 1959, USA.
For transformative work that laid the complexity-theoretic foundations for the science of cryptography, and in the process pioneered new methods for efficient verification of mathematical proofs in complexity theory.

## Field Medal awarded women

**2014 Maryam Mirzakhani**
born 1977, Iran.
For her outstanding work on the dynamics and geometry of Riemann surfaces and their moduli spaces.

**2022 Maryna Viazovska**
born 1984, Ukraine.
For her solution of the sphere packing problem in eight dimensions, as well as further contributions to related extremal problems and interpolation problems in Fourier analysis.

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☆ The exhibition was organised by ☆
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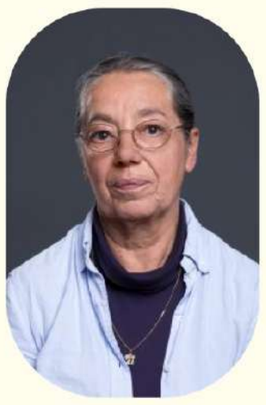
The posters for the exhibition were designed by Yoanna Borisova.

☆ The exhibition is inspired by the exhibition ☆
"Lise Meitners Töchter - Physikerinnen stellen sich vor" of DPG and ÖPG.



# Remarkable female researcher in STEM- in the past and today

by Annette B. Vogt

In this exhibition portraits about female researcher are shown who were and are working in different fields of STEM, and who contributed to theories and practical applications in their scientific disciplines. Portraits are shown about female researcher in computer science, in mathematics, and in physics. Looking back, one may ask why women scientists entered the world of academia so late, and why only few female researchers are known.

The history of women mathematicians and scientists was and is thus closely linked to the respective general history as well as the economic, social and educational history of the countries concerned. The exclusion and discrimination of women, the lack of equal educational, access and work opportunities formed the background that must be taken into account. From the 17th to the 19th century, there were only limited opportunities for women to pursue their inclination towards science: as private scholars, as translators of mathematical, physical and astronomical works, or as employees in a laboratory or observatory run by a brother or husband. Quiet famous were the Berlin astronomer family Gottfried (1639-1710) and Maria Margaretha (1670-1720) Kirch, and the astronomer Wilhelm (William) Herschel (1738-1822) and his sister Caroline Herschel (1750-1848). At the turn of the 20th century, the first women scientists - the exceptions - entered the laboratories and lecture halls.

It was a long way until women were able to study and do their doctorates with equal rights in most countries. Germany was one of the most backward countries in Europe in this "women's issue"; it was not until 1900 that the universities and technical colleges in the German states opened their doors to female students (cf. Vogt (2007)). The first female professors in modern times were the mathematician Sofya V. Kovalevskaja (1850-1891) in Stockholm in 1884, the physicist Marie, née Sklodowska Curie (1867-1934) in Paris in 1906, and the geneticist Kristine Bonnevie (1872-1948) in Oslo in 1912. In contrast to the later widespread legend that a woman had to choose between science or family, two of the three female professors had been married and had one or two daughters. At the beginning of the 20th century, some female physicists became internationally recognised and world-famous - beside Marie Curie and her elder daughter Irène Curie (1897-1956) who was working together with Fréderic Joliot (1900-1958) in the lab in Paris, in Berlin the physicist Lise Meitner (1878-1968) devoted herself to the study of radioactivity. Marie Curie in Paris and Lise Meitner in Berlin and later in Stockholm were exceptions.

The Nobel Prize in Physics has only been awarded to a female physicist four times in its more than 100-year history: in 1903 to Marie Curie, and in 1963 to Maria Goeppert-Mayer (1906-1972). Only in 2018, Donna Strickland (b. 1959) received the prize, and in 2020 Andrea Ghez (b. 1965). The four female Nobel Laureates in physics, eight in chemistry and 12 in the life sciences say less about the achievements of the many female scientists than about the practices of the respective Nobel Committees. Therefore, the awarding of the prestigious Nobel Prize should not be taken as a "measure" of excellence of female scientists.

Looking at the awards for mathematicians - the Fields Medal, awarded since 1936, and the Abel Prize, awarded since 2003 - the situation for women mathematicians is no better. It was only in 2014 that Maryam Mirzakhani (1977-2017) received the Fields Medal, and in 2022 Maryna Viazovska (b. 1984) became the second female mathematician to be awarded. Karen K. Uhlenbeck (b. 1942) was the first mathematician to receive the Abel Prize in 2019. In the computer sciences and informatics, the A. M. Turing Award has been awarded since 1966, an award at least as prestigious as the Abel Prize.

From 1966 to 2022, a total of 76 scientists received the Turing Award, but only three of them were women: Frances (Fran) Elizabeth Allen (b. 1932) in 2006, Barbara Liskov (b. 1939) in 2008 and, together with Silvio Micali, the computer scientist Shafi Goldwasser (b. 1959) in 2012; in the last 10 years, only men received the Turing Award (again).

It has also been more difficult for women scientists to receive lifelong recognition for their scientific achievements. A "side effect" of the lack of academic recognition, e.g. not being accepted as a member of Academies of Science and the lack of prizes, is the resulting under-representation of women scientists in encyclopaedias and other reference works, or more recently in the lack of entries in Wikipedia.

The centuries-long exclusion of women scientists from Academies of Science or the "overlooking" of women scientists as potential members for the Academies has less to do with the possible failure of the criteria of achievement, scientific attitude and objectivity, but it had (and has) social causes, starting with the exclusion of women from higher education at universities until the end of the 19th century, to fewer opportunities for advancement and careers in academia until well into the middle of the 20th century, to the longevity of prejudices and stereotypes, e.g. of the "typical female". In addition, there are structural barriers, called the "glass ceiling" in the 21st century. (cf. Vogt (2007), Wobbe (2003))

Current studies on the situation of female academics still show some barriers and the "glass ceiling". According to the Federal Statistical Office, the share of women in professorships in the Federal Republic of Germany was 27 % in 2021; the year before, in 2020, it was 26 %. Differentiated by scientific discipline, the proportion of female professors was only 15% in engineering, only 21% in mathematics and the natural sciences, 33% in law, economics and social sciences, and highest in the humanities at 42%. (Cf. the data of the Federal Statistical Office, in: Newsletter of the Contact Point Women in EU Research (FiF), 21.12.2022)

A reflection of these figures is shown by the data on female members in three Academies of Sciences in the Federal Republic of Germany (cf. Leopoldina (2022), p. 8):

weibliche Mitglieder Leopoldina, 2021 = 16 %
weibliche Mitglieder BBAW, 2021 = 18 %
weibliche Mitglieder ACATECH, 2021 = 16 %

The Leopoldina is the German Academy of Sciences Leopoldina, on 14 July 2008 it became the National Academy of Sciences. In 2002, the technology scientists founded acatech - the German Academy of Science and Engineering - which became the National Academy of Sciences in 2008. The BBAW is the Berlin-Brandenburg Academy of Sciences and Humanities. The table illustrating the current situation in academia was compiled by a working group of the Leopoldina, which looked at the under-representation of women in the German science system and formulated recommendations to improve the situation in September 2022. (Cf. Leopoldina (2022), p. 4).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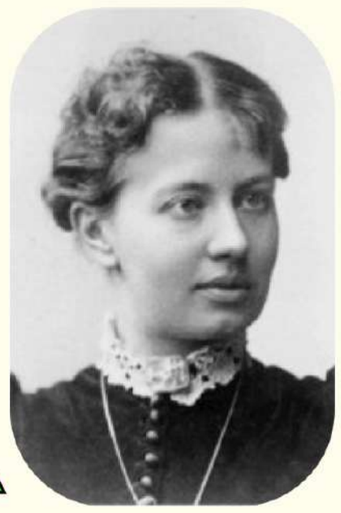


# Sofya Kovalevskaya

She was a mathematician in the 19th century, who made continuous efforts to gain the best possible education of mathematics. This makes her an important advocate for women's rights. She conducted most of her work in analysis, making contributions to the theory of differential equations.
Her interest in mathematics started at an early age. Namely, as an 11 year old girl, Sofya decorated the walls of her room with pages she found from the Mikhail Ostrogradski's integral and differential analysis lectures. Her interests were supported by a professor of physics, Nikolai Tyrtov, who was her neighbor and took note of her intellect, encouraging her parents to allow her to further her studies. Thereby, she started taking lessons in analytic geometry and calculus with Aleksandr Strannoliubskii, in St. Petersburg.

**1850** Born in Moscow, Russia.

**1868** She entered a marriage of convenience which allowed her to relocate and continue her studies in St. Petersburg, as women were not allowed to travel alone.

**1869** She was unofficially accepted as a first female student at the University of Heidelberg, without the possibility to matriculate.

**1870** She moved to the University of Berlin, where she started studying under Karl Weierstrass, who tutored her privately for four years due to women not yet being allowed to officially attend the university. Under his supervision, she wrote three papers titled "Partial differential equations", "Abelian integrals" and "Saturn's rings".

**1874** Based on her previous work with Weierstrass, she was granted her doctorate from the University of Göttingen. She then returned to St. Petersburg together with her husband, and was unable to secure an academic position due to her gender. Therefore, she took a prolonged absence from mathematics and started exploring other areas, such as writing literature, theatre reviews or scientific articles.

**1880** After a six-year absence from mathematics, she returned to Berlin where she resumed her work with Weierstrass.

**1883** She was invited by another former student of Weierstrass, Gosta Mittag-Leffler, to lecture at the University of Stockholm, where she remained for the next five years. There she was granted professorship and appointed Chair of Mechanics.

**1887** She wrote and published a paper on the rotation of rigid bodies around a fixed point, with which she won the Prix Bordin competition (organised by the French Academy of Science).

**1889** She died in Stockholm. Throughout her life she did not only publish ten scientific papers, but also several literary works, such as the theater play she wrote together with her friend Anna Leffler, titled "The struggle for happiness".

# Emmy Noether

She made important contributions to the field of abstract algebra, and is most well known for Noether's first and second theorems. Her theorems have fundamental applications in mathematical physics, by linking the ideas of symmetries of nature and conservation laws. For instance, the time-translation invariance of physical laws leads to energy conservation. She has influenced the works of many mathematical physics students and researchers she has encountered throughout her life, by sharing ideas in casual conversations, and continues to inspire through her brilliance and enthusiasm towards the field.

**1882** Born in Erlangen, Germany.

**1900** Became qualified to teach English and French in an all girls' school, but instead decided to study mathematics at the University of Erlangen, in spite of being forbidden from officially enroling in the courses there due to her gender.

**1903** Spent a semester studying at the University of Göttingen, where she attended lectures by David Hilbert and Hermann Minkowski. There she became especially interested in Hilbert's work.

**1904** Was accepted to do a PhD with Paul Gordan in Erlangen.

**1907** She completed her doctoral thesis in "On complete systems of invariants for Ternary Biquadratic forms". Afterwards, she remained in Erlangen, where she worked as a first lecturer without being paid.

**1915** She joined the group in Göttingen, led by Hilbert, who supported her in getting the position, despite the opposition she generally faced in academic circles (due to her gender). She collaborated with Hilbert and Klein on algebraic invariants related to Einstein's newly published work on general relativity. Albert Einstein, recognizing the injustice she faced, advocated for her appointment and expressed his support to Felix Klein.

**1919** She was able to get her habilitation as a consequence of the November revolution, which brought about slight improvements in women's rights.

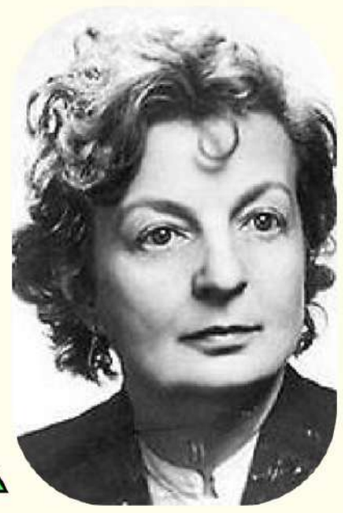
**1927** She started working on non-commutative algebras together with Helmut Hasse and Richard Brauer.

**1928-1929** She worked at the University of Moscow, where she held lectures and seminars in abstract algebra and algebraic topology.

**1930-1933** She was an editor of the Matematische Annalen in Göttingen. With the change of political regime in Germany in 1933, she was dismissed from the University of Göttingen due to her Jewish background. She then moved to the US, where she became a visiting Professor of Mathematics at the Bryn Mawr College, and conducted research at IAS Princeton, New Jersey.

**1935** She died suddenly at fifty-three due to complications following an ovarian cyst surgery.

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7IJ-cg_IsgSa8m49IafRCvHQ/edit?usp=sharing



# Hilda Pollaczek-Geiringer

She was a pioneering figure in statistics, probability theory and mechanics. She conducted novel studies in plasticity and elasticity. These led to her formulating the Geiringer differential equations, which describe plastic deformations of the plane in mathematical plasticity theory. These are relevant for instance in the construction of bridges, as they determine how much stretching and bending the construction metal can support. During World War I, she was an active member of the Academic Women's Association (in Vienna) where she held lectures on women studying at Universities, and was also an advocate for peace. She also cared for those wounded in the war and worked in a Kindergarten for Jewish refugee children.

**1913 - 1918** She studied mathematics and physics at the University of Vienna. Her doctoral thesis, supervised by Wilhelm Wirtinger, focused on double-variable Fourier series. She established fundamental convergence criteria that influenced the development of Fourier analysis in the 20th century.

**1918** Started working together with Leon Lichtenstein as an assistant editor for the journal of mathematics "Jahrbuchs über die Fortschritte der Mathematik".

**1920** Got married to Felix Pollaczek with whom he she had one daughter.

**1921** Started working as a research assistant for Richard Martin Edler von Mises at the University of Berlin. She conducted mathematical work in statistics and mechanics with applications in fluid dynamics.

**1922** Published the book "The world of mathematical ideas".

**1927** Became Private Dozent in applied mathematics at the University of Berlin and simultaneously the first woman to receive a habilitation in mathematics at the University of Berlin, and second woman ever in the German-speaking world, after Emmy Noether (at the University of Göttingen).

**1931** She discovered the Geiringer differential equations.

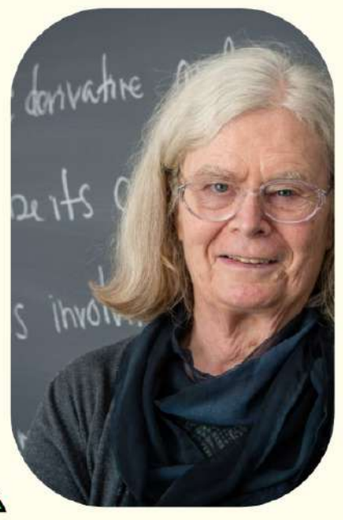
**1933** Was supposed to be promoted to un-tenured associate professor, but was instead forced to flee to Institute of Mechanics at the Université libre de Bruxelles due to her Jewish background.

**1934** Managed to get an assistant position at the Mathematical Institute of the University of Istanbul, with the aid of von Mises who had fled there in the previous year. There she carried out lectures in French and Turkish and continued her research in plasticity.

**1939** Emigrated together with von Mises to the US, where she never managed to find a position measuring up to her brilliance. She later married von Mises, who held a position at Harvard University, while she was teaching for a low salary at the Bryn Mawr College for the Liberal arts. Throughout the period of the 2nd World War she also carried out (classified) work at the National Defense Research Council.

In **1953,** von Mises passed away. While working as a fellow at Harvard, she edited and published his "Mathematical Theory of Compressible Flows" and finished his manuscript on compressible fluid flows.

**1956** Was appointed professor emeritus on a full salary by the University of Berlin.



# Karen Uhlenbeck

She is most well–known for being the first woman to ever win the Abel prize in 2019 for "her pioneering achievements in geometric partial differential equations, gauge theory and integral systems, and for the fundamental impact of her work on analysis, geometry and mathematical physics.".
She was awarded a MacArthur Fellowship in 1983 for work in geometry and partial differential equations.

**1942** Born in Cleveland, Ohio, U.S.

**1964** She completed her undergraduate studies at the University of Michigan. Initially drawn to physics due to popular science books, her interests shifted towards mathematics during her studies. She found experimental work in physics non-enjoyable and developed a passion for the challenges presented by mathematics, ultimately choosing it as her major.

**1968** She finished her graduate studies in mathematics at Brandeis University with a thesis on "The Calculus of Variations and Global Analysis" under Richard Palais. She held short-term teaching positions at MIT and UC Berkeley, feeling that long-term prospects were limited for women due to discriminatory hiring practices. At UC Berkeley, her interest shifted to the geometry of spacetime and she began studying general relativity. Inspiration from theoretical physics continued to influence her subsequent work.

**1971** She joined the faculty at the University of Illinois at Urbana-Champaign but didn't find satisfaction in the role. She felt disconnected from the community and undervalued as a mathematician.

**1976** She moved to the University of Illinois at Chicago, where she started a prolific collaboration with Shing-Tung Yau.

**1982** She published a series of papers which provided the analytic tools behind the theory of instanton and greatly helped Simon Donaldson conduct work which led to him being awarded.

**1983** Received her full professorship at the University of Chicago.

**2000** Received US National medal of science.

She co-founded a program for "Women and Mathematics Program" at the IAS, Princeton, which has the aim of encouraging more women to study math.
She co-founded the outreach program Park City Mathematics Institute (PCMI), which has the mission to "provide an immersive educational and professional development opportunity for several parallel communities from across the larger umbrella of the mathematics profession.".

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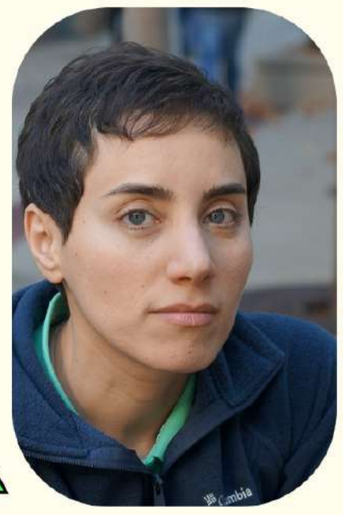


# Maryam Mirzakhani

She has conducted work in Teichmuller theory, symplectic geometry, hyperbolic geometry, ergodic theory. Despite growing up during the Iran-Iraq war, she showed a vivid imagination and excelled academically. Encouraged by her parents, she and her siblings pursued creative careers. At Farzanegan school, she received special support from the principal, who organized classes for her to prepare for the Mathematics Olympiad. Maryam broke barriers as the first girl to participate in the Iranian competition. The principal's positive mindset left a lasting impact on her, shaping her life significantly.

**1994, 1995** She showed early interest and dedication to the field by winning gold medals in the International Mathematical Olympiad for high school students, attaining a perfect score.

**1999** Obtained her undergraduate degree in mathematics from Sharif University of Technology in Teheran.

**2004** Obtained her doctorate from Harvard University for “Simple Geodesics on Hyperbolic Surfaces and Volume of the Moduli Space of Curves”, which brought her international recognition.

**2004-2008** Became a Clay Mathematics Institute research fellow and an assistant professor of mathematics at Princeton University.

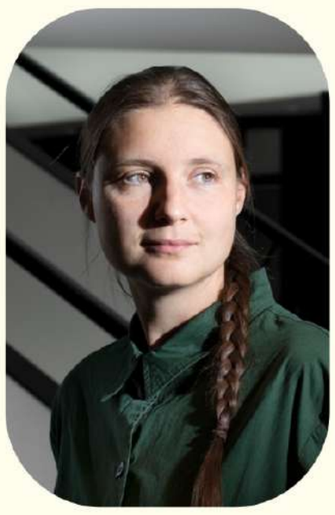
**2009** Obtained her professorship at the Stanford University.

**2014** Became the first woman (and Iranian) to ever be awarded the Fields Medal for “her outstanding contributions to the dynamics and geometry of Riemann surfaces and their moduli spaces”. Her work together with Alex Eskin serves as a “Magic Wand” for numerous applications - which is why their theorem was called the Magic Wand Theorem.

**2017** Died of breast cancer at the age of forty.

Maryam Mirzakhani herself did hardly answer questions which aimed beyond mathematical content. Upon her death, several Iranian newspapers, along with Iranian President Hassan Rouhani, broke taboo and published photographs of Mirzakhani with her hair uncovered. Although most newspapers used photographs with a dark background, manipulation by photoshop, and even paintings to "hide" her hair. This gesture was widely noted in the western press and on social media.

Recommendation Arte DE documentary on her life and work (illustrating her work in a way which makes it more accessible to a broader audience not necessarily of mathematical background)



# Maryna Viazovska

She won the 2022 Fields medal for proving the Kepler Conjecture in 8, 24 dimensions, which is a problem of sphere packing. Namely, the question is how much ”space” or bulk can be filled with hyper spheres. The dimensional choices 8 and 24 are special, in that this ratio can actually be estimated there due to their high degree of symmetry - the configurations are ”universally optimal”. Beyond it being an extremely interesting mathematical problem, such work has useful real-life applications, for instance in signal transmission and noise minimization. In summary, a signal can be reconstructed from a maximal number N of sampled frequencies (Shannon). These frequencies can be used as coordinates in an N-dimensional real space, with the standard topology of open balls. The open sets are then error balls, centered at signal values, and the full topology can specify a vocabulary dictating the allowed signals that can be received and processed. The Kepler conjecture also has applications in energy optimization problems.

**1984** Born in Kiev, Ukrainian USSR.

**2005** Completed her undergraduate studies in mathematics at the National University of Kiev.

**2007** Completed her MSc in mathematics at the Technical University Kaiserslautern, her thesis titled "Inequalities for polynomials and rational functions and quadrature formulas in the sphere".

**2013** Completed her PhD at Max Planck Institute for Mathematics (at the Rheinische Friedrich-Wilhelms-Universität in Bonn).

**2014** Completed postdoctoral work at IHES France.

**2017** She published her solution to the Kepler problem in 8 dimensions in the paper titled "The sphere packing problem in dimension 8", and the 24-dimensional case in "The sphere packing problem in dimension 24", alongside colleagues Henry Cohn, Abhinav Kumar, Stephen D. Miller, Danylo Radchenko.

**2018** She received her full professorship at École Polytechnique Fédérale de Lausanne and also the New Horizons in Mathematics Prize for her remarkable contributions to the field.

**2022** Received the Fields Medal for her work on the higher-dimensional counterparts of the Kepler problem.

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# Lise Meitner

Lise Meitner was a nuclear physicist who researched on radioactivity and nuclear fission. She was the first female professor of physics in Germany. She and her nephew Otto Robert Frisch provided the theoretical explanation for nuclear fission. They concluded that, when bombarding uranium, the heaviest element known at the time, with neutrons, uranium nuclei split in two. They also provided the estimate for the large amount of energy released in nuclear fission and named the new nuclear process "fission". During her lifetime, Meitner was nominated 49 times for the Nobel Prize in physics and chemistry, including by colleagues such as W. Heisenberg, M. von Laue, A. Compton, L. de Broglie and M. Planck.

In a 1953 radio interview, Lise Meitner spoke about women in research based on her own experience: "[...] I also knew very little about the development of the women's movement. Above all, it had not become clear to me what it meant for the most diverse problems that involve individual life and community life in human society. Of course, I had read one thing or another about the women's question. [...] Later I realized how erroneous this view of mine was and how much gratitude is owed, especially by every woman working in an intellectual profession, to the women who fought for equal rights. That I came to this realization relatively late was due to some particularly fortunate circumstances in my scientific development."

The full original interview is available here: Lise Meitner: "Frauen in der Wissenschaft", SWR2 Archivradio)

**1878** Born in Vienna.

**1899** External preparation for Matura which, as a girl, she could only get as an external student in a boys school.

**1901** Studies of physics, mathematics and philosophy at the University of Vienna, doctorate on "Heat conduction in homogeneous bodies" in 1906. She was the second woman to earn a doctorate in physics at the University of Vienna.

**1907** Moved to Berlin and attended lectures of Max Planck, start of the 30-year collaboration with chemist Otto Hahn.

**1911** Scientific guest at the Kaiser Wilhelm Institute (KWI) for Chemistry.

**1912 - 1913** Assistant to Max Planck, first female assistant at the Friedrich-Wilhelms-University (FWU) Berlin.

**1913** Appointment as scientific member at the KWI for Chemistry.

**1917** Discovery of the element 91, Protactinium, together with O. Hahn.

**1919** Award of the title of professor.

**1922** Habilitation at the FWU Berlin.

**1926-1933** Associate Professor at the FWU Berlin.

**1920s** Silver Leibniz Medal of the Prussian Academy of Sciences, member of the Leopoldina. Start of multiple nominations of Meitner and Hahn for the Nobel Prize.

**1934** Start of research on transuranic elements, elements with atomic numbers greater than 92 (Uranium).

**1938** Meitner had Jewish ancestry and escaped from Germany to Sweden where she was employed at the Nobel Institute for Physics in Stockholm.

**1938** Discovery of nuclear fission based experiments of neutron bombardment of Uranium conducted by Hahn and Fritz Strassmann in Berlin. The theoretical explanation of nuclear fission was given by Lise Meitner and her nephew O. R. Frisch.

**1946** Otto Hahn receives the Nobel Prize for Chemistry.

From **1948** on, many honors and awards, including six honorary doctorates, as well as medals and prizes, member of many academies of sciences, award of the Max-Planck-Medal of the DPG, Enrico Fermi Prize together with Hahn and Strassmann.

**1947 – 1953** Professor in Stockholm and worked on ß-spectra and nuclear structures.

**1968** Death in Cambridge (UK) after she had moved there, to the family of O. R. Frisch, in 1960.

References:
https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7IJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing

# Prof. Chien-Shiung Wu

She has brought important contributions to the field of particle physics through the Wu experiment which used asymmetries in beta-decay experiments conducted on Cobalt-60 to provide proof of parity violations by the weak interactions. Some of the implications of Wu's work include a better understanding of the special traits of weak interactions, which govern thermonuclear reactions in the sun through the fusion of Hydrogen into Helium, or are useful in radiocarbon dating (dating probes which contain traces of organic matter using the decay of the Carbon-14 isotope). Moreover, this research later led to the electroweak unification (unification of the electromagnetic and weak interactions) and to CP violations (charge and parity are not conserved) which imply the matter-antimatter asymmetry in the universe. She also worked on the Manhattan project. Her male colleagues Tsung-Dao Lee and Chen Ning Yang were awarded the Nobel Prize in 1957 for their investigations of the parity laws, whereas Chien-Shiung Wu was overlooked by the prize committee.

**1912** Born in Taicang, China; her father was a strong advocate for girls' access to education and founded a women's school in China.

**1936** Graduated from National Central University in Nanjing, China.

**1940** Earned her PhD in physics from UC Berkeley and started teaching at Smith College and Princeton University.

**1944** Started conducting work in the Division of War Research at University of Columbia, specifically in radiation detection (as part of the Manhattan project).

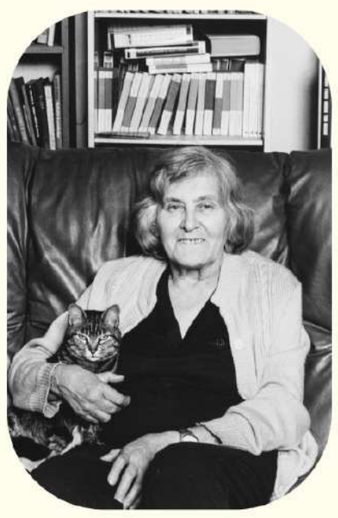
**1956** Designed the Wu experiment for parity violation in weak subatomic interactions, alongside with Tsung-Dao Lee and Chen Ning Yang (IAS Princeton). Her collaborators received the Nobel Prize for their work in 1957.

**1957** She earned her professorship at the University of Columbia after World War II and she would remain there for the rest of her career.

**1975** Received the National Medal of Science and became the first woman president of the American Physical Society.

**1981** Retirement from the University of Columbia.

She devoted her retirement years to conducting education programs for girls in the US, Taiwan and the People's Republic of China and was a strong advocate for women in STEM fields



# Margherita Hack

She was a multi-faceted scientist with diverse research interests. Her primary area of expertise focused on observing and interpreting the spectroscopic properties of stars. Her research delved into studying the chemical composition of stars, as well as their surface temperature and gravity. In 1969, she co-authored the textbook "Stellar Spectroscopy" with Otto Struve, which remains a classic reference in the field of stellar atmospheres.

**1922** Born in Florence.

**1945** She received a degree in physics from the University of Florence .

**1961** While working at UC Berkeley, she developed the hypothesis that Epsilon Aurigae is a “Be-star-like hot object at the center of a large disk of occulting material”, at the time this hypothesis was impossible to confirm.

**1978** The hypothesis was confirmed, when the International Ultraviolet Explorer satellite was launched.

**1964 – 1992** Full professor of astronomy at the University of Trieste.

**1969** and **1970** Published Stellar Spectroscopy in two volumes.

**1980** She founded the Department of Astronomy at the University of Trieste.

**1985 – 1991, 1994 – 1997** Director of the Astronomy Department at the University of Trieste.

**1964 – 1987** First women directing an Astronomical Observatory, “Osservatorio Astronomico di Trieste”.

Margherita Hack was a strong advocate for civil rights and secularism in Italian society.

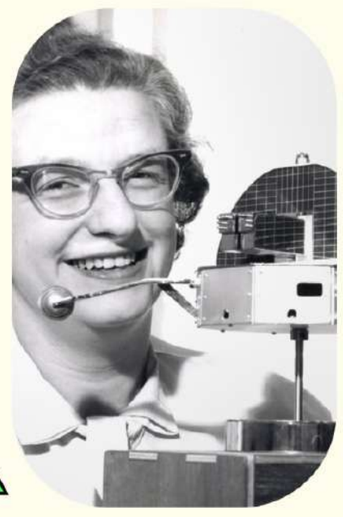
She was the well-known spokesperson for the Italian Union of Rationalist Atheists and Agnostics, and actively promoted their message.

As the first woman to become the director of an astronomical observatory, she staunchly defended civil rights.

Even as a teenager in **1940**, she was suspended from school for twenty days due to her anti-fascist beliefs.

From **1996** to **2013**, she wrote a column for the Italian newspaper L'Unità, called "Pan di stelle", which covered a wide range of topics including science, civil rights, politics, gender equality, and LGBT+ rights.

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4lme4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing



# Nancy Grace Roman

She was the first Chief of Astronomy at NASA and the first woman to hold an executive position there. When she first started at NASA, part of her work entailed traveling across the country and popularizing ideas related to the benefits of conducting astronomical observations directly from space. This highly contributed to the Hubble Telescope being approved as an official NASA project. During her time at NASA she played a foundational role in planning the Hubble Space Telescope.

She was part of the American Association of University Women (AAUW). She was vocal about the discrimination she felt in the field (for instance through her much lower pay than her male colleagues). Thus, she raised concerns with her department chair at the University of Chicago and was told "We don't discriminate against women. We can just get them for less." While acknowledging the lack of women in senior academic positions, she also highlighted positive trends in academia regarding gender biases: "Persevere! Things are better than they used to be. Women now can and do get professorships; women are heads of observatories and departments". This helps us note that change is possible, and it is happening one step at a time, aided greatly by each incredible scientist and their legacy such as the one left behind by Roman.

**1925** Born in Nashville, Tennessee, U.S.

**1946** Completed her undergraduate studies in astronomy at the Swarthmore University.

**1949** Completed her PhD at the University of Chicago, where she conducted studies on the movement of stars which originated from the Big Dipper cluster. The Big Dipper cluster consists of seven bright stars within the Ursa Major (Great Bear) constellation. She was thus able to trace the origin of over two hundred stars to Ursa Major.

After her doctorate, she remained in Chicago for postdoctoral studies and continued her research.

**1955** Completed her 6-year research associate work at the Yerkes Observatory in Williams Bay, Wisconsin.

**1959** Began her work as a scientist at the newly formed organization NASA and became Chief of Astronomy in NASA's Office of Space Science. Undertaking this job meant leaving the academic environment behind, and this was in part owed to her belief that it was impossible to get tenured as a female astronomer in the US.

Programmes overseen and planned by Nancy Roman throughout her career at NASA consisted of satellite launches, such as:

**1966 - 1972** a series of four satellites, part of the project Orbiting Solar Observatory (OSO), led to the first successful telescope in space which carried out high-quality observations and introduced technology used to establish the Hubble Space Telescope.

**1978** International Ultraviolet Explorer, the first observatory from space which could be operated in real time from ground stations. It made important observations of stellar winds, light absorption by cosmic dust and studied the supernova SN 1987A, which helped provide crucial insights about stellar evolution.

Twenty other satellite launches, as well as preparations regarding the Apollo 11 and the three Skylab 1-3 missions.

**1979** Early retirement from NASA because she wanted to keep up with the times and continue her studies by learning the programming language Fortran, widely used in astronomical data analysis.

**1981** She joined the Goddard's Astronomical Data Center and became the center's director fourteen years later.

**1997** She retired once again, and dedicated the rest of her time to voluntary work. She joined programs such as "Reading for the Blind and Dyslexic" (which has now changed name to "Learning Ally") and "Journey to the Universe". The latter program focused on sending scientists and engineers to help educate under-served areas in the US. She conducted a lot of outreach work and aimed at becoming a model for children interested in science.

# Susan Jocelyn Bell Burnell

She is an astrophysicist from Northern Ireland who made a groundbreaking discovery as a postgraduate student in 1967, by detecting the first radio pulsars. Radio pulsars are rotating neutron stars emitting beams of electromagnetic radiation, including radio waves, detected on earth as periodic pulses. They have been used to probe fundamental physics and study the interstellar medium, as well as discover exoplanets. Despite the discovery leading to a Nobel Prize in Physics in 1974, she was not among the recipients. In retrospect, she believed that her status as a woman and a graduate student contributed to her exclusion from the prize.

**1943** Born in Northern Ireland.

**1965** Bachelor of Science degree in Natural Philosophy (physics) at University of Glasgow.

**1969** PhD at the University of Cambridge.

**1968-1991** Lecturer and researcher at many laboratories and universities including: University of Southampton, Mullard Space Science Laboratory at UCL, Royal Observatory in Edinburgh.

**1991-2001** Professor at Open University.

**1999-2000** Visiting professor at Princeton University.

**2001 – 2004** Dean of Science at the University of Bath.

**2002 and 2004** President of the Royal Astronomical Society between.

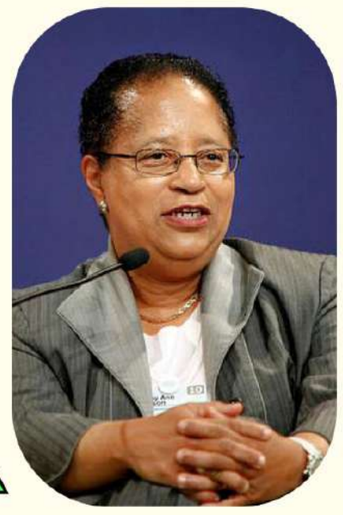
**2004 - Present** Visiting professor at University of Oxford.

**2018 – Present** Chancellor at University of Dundee.

During a 2021 lecture at the University of Bedfordshire, she recounted how she was criticized for wearing an engagement ring when she returned to the observatory, as it was considered shameful for women to work back then.

She was awarded the Special Breakthrough Prize in Fundamental Physics in 2018 and decided to use the $3 million prize money to establish a fund that supports female, minority, and refugee students in pursuing careers in physics research.

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing



# Shirley Ann Jackson

She is an American theoretical physicist. Her research areas include theoretical elementary particle physics and theoretical condensed matter physics, especially layered and two-dimensional systems and optoelectronic materials. She later served on several educational, corporate and governmental boards.

**1946** Born in Washington, U.S.

**1968** Bachelors in physics at M.I.T.

**1973** Ph.D. in theoretical elementary particle physics from M.I.T., followed by postdoctoral years at the Fermi National Accelerator Laboratory, Illinois, and at CERN, Switzerland.

**1976 – 1991** Conducted research in theoretical solid state physics, quantum physics and optical physics at AT&T Bell Laboratories, New Jersey.

**1991 – 1995** Professor of physics at Rutgers University. She conducted research on the electronic and optical properties of two-dimensional systems.

**1995 – 1999** Chairman of the U.S. Nuclear Regulatory Commission (NRC). She contributed to the formation of the International Nuclear Regulators Association (INRA) and was elected the group's first chair in 1997.

Since **1999** President of Rensselaer Polytechnic Institute, US.

**2009 – 2017** Held government roles under Barack Obama in organizations such as President's Council of Advisors on Science and Technology (PCAST) and the President's Intelligence Advisory Board.

She is the second African American woman in the United States to earn a doctorate in physics and the first African American woman to earn a doctorate in any field at the Massachusetts Institute of Technology (MIT). A landmark decision of the US supreme court in 1954 ended racial segregation in public schools during her childhood. This allowed her to attend advanced programs in mathematics and science in high school.

# Fabiola Gianotti

As the project leader and spokesperson of ATLAS, Gianotti played a crucial role in the experiment's observation of the Higgs boson. ATLAS is one of two general-purpose detectors at the Large Hadron Collider (LHC) and was one of two experiments involved in the Higgs boson discovery. On July 4, 2012, Gianotti announced the groundbreaking discovery of this long-theorized particle, which is a major component of the Standard Model of particle physics. Her exceptional leadership and profound understanding of the ATLAS experiment were widely acknowledged as instrumental factors in this achievement.

**1960** Born in Rome.

**1989** PhD in experimental particle physics from the Physics department of the University of Milan.

**1994** Researcher in the Departments of Experimental Physics at CERN.

**2009 - 2014** Project leader and spokesperson of the ATLAS Collaboration.

**2013** Enrico Fermi Prize of the Italian Physical Society, Special Breakthrough Prize in Fundamental Physics Prize, Medal of Honour of the Niels Bohr Institute of Copenhagen.

**2013** Honorary Professor in the School of Physics and Astronomy at the University of Edinburgh.

**2014 - 2016** Member of the  Advisory Committee of the Secretary-General of the United Nations Ban Kimoon.

**In 2016** Elected to be the first female Director-General of CERN

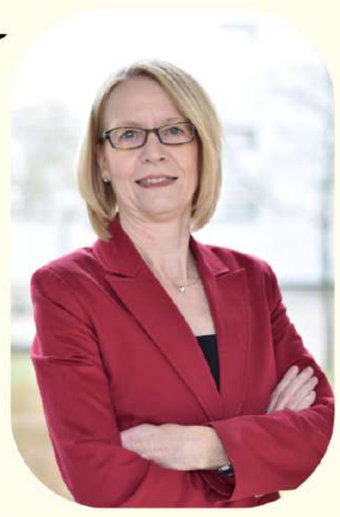
**2019** First director to be selected for a second term 2021-2025, Tate Medal of the American Institute of Physics for International Leadership

*"Cern is a concrete example of worldwide, international co-operation — and a concrete example of peace. The place which makes, in my opinion, better scientists but also better people."*

*Fabiola Gianotti*

Gianotti's appointment as the first female Director-General of CERN on January 1st, 2016, is a significant milestone in breaking down barriers for aspiring female scientists in the male-dominated field.

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing



# Cornelia Denz

Her research focus is nonlinear photonics and its application in different fields. Nonlinear optical effects are in general achieved with high light intensities and a medium with a high nonlinearity. More specifically, she works on structured light, soft and hard laser lithography, information optics, biophotonics and biophysics, micro and optofluidics, optical pattern formation and complex optical systems. In addition to numerous research articles, she has authored and co-authored several textbooks in her research field.

Cornelia Denz is also a fellow of the European Optical Society and Fellow of the Optical Society of America and has received several prizes such as the Lise Meitner Prize of the State Government of Hesse, Adolf Messer Foundation's prize and the "Gender Equality Prize" of the University of Muenster. She also received the "Professor of the Year" award from Unicum magazine for her career mentoring of students for the academic and non-academic sector. She is married and has two grown-up sons.

**1963** Born in Frankfurt am Main.

**1982 – 1988** Physics studies at the TU Darmstadt.

**1988 – 1992** Doctoral studies at the TU Darmstadt and at the Institut d'Optique, Orsay, France.

**1999** Habilitation in experimental physics at TU Darmstadt.

Since **2001** She holds a professorship at the Institute for Applied Physics at University of Münster (UoM).

**2003 – 2022** Director of the Institute for Applied Physics, UoW.

**2010 – 2016** Vice-Rector for International Affairs and Young Researchers, UoM.

**2016 – 2022** Professor of Experimental Physics and Gender Studies in Physics at UoM.

Since May **2022** President of the Physikalisch-Technische Bundesanstalt (PTB), the national metrology institute of Germany and Associate Professor in the Department of Physics at UoM.

Prof. Denz is author and co-author of several books on women in physics such as "Einsteins Kolleginnen - Physikerinnen gestern und heute" (2005, C. Denz, A. Vogt) and "Vielfältige Physik - Wissenschaftlerinnen schreiben über ihre Forschung" (2019, D. Duchardt, A. B. Bossmann, C. Denz). She is a founding director of an experimental laboratory for pupils which targets at encouraging girls and boys in their interest in natural sciences outside of school and hands-on learning.

# Jessica Wade

She studies novel materials obtained by manipulating their molecular chirality, which could potentially be useful in developing new technologies through their specific charge transport properties. The emerging structures from the chirality of electrons (such as a bias of the properties encoded in the material for up or down electrons) leads to very special characteristics. Specifically, such materials could effectively circumvent issues in quantum technology, such as the need for very low temperatures to maintain coherence, an alternative to very expensive materials.

**1988** Born in London, UK.

**2012** Completed her MSci studies in physics at the Blackett Laboratory, Imperial College London.

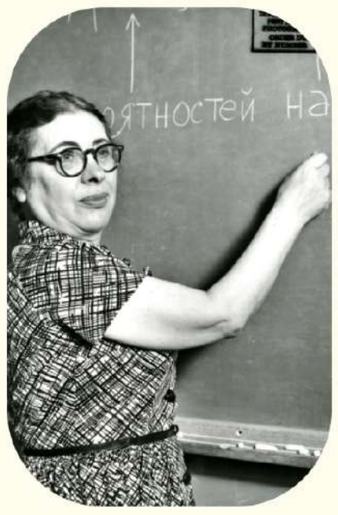
**2016** Completed her PhD in solid state physics at Imperial College under Professor Ji-Seon Kim.

**2017** Began her work as a postdoctoral research associate at Imperial College, where she remains until the present. Her research centers around investigating polymer-based organic light-emitting diodes (OLEDs).

She is a gender equality advocate and she has written over 1700 Wikipedia biographies for various people in STEM that did not have them yet (women and other minorities such as people of color, LGBTQ+).

She is extremely involved in outreach work, whereby she collaborates with schools and teachers to popularize science and has written a children's book about nanoscience, titled "Nano - The spectacular science of the very (very) small".

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing

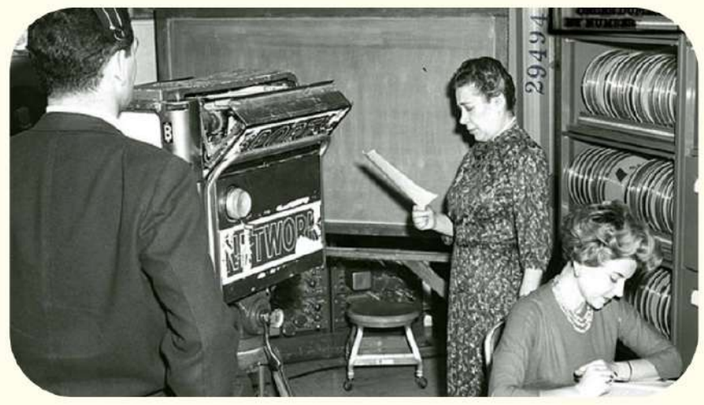


# Ida Rhodes

She became a member of the clique of influential women at the heart of the early computer development. Rhodes was credited as the original developer of the "Jewish Holiday" algorithm, which remains in use today in calendar programs, defying the norm of old specialized algorithms being replaced over time.

*"The more we work with electronic machines, [...] the more awe we feel about the marvelous workings of the human mind. We call it ADAM— absolutely divine automatic machine."*

*Ida Rhodes*



**1900** Born in Ukraine.

**1913** Moved with her family to the USA.

**1919 - 1923** Studying mathematics at Cornell University only six years after coming to the United States.

**1922, 1923** She was elected to the honorary organizations Phi Beta Kappa (1922) and Phi Kappa Phi (1923).

**1940** She held numerous positions involving mathematical computations before she joined the Mathematical Tables Project, where she worked under Gertrude Blanch, whom she would later credit as her mentor.

**1949** The Department of Commerce awarded her a Gold Medal for "significant pioneering leadership and outstanding contributions to the scientific progress of the Nation in the functional design and the application of electronic digital computing equipment".

**1950** Was a pioneer in the analysis of systems of programming, and with Betty Holberton designed the C-10 programming language for the UNIVAC I. She also designed the original computer used for the Social Security Administration.

**1964** Though she retired, Rhodes continued to consult for the Applied Mathematics Division of the National Bureau of Standards until 1971.

Her work became much more widely known after her retirement, as she took the occasion to travel around the globe, lecturing and maintaining international correspondence.

**1976** The Department of Commerce presented her with a further Certificate of Appreciation on the 25th Anniversary of UNIVAC I, and at the 1981 Computer Conference cited her a third time as a "UNIVAC I pioneer."

# Elizabeth J. Feinler

She is an innovative information scientist who served as the Director of the Network Information Systems Center at the Stanford Research Institute (now SRI International). She began her tenure at SRI in 1960, working in the Information Research Department. In 2012, Elizabeth received recognition for her achievements with an induction into the Internet Hall of Fame. Following her retirement, she has served as a consultant at The Computer History Museum. Her contributions include the donation, organization, and thorough documentation of over 350 boxes of archives from the Engelbart and NIC projects.

*“I am proud to have had a small role in the development of the Internet, a technical phenomenon that has changed the way the world learns and communicates.”*

*Elisabeth J. Feinler*

**1931** Born in Wheeling, West Virginia, United States.

**1954** Graduated of West Liberty University in West Liberty, WV with a B.S. degree in chemistry.

She then did graduate work in biochemistry at Purdue University under Dr. Roy Whistler.

From there she joined the Shuman Chemical Co. where she did work on nutritional supplements for sufferers of phenylketonuria.

**1958** Joined Chemical Abstracts Service in Columbus, OH as Assistant Editor for several sections of the Chemical Abstracts 5th Decennial Index.

**1960** Joined SRI International in Menlo Park, CA in 1960 as an information scientist heading up the Information Research Department.

**1972** Becoming a member of Dr. Douglas Engelbart’s Augmentation Research Center, where she began her work on the Internet.

Her early networking effort was carried out on Host 2 of the Internet, where she pioneered and managed first the ARPNET, and then the Defense Data Network, Network Information Center (NIC) under contract to the Department of Defense. Both of these early networks were the forerunners of today’s Internet.

**1974** Served as Principal Investigator for the NIC project.

**1985-1989** Director for the Network Information Systems Center at SRI International.

Her group developed the first Internet “yellow-” and “white-page” servers as well as the first query-based network host name and address (WHOIS) server. Her group managed the Host Naming Registry for the Internet from **1972** until **1989**.

As part of this effort she and her group developed the top-level domain naming scheme of .com, .edu, .gov, .mil, .org, and .net, which are still in use on the Internet today.

References: https://docs.google.com/document/d/1hqxWk6yxc555w4lme4O7lJ-cq_isq5a8m49iafRCvHQ/edit?usp=sharing

# Frances Elizabeth Allen

She was an American computer scientist and pioneer in the field of optimizing compilers. Allen was the first woman to become an IBM Fellow, and in 2006 became the first woman to win the Turing Award.

*"You need to hire and develop great people. You need to set the vision and trust them to do the right thing. You need to let go of control. That's wonderful for all involved because you're empowering and trusting your people to do what's right for the brand."*

*Frances Elizabeth Allen*

**1932** Born in Peru, New York, USA.

**1954** Graduated from The New York State College for Teachers (now part of the University at Albany, SUNY) with a Bachelor of Science degree in mathematics.

**1954** Began teaching at school in Peru, New York.

**1957** She enrolled at the University of Michigan and earned a Master of Science degree in mathematics.

**1957** Deeply in debt with student loans, she joined IBM Research in Poughkeepsie, New York, as a programmer, where she taught incoming employees the basics of Fortran.

**1959** She was assigned to the Harvest project for code breaking with the National Security Agency, and worked on a programming language called Alpha. She managed the compiler-optimization team for both Harvest and the Stretch project.

**1962** Transferred to Thomas J. Watson Research Center, where she contributed to the ACS-1 (IBM Advanced Computer Systems) project.

**1970 - 1971** Spent a sabbatical at New York University and acted as adjunct professor for a few years afterwards.

**1977** Another sabbatical brought her to Stanford University.

**1980 - 1995** Allen led IBM's work in parallel computing development and helped develop software for the IBM Blue Gene project.

**1989** Allen became the first female IBM Fellow.

**2002** She retired from IBM, but remained affiliated with the corporation as a Fellow Emerita.

**2006** Allen was recognized for her work in high-performance computing with the "2006 Turing Award". She became the first woman recipient in the forty-year history of the award, which is considered the equivalent of the Nobel Prize for computing and is given by the Association for Computing Machinery. In interviews following the award she hoped it would give more "opportunities for women in science, computing, and engineering".

**2007** The IBM Ph.D. Fellowship Award was created in her honor. After retiring, she remained active in programs that encourage women and girls to seek careers in science and computing.

# Annie Easley

She was a computer scientist, mathematician, and rocket scientist, who made significant contributions to NASA and its predecessor, NACA. She played a pivotal role in the development of software for the Centaur rocket stage and was among the early African-Americans to work as a computer scientist at NASA's Lewis Research Center (now Glenn Research Center).

*"Don't give up on it. Just stick with it. Don't listen to people who always tell you it's hard, and walk away from it"*

*Annie Easley*

**1933** Born in Birmingham, Alabama, U.S.

**1950** Entered Xavier University, an African-American Catholic university, and majored in pharmacy for about two years.

Despite not having a B.A. degree, she began working as a substitute teacher in Jefferson County, Alabama. In between teaching, she helped members of her community prepare for literacy tests required for voter registration. The literacy tests were primarily designed to exclude African Americans from voting. Easley, however pushed back against this discrimination by helping as many as possible to register and vote.

**1955** She read an article highlighting twin sisters who worked as "human computers" at the Aircraft Engine Research Laboratory in Cleveland, which eventually was absorbed into the National Aeronautics and Space Agency (NASA).

The article noted that individuals with strong mathematics skills were needed at the laboratory. Easley immediately applied and two weeks later began her 34 year-long career with NASA as a computer scientist and mathematician.

**1960-1963** Working on nuclear-powered rocket systems including the Centaur high-energy booster rocket, which had its first successful launch in 1963**.**

**1962** Easley was on the front line of space research and subsequent space missions that began with the launch of astronaut John Glenn into orbit.

When NASA gradually replaced its "human computers" with "machine" computers, she learned computer programming languages like Formula Translating System (Fortran) and Simple Object Access Protocol (SOAP).

**1977** Obtained a Bachelor of Science in Mathematics from Cleveland State University.

While completing her degree, Easley worked with local tutoring programs encouraging younger students to explore their interests in what would later be known as the STEM field. She also worked as an Equal Employment Opportunity (EEO) counselor, addressing race, gender, and age discrimination complaints from NASA employees.

References: https://docs.google.com/document/d/1hqxWk8yxcS5Sw4Ime4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing

# Barbara Liskov

She is an American computer scientist who has made pioneering contributions to programming languages and distributed computing. Her notable work includes the development of the Liskov substitution principle which describes the fundamental nature of data abstraction and is used in type theory and in object-oriented programming. Liskov is one of the earliest women to have been granted a doctorate in computer science in the United States, and the second woman to receive the Turing Award.

*What we desire from an abstraction is a mechanism which permits the expression of relevant details and the suppression of irrelevant details. In the case of programming, the use which may be made of an abstraction is relevant; the way in which the abstraction is implemented is irrelevant. — Programming With Abstract Data Types*

*Barbara Liskov*

Barbara Liskov while designing ADTs (Abstract Data Types)

**1939** Born in Los Angeles, CA, U.S.

**1961** Earned her bachelor's degree in mathematics with a minor in physics at the University of California, Berkeley.

During her time at Berkeley, she had only one other female classmate in her major.

She applied to graduate mathematics programs at Berkeley and Princeton, but Princeton was not accepting female students until 1969.

Instead of attending Berkeley, she started working at Mitre Corporation in Boston, where she developed an interest in computers and programming, and later moved to Harvard to work on language translation.

**1968** Became one of the first women in the United States to be awarded a Ph.D. from a computer science department when she was awarded her degree from Stanford University. After graduating from Stanford, Liskov returned to Mitre to work as research staff.

Liskov has been at the forefront of several notable initiatives. These include overseeing the development of the Venus operating system, a compact and affordable time-sharing system. Additionally, she played a crucial role in the design and creation of CLU, a programming language known for its high-level capabilities.

Furthermore, Liskov led the development of Argus, which was the first language to support distributed program implementation and demonstrate promise pipelining techniques. Another noteworthy contribution was Thor, an object-oriented database system.

With Jeannette Wing, she developed a particular definition of sub-typing, commonly known as the Liskov substitution principle.

She leads the Programming Methodology Group at MIT, with a current research focus in Byzantine fault tolerance and distributed computing.

**2009** She was on the inaugural Engineering and Computer Science jury for the Infosys Prize.

Barbara Liskov won the John von Neumann Medal for "fundamental contributions to programming languages, programming methodology, and distributed systems".

**2009** Liskov received the 2008 Turing Award from the ACM in March , for her work in the design of programming languages and software methodology that led to the development of object-oriented programming.

# Sophie Wilson

Sophie Wilson is a computer scientist who designed the architecture behind the Acorn Micro-Computer — the first computer sold by the British technology company Acorn Computers.

*“Overnight success takes 30 years.” - Sophie Wilson, Computer Scientists, ARM (Advanced RISC Machines) processor pioneer*

*"Not knowing something is impossible has interesting effects on your work."*
*Sophie Wilson*

**1957** Born in Leeds, Yorkshire, England.

**1975** Studied computer science and the mathematical tripos at Selwyn College, University of Cambridge, was a member of their Microprocessor society.

During an Easter break, Wilson designed a microcomputer using a 6502 microprocessor from MOS Technology, inspired by the earlier MK14 used to electronically control cow feeding.

**1978** She joined Acorn Computers Ltd, after designing a device to prevent cigarette lighter sparks triggering payouts on fruit machines. Her computer design was used by Chris Curry and Hermann Hauser to build the Acorn Micro-Computer, the first of a long line of computers sold by the company.

**1981** Extended the Acorn Atom's BASIC programming language dialect into an improved version for the Acorn Proton, a microcomputer that enabled Acorn to win the contract with the British Broadcasting Corporation (BBC) for their ambitious computer education project.

**1983** She began designing the instruction set for one of the first reduced instruction set computer (RISC) processors, the Acorn RISC Machine (ARM). The ARM1 was delivered on 26 April 1985 and worked first time. This processor type was later to become one of the most successful IP cores – a licensed CPU core – and by **2012** was being used in 95% of smartphones.

**1990** She was a non-executive director of the technology and games company Eidos plc, which bought and created Eidos Interactive, for the years following its flotation.

**1990** She was a consultant to ARM Ltd when it was split off from Acorn.

PC hardware, magazine Maximum PC listed her as number 8 in an article titled "The 15 Most Important Women in Tech History."

References: https://docs.google.com/document/d/1hgxWk8yxcS5Sw4Ime4O7lJ-cg_isgSa8m49iafRCvHQ/edit?usp=sharing