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IMMIGRANTS AND NOBEL PRIZES: 1901-2021

EXECUTIVE SUMMARY

Immigrants have been awarded 38%, or 40 of 104, of the Nobel Prizes won by Americans in chemistry, medicine and physics since 2000, according to an analysis by the National Foundation for American Policy (NFAP).¹ In 2021, three of the four U.S. recipients of Nobel Prizes in medicine, chemistry and physics were immigrants to the United States. Between 1901 and 2021, immigrants have been awarded 35%, or 109 of 311, of the Nobel Prizes won by Americans in chemistry, medicine and physics.

In 2021, David W.C. MacMillan, born in Scotland and a professor of chemistry at Princeton University, was awarded the Nobel Prize in chemistry. He came to the United States as an international student and earned a Ph.D. at the University of California-Irvine. Syukuro Manabe, who immigrated to America from Japan to take a job at the U.S. Weather Bureau, received the 2021 Nobel Prize in physics. He is a senior meteorologist at Princeton University. Ardem Patapoutian, who immigrated to America at age 18 from war-torn Lebanon, received the 2021 Nobel Prize in physiology or medicine, sharing the award with David Julius, who was born in the United States. Dr. Patapoutian came to United States after being [“captured and held by armed militants”](#) in Lebanon and enrolled at UCLA.

Table 1
U.S. Nobel Prize Winners in Chemistry, Medicine and Physics: 2000-2021

Category	Immigrant	Native-Born	Percentage of Immigrant Winners
Physics	16	20	44%
Chemistry	13	22	37%
Medicine	11	22	33%
TOTAL	40	64	38%

Source: National Foundation for American Policy, Royal Swedish Academy of Sciences, George Mason University Institute for Immigration Research.

Among the findings of this report:

- Since 1901, immigrants have been awarded 37% of the U.S. Nobel Prizes in physics, 35% in chemistry and 33% in medicine.
- The proper immigration laws matter, particularly in determining whether the United States gains from increased globalization and rising educational achievement in the world. The Immigration and Nationality Act of 1965 eliminated the discriminatory national origin quotas and opened the door to Asian immigrants, while the Immigration Act of 1990 increased employment-based green card numbers. Those two pieces of

¹ This research updates *Immigrants and Nobel Prizes: 1901-2020*, NFAP Policy Brief, National Foundation for American Policy, 2020. For more background on Nobel Prize winners, see <https://www.nobelprize.org/>.

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legislation have been essential factors in drawing international students to the country and enhancing the ability of America to assimilate talented individuals into our culture and economy.

- The rise in immigrant Nobel Prize winners reflects an overall increase in the reputation and capability of American institutions and researchers post-1960, and a greater openness to immigration has helped make the United States the leading global destination for research in many different science and technology fields, including computer and information sciences, cancer research and others.
- One can see the increasing influence and importance of immigrants on science in America reflected in Nobel Prize winners. Between 1901 and 1959, immigrants won 21 Nobel Prizes in chemistry, medicine and physics but won 88 prizes in these fields – *more than four times as many* – between 1960 and 2021.
- The pre-1960 immigrant (and U.S.) Nobel Prize total would have been lower if not for the many Jewish scientists who overcame significant restrictions against immigration in the 1930s and fled to the United States to escape European fascism.
- Since 2000, immigrants have been awarded 44% of the U.S. Nobel Prizes in physics, 37% in chemistry and 33% in medicine.

In 2020, Reinhard Genzel, who was born in Germany and is a professor emeritus of physics and astronomy at the University of California, Berkeley, was awarded the Nobel Prize in physics, which he shared with U.S.-born UCLA professor Andrea Ghez for their research on black holes. In 2019, the U.S. winner of the Nobel Prize in physics (James Peebles) and one of the two American winners of the Nobel Prize in chemistry (M. Stanley Whittingham) were immigrants to the United States.

In 2019, two of the three U.S. winners of the Nobel Prize in economics were immigrants – Abhijit Banerjee, born in India, and Esther Duflo, born in France. Both are professors at the Massachusetts Institute of Technology (MIT). They shared the award with Michael Kremer for their “new approach to obtaining reliable answers about the best ways to fight global poverty.”

The showing by immigrants in 2019, 2020 and 2021 is consistent with recent history and illustrates the contributions of immigrants to America. In 2018, Gérard Mourou, an immigrant from France, won the Nobel Prize in physics. In 2017, the sole American winner of the Nobel Prize in chemistry was an immigrant, Joachim Frank, a Columbia University professor born in Germany. Immigrant Rainer Weiss, who was born in Germany and came to the United States as a teenager, was awarded the 2017 Nobel Prize in physics, sharing it with two other Americans, Kip S.

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Thorne and Barry C. Barish. In 2016, all 6 American winners of the Nobel Prize in economics and scientific fields were immigrants.

The achievements of immigrants in the form of Nobel Prizes, successful businesses and contributions in other fields are a testament to the American Dream. Being open to immigration allows America to reap the most benefits of scientific and technological innovation.

*Immigrants and Nobel Prizes: 1901-2021***HISTORY**

Between 1901 and 2021, immigrants have been awarded 35%, or 109 of 311, of the Nobel Prizes won by Americans in chemistry, medicine and physics. (See Table 2.) Since 1901, immigrants have been awarded 37% of the U.S. Nobel Prizes in physics, 35% in chemistry and 33% in medicine. These numbers do not include Nobel Prize winners who immigrated to America *after* receiving a Nobel Prize, such as Albert Einstein, Enrico Fermi and Niels Bohr. Donna Strickland, who shared a 2018 Nobel Prize in physics with Gérard Mourou, is also not included as a U.S. recipient, though the Canadian-born professor was an international student in America when she conducted her groundbreaking research and received a Ph.D. from the University of Rochester in New York.

Table 2
U.S. Nobel Prize Winners in Chemistry, Medicine and Physics: 1901-2021

Category	Immigrant	Native-Born	Percentage of Immigrant Winners
Physics	41	71	37%
Chemistry	29	53	35%
Medicine	39	78	33%
TOTAL	109	202	35%

Source: National Foundation for American Policy, Royal Swedish Academy of Sciences, George Mason University Institute for Immigration Research. Numbers and percentage for chemistry, medicine and physics prizes.

These achievements by immigrants point to the gains to America of welcoming talent from across the globe. The findings do not mean America should welcome only Nobel Prize winners. Such a policy would be highly restrictive. Moreover, most immigrant Nobel Prize winners entered the United States many years before being awarded this honor. Most people immigrate to another country in their twenties, particularly employment-based immigrants to the United States, who either study in America or come here to work shortly after obtaining a degree abroad. The average age of Nobel Prize winners at the time of the award is 59.5 years, according to economist Mark J. Perry.²

Nobel Prize winners represent great individual achievement and reflect the state of research, openness and scientific advancement within a society. American students, research colleagues and the U.S. economy gain from the work performed by outstanding scientists and researchers, including Nobel Prize winners.

The proper immigration laws matter, particularly in determining whether the United States gains from increased globalization and rising educational achievement in the world. The Immigration and Nationality Act of 1965 eliminated the discriminatory national origin quotas and opened the door to Asian immigrants, while the Immigration

² Mark J. Perry, "Looking back at the remarkable history of the Nobel Prize from 1901-2016 using maps, charts and tables," Carpe Diem, October 13, 2016.

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Act of 1990 increased employment-based green card numbers. Those two pieces of legislation have been essential to drawing international students to the country and enhancing the ability of America to assimilate talented individuals into our culture and economy. The rise in immigrant Nobel Prize winners reflects an overall increase in the reputation and capability of American institutions and researchers post-1960, and a greater openness to immigration has helped make the United States the leading global destination for research in many different science and technology fields, including computer and information sciences, cancer research and others.

Sir J. Fraser Stoddart, winner of the Nobel Prize in chemistry in 2016 and an immigrant from the United Kingdom, noted that “his research group at Northwestern University has students and scientists from a dozen different countries.” Stoddart believes scientific research will remain strong in America “as long as we don’t enter an era where we turn our back on immigration.”

One can see the increasing influence and importance of immigrants on science in America reflected in Nobel Prize winners. Between 1901 and 1959, immigrants won 21 Nobel Prizes in chemistry, medicine and physics but won 88 prizes in these fields – *more than four times as many* – between 1960 and 2021. The pre-1960 immigrant (and U.S.) Nobel Prize total would have been lower if not for the many Jewish scientists who overcame significant restrictions against immigration in the 1930s and fled to the United States to escape European fascism.

The difference between the two periods over approximately the same number of years illustrates the importance of changes in U.S. immigration law, particularly the Immigration and Nationality Act of 1965 ending the restrictive “national origins” quotas that prevented people from much of the world, including Asia, from immigrating to the United States. The Immigration Act of 1990 increased immigration quotas for employment-based green cards. Becoming a more open place for international students from all over the world, and the overall increase in the reputation and capability of American institutions and researchers post-1960, combined to make the United States the leading global destination for research in many science and technology fields.

A number of the earliest U.S. winners of the Nobel Prize in physics were Jewish scientists who fled Europe after the rise of Hitler and Mussolini. These scientists were crucial in America becoming the first nation to develop the atomic bomb. In 1954 the Atomic Energy Act established an award to recognize scientific achievements in atomic energy. The first winner of the award was the Italian-born Enrico Fermi. After his death, the award became known as the Enrico Fermi Award, and five of the first 8 winners were immigrants. Four of the nuclear scientists who came to the United States from Europe in the 1930s and later received a Nobel Prize for physics were Felix Bloch (1952), born in Switzerland, Emilio Segre (1959), born in Italy, Maria Mayer (1963), born in Poland, and Eugene Wigner (1963), born in Hungary.

CHEMISTRY

In 2021, David W.C. MacMillan, born in Scotland and now a professor of chemistry at Princeton University, was awarded the Nobel Prize in chemistry. He came to the United States as an international student and earned a Ph.D. at the University of California-Irvine. MacMillan shared the award with Benjamin List, director of the Max Planck Institute for Coal Research in Germany. List was also an assistant professor at the Scripps Research Institute in California.³

“The Nobel Prize in chemistry was awarded to Benjamin List and David W.C. MacMillan for their development of a new tool to build molecules, work that has spurred advances in pharmaceutical research and lessened the impact of chemistry on the environment,” reported the *New York Times*. “Their work, while unseen by consumers, is an essential part in many leading industries and is crucial for research.”⁴

“Building molecules is a difficult art. Benjamin List and David MacMillan are awarded the Nobel Prize in chemistry 2021 for their development of a precise new tool for molecular construction: organocatalysis,” according to the Nobel Prize Committee. “This has had a great impact on pharmaceutical research, and has made chemistry greener. Many research areas and industries are dependent on chemists’ ability to construct molecules that can form elastic and durable materials, store energy in batteries or inhibit the progression of diseases. This work requires *catalysts*, which are substances that control and accelerate chemical reactions, without becoming part of the final product.”⁵

“Organocatalysis has developed at an astounding speed since 2000. Benjamin List and David MacMillan remain leaders in the field, and have shown that organic catalysts can be used to drive multitudes of chemical reactions,” according to the committee. “Using these reactions, researchers can now more efficiently construct anything from new pharmaceuticals to molecules that can capture light in solar cells. In this way, organocatalysts are bringing the greatest benefit to humankind.”⁶

In 2019, one of the two U.S. winners of the Nobel Prize in chemistry was an immigrant – M. Stanley Whittingham, who was born in the United Kingdom and is a professor at Binghamton University, State University of New York.

³ Marc Santora and Cora Engelbrecht, “Nobel Prize in Chemistry Awarded to Scientists for Creating a Tool to Build Molecules,” *New York Times*, October 6, 2021.

⁴ Ibid.

⁵ <https://www.nobelprize.org/prizes/chemistry/2021/press-release/>.

⁶ Ibid.

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“Lithium-ion batteries have revolutionized our lives and are used in everything from mobile phones to laptops and electric vehicles,” according to a 2019 statement by the [Royal Swedish Academy of Sciences](#). “Through their work, this year’s Chemistry Laureates have laid the foundation of a wireless, fossil fuel-free society.”

The Royal Swedish Academy of Sciences [continued](#), “In the early 1970s, Stanley Whittingham, awarded this year’s Chemistry Prize, used lithium’s enormous drive to release its outer electron when he developed the first functional lithium battery. 2019 Chemistry Laureate John Goodenough doubled the lithium battery’s potential, creating the right conditions for a vastly more powerful and useful battery.”⁷

The American winner of the 2017 Nobel Prize in chemistry was Joachim Frank, who was born in Germany in 1940. Frank is a Professor of Biochemistry and Molecular Biophysics and of Biological Sciences at Columbia University in New York. He shared the award with Jacques Dubochet, an Honorary Professor of Biophysics at the University of Lausanne, Switzerland, and Richard Henderson, Programme Leader, MRC Laboratory of Molecular Biology, Cambridge, United Kingdom.

“The Nobel Prize in chemistry 2017 is awarded to Jacques Dubochet, Joachim Frank and Richard Henderson for the development of cryo-electron microscopy, which both simplifies and improves the imaging of biomolecules,” announced the Royal Swedish Academy of Sciences. “This method has moved biochemistry into a new era.”⁸

Scientists believe the advances in microscopes will open up additional opportunities for discovery. “Electron microscopes were long believed to only be suitable for imaging dead matter, because the powerful electron beam destroys biological material. But in 1990, Richard Henderson succeeded in using an electron microscope to generate a three-dimensional image of a protein at atomic resolution. This breakthrough proved the technology’s potential,” according to Royal Swedish Academy of Sciences.⁹

“Joachim Frank made the technology generally applicable,” the Academy noted. “Between 1975 and 1986 he developed an image processing method in which the electron microscope’s fuzzy two-dimensional images are analysed and merged to reveal a sharp three-dimensional structure.”¹⁰ Jacques Dubochet carried these advances further after he “added water to electron microscopy.”¹¹

⁷ Royal Swedish Academy of Sciences.

⁸ Press Release: The Nobel Prize in Chemistry 2017, The Royal Swedish Academy of Sciences, October 4, 2017.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

Table 3
Immigrant Nobel Prize Winners in Chemistry: 2000-2021

YEAR	WINNER	PLACE OF BIRTH	U.S. AFFILIATION
2000	Alan G. MacDiarmid	New Zealand	University of Pennsylvania
2002	Kurt Wüthrich	Switzerland	The Scripps Research Institute
2008	Osamu Shimomura	Japan	Marine Biological Laboratory, Boston University Medical School
2010	Ei-ichi Negishi	China	Purdue University
2011	Dan Shechtman	Palestine	Iowa State
2013	Martin Karplus	Austria	Harvard University
2013	Michael Levitt	South Africa	Stanford University School of Medicine
2013	Arieh Warshel	Israel	University of Southern California
2015	Aziz Sancar	Turkey	University of North Carolina School of Medicine
2016	Sir J. Fraser Stoddart	UK	Northwestern University
2017	Joachim Frank	Germany	Columbia University
2019	M. Stanley Whittingham	UK	Binghamton University, State University of New York
2021	David W.C. MacMillan	UK	Princeton University

Source: National Foundation for American Policy. Royal Swedish Academy of Sciences, George Mason University Institute for Immigration Research.

Sir J. Fraser Stoddart was awarded the Nobel Prize in chemistry in 2016. He was born and educated primarily in the United Kingdom and came to UCLA to teach nearly 20 years before winning the Nobel Prize. He currently is a professor of chemistry at Northwestern University in Illinois. "The laureate told *The Guardian* that his research group at Northwestern University has students and scientists from a dozen different countries and that bringing in international talent raises the bar overall."¹² Stoddart said, "I think the resounding message that should go out all around the world is that science is global." He "credited American openness with bringing top scientists to the country" and told *The Hill* that the American scientific establishment will only remain strong "as long as we don't enter an era where we turn our back on immigration."¹³

Between 1901 and 1959, only one immigrant to the United States (William Francis GIAUQUE) won the Nobel Prize in chemistry, while between 1960 and 2021, 28 immigrants were awarded the Nobel Prize for chemistry.

¹² Zhai Yun Tan, "Why Nobel-Winning Scientists Are Talking About Immigration Policy," *Christian Science Monitor*, October 11, 2016.

¹³ Rafael Bernal, "Amid debate, all 2016 American Nobel laureates are immigrants," *The Hill*, October 10, 2016.

MEDICINE

In 2021, Ardem Patapoutian, an immigrant from Lebanon, shared the 2021 Nobel Prize in physiology or medicine, with David Julius, who was born in the United States. Dr. Patapoutian is a professor in the Dorris Neuroscience Center at Scripps Research in La Jolla, CA, and a Howard Hughes Medical Institute investigator. The two men received their prize for “groundbreaking research that solved a long-standing mystery of how the body senses touch and other mechanical stimuli.”¹⁴

“Dr. Patapoutian, who is of Armenian origin, grew up in Lebanon during the country’s long and calamitous civil war before fleeing to the United States with his brother in 1986 at age 18,” reported the *New York Times*. “Needing to establish residency in California so that he could afford college, Dr. Patapoutian worked eclectic jobs for a year, delivering pizzas and writing the weekly horoscopes for an Armenian newspaper. At UCLA, in the course of preparing to apply to medical school, he joined a research laboratory so that the professor would write him a good recommendation.”¹⁵

He told the *New York Times*: “I fell in love with doing basic research. That changed the trajectory of my career.” Illustrating how immigration can change an individual’s horizons and allow them to fulfill their potential, he said, “In Lebanon, I didn’t even know about scientists as a career.”¹⁶

In a brief autobiography, Dr. Patapoutian wrote that he came to Los Angeles after being “[captured and held by armed militants](#)” in Lebanon: “I had three havens of childhood I remember with fondness: my sports club where I played basketball (not well, see height above) and table tennis (local champ!), our trips to the Mediterranean Sea and the wooded mountains surrounding Beirut, and the beautiful campus of the American University of Beirut, where I attended one year of undergraduate classes as a pre-med major. However, the conflict continued to escalate, and one fateful and terrifying morning, I was captured and held by armed militants. A few months later, I moved to Los Angeles.

“This first year in LA was a different kind of struggle to adapt, perhaps as challenging a year as a young adult as any I had experienced as a child in Beirut. Suffice to say, a highlight was writing horoscopes for the local Armenian newspaper. What a relief it was to gain admission to UCLA to resume my student life.”¹⁷

¹⁴ <https://www.scripps.edu/news-and-events/press-room/2021/20211004-ardem-patapoutian-wins-nobel-prize-in-medicine.html>.

¹⁵ Benjamin Mueller, Marc Santora and Cora Engelbrecht, “Nobel Prize Awarded for Research About Temperature and Touch,” *New York Times*, October 5, 2021.

¹⁶ *Ibid.*

¹⁷ https://www.aub.edu.lb/articles/Pages/Nobel_Prize_AUB_alumnus_Ardem_Patapoutian.aspx.

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“In the latter part of the 1990’s, David Julius at the University of California, San Francisco, USA, saw the possibility for major advances by analyzing how the chemical compound capsaicin causes the burning sensation we feel when we come into contact with chili peppers,” according to a press release from the Nobel Prize Committee. “After a laborious search, a single gene was identified that was able to make cells capsaicin sensitive (Figure 2). The gene for capsaicin sensing had been found! Further experiments revealed that the identified gene encoded a novel ion channel protein and this newly discovered capsaicin receptor was later named TRPV1. When Julius investigated the protein’s ability to respond to heat, he realized that he had discovered a heat-sensing receptor that is activated at temperatures perceived as painful.

“The discovery of TRPV1 was a major breakthrough leading the way to the unravelling of additional temperature-sensing receptors. Independently of one another, both David Julius and Ardem Patapoutian used the chemical substance menthol to identify TRPM8, a receptor that was shown to be activated by cold. . . . While the mechanisms for temperature sensation were unfolding, it remained unclear how mechanical stimuli could be converted into our senses of touch and pressure. Researchers had previously found mechanical sensors in bacteria, but the mechanisms underlying touch in vertebrates remained unknown. Ardem Patapoutian, working at Scripps Research in La Jolla, California, USA, wished to identify the elusive receptors that are activated by mechanical stimuli. Patapoutian and his collaborators first identified a cell line that gave off a measurable electric signal when individual cells were poked with a micropipette.”

“The breakthrough by Patapoutian led to a series of papers from his and other groups, demonstrating that the Piezo2 ion channel is essential for the sense of touch,” according to the Nobel Prize Committee. “Moreover, Piezo2 was shown to play a key role in the critically important sensing of body position and motion, known as proprioception. In further work, Piezo1 and Piezo2 channels have been shown to regulate additional important physiological processes including blood pressure, respiration and urinary bladder control. The groundbreaking discoveries of the TRPV1, TRPM8 and Piezo channels by this year’s Nobel Prize laureates have allowed us to understand how heat, cold and mechanical force can initiate the nerve impulses that allow us to perceive and adapt to the world around us.”¹⁸

In 2015, William C. Campbell, who was born in Ireland and is a research fellow emeritus at Drew University in New Jersey, was awarded the Nobel Prize in medicine with Satoshi Ōmura of Japan and Youyou Tu of China.

“William C. Campbell and Satoshi Ōmura discovered a new drug, Avermectin, the derivatives of which have radically lowered the incidence of River Blindness and Lymphatic Filariasis, as well as showing efficacy against an expanding

¹⁸ <https://www.nobelprize.org/prizes/medicine/2021/press-release/>.

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number of other parasitic diseases,” according to the Royal Swedish Academy of Sciences. “Youyou Tu discovered Artemisinin, a drug that has significantly reduced the mortality rates for patients suffering from Malaria. These two discoveries have provided humankind with powerful new means to combat these debilitating diseases that affect hundreds of millions of people annually. The consequences in terms of improved human health and reduced suffering are immeasurable.”¹⁹

From 1901 to 1959, 9 immigrants to the United States won the Nobel Prize for medicine, but 30 immigrants were awarded the Nobel Prize for medicine from 1960 to 2021.

Table 4
Immigrant Nobel Prize Winners in Medicine: 2000-2021

YEAR	WINNER	PLACE OF BIRTH	U.S. AFFILIATION
2000	Eric R. Kandel	Austria	Columbia University
2002	Sydney Brenner	South Africa	The Molecular Sciences Institute
2007	Mario R. Capecchi	Italy	University of Utah, Howard Hughes Medical Institute
2007	Oliver Smithies	United Kingdom	Univ. of North Carolina Chapel Hill
2009	Elizabeth H. Blackburn	Australia	University of California, San Francisco
2009	Jack W. Szostak	United Kingdom	Harvard Medical School
2011	Ralph M. Steinman	Canada	Rockefeller University
2012	Shinya Yamanaka	Japan	Gladstone Institutes
2013	Thomas Südhof	Germany	Stanford University
2015	William C. Campbell	Ireland	Drew University
2021	Ardem Patapoutian	Lebanon	Howard Hughes Medical Institute, Scripps Research

Source: Royal Swedish Academy of Sciences, National Foundation for American Policy, George Mason University Institute for Immigration Research.

Elizabeth Blackburn, born in Australia, shared the 2009 Nobel Prize for medicine with Jack Szostak (Harvard Medical School), a British-born immigrant to the U.S., and American-born Carol Greider (Johns Hopkins University School of Medicine). Greider was Elizabeth Blackburn’s student in 1985 when they “published a paper announcing the discovery of the enzyme telomerase.”²⁰ Blackburn was a professor of Biology and Physiology at the University of California San Francisco (UCSF). She came to America in 1978, more than 30 years before she won the Nobel Prize, to teach at the University of California Berkeley, before joining the faculty at UCSF in 1990.²¹

¹⁹ Press Release: The Nobel Prize in Physiology or Medicine 2015, The Royal Swedish Academy of Sciences, October 5, 2015.

²⁰ Goutam Naik, “U.S. Cell-Aging Researchers Awarded Nobel,” *The Wall Street Journal*, October 6, 2009, A5.

²¹ Dr. Elizabeth Blackburn, Blackburn Lab, University of California San Francisco.

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Dr. Blackburn and Dr. Szostak were able to establish that “repeated DNA sequences make up the tips of each chromosome.”²² Since the enzyme serves an important function in the health of cells, the discovery has helped launch research into cancer, cardiovascular disease and other age-related illnesses.²³ In naming Elizabeth Blackburn “Scientist of the Year” in 2007, *Discover Magazine* wrote, “Imagine that this scientist kept a to-do list: On it would be a cure for cancer and, further down, understanding the diseases associated with aging. Elizabeth Blackburn is the 59-year-old Tasmanian-born scientist responsible for launching one of the hottest fields in the life sciences, the study of telomeres. These tiny strips of DNA cap the ends of chromosomes, and her research promises to yield potent therapeutics for many of the scourges that plague humanity.”²⁴

PHYSICS

Syukuro Manabe, who received the 2021 Nobel Prize in physics, immigrated to America from Japan in 1958 to take a job as a research meteorologist at the U.S. Weather Bureau.²⁵ He is currently a senior meteorologist at Princeton University. Manabe shared the award with Klaus Hasselmann of the Max Planck Institute for Meteorology, in Germany “for the physical modelling of Earth’s climate, quantifying variability and reliably predicting global warming.”²⁶ Giorgio Parisi at the Sapienza University of Rome, in Italy, received half of the 2021 award for “for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales.”²⁷

“One complex system of vital importance to humankind is Earth’s climate,” said the Nobel Prize Committee in a press release. “Syukuro Manabe demonstrated how increased levels of carbon dioxide in the atmosphere lead to increased temperatures at the surface of the Earth. In the 1960s, he led the development of physical models of the Earth’s climate and was the first person to explore the interaction between radiation balance and the vertical transport of air masses. His work laid the foundation for the development of current climate models.”²⁸

In October 2020, Reinhard Genzel, born in Germany, and a professor emeritus of physics and astronomy at the [University of California, Berkeley](https://www.berkeley.edu/), was awarded the Nobel Prize in physics, which he shared with U.S.-born UCLA professor Andrea Ghez for their research on black holes. Roger Penrose from the University of Oxford shared the other half of the 2020 Nobel Prize in physics.

“In 1969, Donald Lynden-Bell and Martin Rees suggested that the Milky Way galaxy might contain a supermassive black hole at its center, but evidence was lacking because the galactic core is obscured by interstellar dust and

²² Ibid.

²³ Ibid. See also Stuart Anderson, *Immigration* (Greenwood, 2010).

²⁴ Linda Marsa, “Scientist of the Year Notable: Elizabeth Blackburn,” *Discover Magazine*, December 6, 2007.

²⁵ <https://scholar.princeton.edu/manabe/cv-0>.

²⁶ <https://www.nobelprize.org/prizes/lists/all-nobel-prizes-in-physics/>.

²⁷ Ibid.

²⁸ <https://www.nobelprize.org/prizes/physics/2021/press-release/>.

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could only be detected as a relatively faint radio source, called Sagittarius A*,” reported the *Berkeley News*. “At the time, Genzel was a postdoctoral fellow at UC Berkeley working with the late Nobel laureate Charles Townes. The two presented the first observations hinting that the center of our galaxy harbored a massive black hole, though the evidence was weak. Genzel worked steadfastly over the ensuing decades to prove his case. He developed a ‘remarkable technique, in which he can measure very accurately and determine quite precisely the mass and behavior of stars circulating around the galactic center,’ Townes said in 2008.”²⁹

The Nobel Prize Committee said in a press release, “Using the world’s largest telescopes, Genzel and Ghez developed methods to see through the huge clouds of interstellar gas and dust to the centre of the Milky Way. Stretching the limits of technology, they refined new techniques to compensate for distortions caused by the Earth’s atmosphere, building unique instruments and committing themselves to long-term research. Their pioneering work has given us the most convincing evidence yet of a supermassive black hole at the centre of the Milky Way.”³⁰

“The discoveries of this year’s Laureates have broken new ground in the study of compact and supermassive objects. But these exotic objects still pose many questions that beg for answers and motivate future research. Not only questions about their inner structure, but also questions about how to test our theory of gravity under the extreme conditions in the immediate vicinity of a black hole,” said David Haviland, chair of the Nobel Committee for Physics.³¹

James Peebles, who was born in Canada and is a professor at Princeton University, was awarded the 2019 Nobel Prize in physics. “This year’s Nobel Prize in physics rewards new understanding of the universe’s structure and history, and the first discovery of a planet orbiting a solar-type star outside our solar system,” reported the Royal Swedish Academy of Sciences in announcing the 2019 award. “James Peebles’ insights into physical cosmology have enriched the entire field of research and laid a foundation for the transformation of cosmology over the last fifty years, from speculation to science. His theoretical framework, developed since the mid-1960s, is the basis of our contemporary ideas about the universe.”

Peebles has helped advance our understanding of space. “Barely 400,000 years after the Big Bang, the universe became transparent and light rays were able to travel through space,” noted the Royal Swedish Academy of Sciences. “Even today, this ancient radiation is all around us and, coded into it, many of the universe’s secrets are hiding. Using his theoretical tools and calculations, James Peebles was able to interpret these traces from the infancy of the universe and discover new physical processes. The results showed us a universe in which just five

²⁹ <https://news.berkeley.edu/2020/10/06/uc-berkeleys-reinhard-genzel-awarded-nobel-prize-in-physics/>.

³⁰ <https://www.nobelprize.org/prizes/physics/2020/press-release/>.

³¹ Ibid.

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percent of its content is known, the matter which constitutes stars, planets, trees – and us. The rest, 95 percent, is unknown dark matter and dark energy.”³²

Table 5
Immigrant Nobel Prize Winners in Physics: 2000-2021

YEAR	WINNER	PLACE OF BIRTH	U.S. AFFILIATION
2000	Herbert Kroemer	Germany	University of California, Santa Barbara
2001	Wolfgang Ketterle	West Germany	Massachusetts Institute of Technology (MIT)
2002	Riccardo Giacconi	Italy	Associated Universities Inc.
2003	Anthony J. Leggett	United Kingdom	University of Illinois, Urbana
2003	Alexei A. Abrikosov	USSR/Russia	Argonne National Laboratory
2008	Yoichiro Nambu	Japan	University of Chicago
2009	Willard S. Boyle	Canada	Bell Laboratories
2014	Shuji Nakamura	Japan	University of California, Santa Barbara
2016	David J. Thouless	United Kingdom	University of Washington
2016	F. Duncan M. Haldane	United Kingdom	Princeton University
2016	J. Michael Kosterlitz	United Kingdom	Brown University
2017	Rainer Weiss	Germany	Massachusetts Institute of Technology (MIT)
2018	G�rard Mourou	France	University of Michigan
2019	James Peebles	Canada	Princeton University
2020	Reinhard Genzel	Germany	University of California, Berkeley
2021	Syukuro Manabe	Japan	Princeton University

Source: National Foundation for American Policy, Royal Swedish Academy of Sciences, George Mason University Institute for Immigration Research.

In 2018, G rard Mourou won the Nobel Prize in physics, sharing it with Arthur Ashkin and Donna Strickland. Mourou earned a Ph.D. at the Universit  Pierre-et-Marie-Curie in Paris, and “later moved to the United States and became a professor at the University of Rochester, where he did his Nobel Prize awarded work along with Donna Strickland. He subsequently worked at the University of Michigan,” with which he remained affiliated at the time of the award.³³

“G rard Mourou and Donna Strickland paved the way towards the shortest and most intense laser pulses ever created by mankind,” according to the Royal Swedish Academy of Sciences.³⁴ “Their revolutionary article was

³² <https://www.nobelprize.org/prizes/physics/2019/press-release/>.

³³ <https://www.nobelprize.org/prizes/physics/2018/mourou/facts/>.

³⁴ <https://www.nobelprize.org/prizes/physics/2018/press-release/>.

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published in 1985 and was the foundation of Strickland's doctoral thesis." Strickland was an international student in the U.S. at the time of her research.

Strickland and Mourou developed a new approach by creating ultrashort high-intensity laser pulses. "Strickland and Mourou's newly invented technique, called chirped pulse amplification, CPA, soon became standard for subsequent high-intensity lasers," noted the Royal Swedish Academy of Sciences in its award announcement. "Its uses include the millions of corrective eye surgeries that are conducted every year using the sharpest of laser beams. The innumerable areas of application have not yet been completely explored. However, even now these celebrated inventions allow us to rummage around in the microworld in the best spirit of Alfred Nobel – for the greatest benefit to humankind."³⁵

Dr. Rainer Weiss, who was awarded a Nobel Prize in physics in 2017, came to America as a teenager, many years before he began producing Nobel Prize-caliber research. "Dr. Weiss was born in Berlin in 1932 and came to New York by way of Czechoslovakia in 1939," reported the *New York Times*. "As a high school student, he became an expert in building high-quality sound systems and entered M.I.T. intending to major in electrical engineering. He inadvertently dropped out when he went to Illinois to pursue a failing romance. After coming back, he went to work in a physics lab and wound up with a Ph.D. from M.I.T."³⁶

The winners received the 2017 Nobel Prize in physics for their "decisive contributions to the LIGO detector and the observation of gravitational waves."³⁷

"On 14 September 2015, the universe's gravitational waves were observed for the very first time," explained the Royal Swedish Academy of Sciences. "Gravitational waves are an entirely new way of observing the most violent events in space and testing the limits of our knowledge."³⁸

The Academy detailed the efforts of the 2017 physics prize winners: "In the mid-1970s, Rainer Weiss had already analysed possible sources of background noise that would disturb measurements, and had also designed a detector, a laser-based interferometer, which would overcome this noise. Early on, both Kip Thorne and Rainer Weiss were firmly convinced that gravitational waves could be detected and bring about a revolution in our knowledge of the universe . . . gravitational waves are direct testimony to disruptions in spacetime itself. This is

³⁵ Ibid.

³⁶ Dennis Overbye, "2017 Nobel Prize in Physics Awarded to LIGO Black Hole Researchers," *New York Times*, October 3, 2017.

³⁷ Press Release: The Nobel Prize in Physics 2017, The Royal Swedish Academy of Sciences, October 3, 2017.

³⁸ Ibid.

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something completely new and different, opening up unseen worlds. A wealth of discoveries awaits those who succeed in capturing the waves and interpreting their message.”³⁹

Three immigrants born in the United Kingdom shared the Nobel Prize for physics in 2016 – David J. Thouless (University of Washington), F. Duncan M. Haldane (Princeton University) and J. Michael Kosterlitz (Brown University). In 2016, the Royal Swedish Academy of Sciences wrote of the winners: “They have used advanced mathematical methods to study unusual phases, or states, of matter, such as superconductors, superfluids or thin magnetic films. Thanks to their pioneering work, the hunt is now on for new and exotic phases of matter. Many people are hopeful of future applications in both materials science and electronics.”⁴⁰

In physics, 11 immigrants won the Nobel Prize from 1901 to 1959, while 30 immigrants won the Nobel Prize for Physics between 1960 and 2021.

CONCLUSION

The achievements of immigrants in the form of Nobel Prizes, thriving businesses and contributions in other fields are a testament to the American Dream. Being open to immigration allows America to reap the most benefits of scientific and technological innovation. When one asks successful entrepreneurs and scientists conducting groundbreaking research whether they favor liberalized policies on immigration, the answer they invariably give is that more immigration and greater openness to international students, researchers and immigrants across the skill spectrum will help America to grow and prosper.

³⁹ Ibid.

⁴⁰ Press Release: The Nobel Prize in Physics 2016, The Royal Swedish Academy of Sciences, October 5, 2016.

ABOUT THE NATIONAL FOUNDATION FOR AMERICAN POLICY

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