

NATIONAL FOUNDATION FOR AMERICAN POLICY
.....
NFAP POLICY BRIEF » OCTOBER 2016

IMMIGRANTS AND NOBEL PRIZES

EXECUTIVE SUMMARY

Immigrants have been awarded 40 percent, or 31 of 78, of the Nobel Prizes won by Americans in Chemistry, Medicine and Physics since 2000. In 2016, all 6 American winners of the Nobel Prize in economics and scientific fields were immigrants.

These achievements by immigrants point to the gains to America of welcoming talent from across the globe. It does not mean America should welcome only Nobel Prize winners. Such a policy would be impossible to implement, since most immigrant Nobel Prize winners enter the United States many years before being awarded this honor. Most people immigrate to another country in their 20s, particularly employment-based immigrants, who either study in America or come here to work shortly after obtaining a degree abroad. The average of age of Nobel Prize winners at the time of the award is 59.5 years, according to economist Mark J. Perry.¹

Table 1
Immigrant Nobel Prize Winners in Chemistry, Medicine and Physics Since 2000

Immigrant Nobel Winners Since 2000	31 of 78 American winners have been immigrants
Percentage of Immigrant Winners Since 2000	40%

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

Nobel Prize winners represent great individual achievement but also 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 right immigration laws matter, particularly in determining whether the United States gains from increased globalization and rising educational achievement in India, China and elsewhere. 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 legislation have been important factors in drawing international students to the country and enhancing the ability of America to assimilate talented individuals into our culture and economy. While the rise in immigrant Nobel Prize winners reflects an overall increase in the reputation and capability of American institutions and researchers post-1960, 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 computers, cancer research and many others.

¹ 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.

Immigrants and Nobel Prizes

Sir J. Fraser Stoddart, winner of the Nobel Prize in Chemistry in 2016 and an immigrant from the United Kingdom, notes 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.”

Among the key findings in this report:

- One can see the increasing influence and importance of immigrants on science in America over the past half century. Between 1901 and 1959, immigrants won 25 Nobel Prizes in Chemistry, Medicine and Physics but won 79 prizes in these fields – *more than three times as many* – between 1960 and 2016.²
- Between 1901 and 1959, only one immigrant to the United States (William Francis Giauque) won the Nobel Prize in Chemistry, while between 1960 and 2016, 25 immigrants won the Nobel Prize for Chemistry.
- From 1901 to 1959, 9 immigrants to the United States won the Nobel Prize for Medicine, but 29 immigrants were awarded the Nobel Prize for Medicine from 1960 to 2016.
- In Physics, 15 immigrants won the Nobel Prize from 1901 to 1959, while 25 immigrants won the Nobel Prize for Physics between 1960 and 2016.

² The numbers in this report have been updated from Stuart Anderson, *The Increasing Importance of Immigrants to Science and Engineering in America*, NFAP Policy Brief, National Foundation for American Policy, June 2014. For more background on Nobel Prize winners see <https://www.nobelprize.org/>.

*Immigrants and Nobel Prizes***OVERVIEW**

Immigrants have been awarded 40 percent, or 31 of 78, of the Nobel Prizes won by Americans in Chemistry, Medicine and Physics since 2000. Approximately 13 percent of the U.S. population today is foreign-born.³ In 2016, all 6 Americans who won the Nobel Prize in economics and scientific fields were immigrants.⁴ The 6 American winners were Sir J. Fraser Stoddart (Chemistry), F. Duncan M. Haldane (Physics), David Thouless (Physics), Michael Kosterlitz (Physics), Oliver Hart (Economics) and Bengt Holmström (Economics). While typically hailing from a variety of countries, this year's immigrant winners were all born in the United Kingdom, with the exception of Bengt Holmström, who was born in Finland.

Table 2
Immigrant and Native-Born (U.S.) Nobel Prize Winners Since 2000

CHEMISTRY	MEDICINE	PHYSICS
Immigrant – 10 winners	Immigrant – 10 winners	Immigrant – 11 winners
Native-Born – 18 winners	Native-Born – 13 winners	Native-Born – 16 winners
Percentage Immigrant – 36%	Percentage Immigrant – 43%	Percentage Immigrant – 41%

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

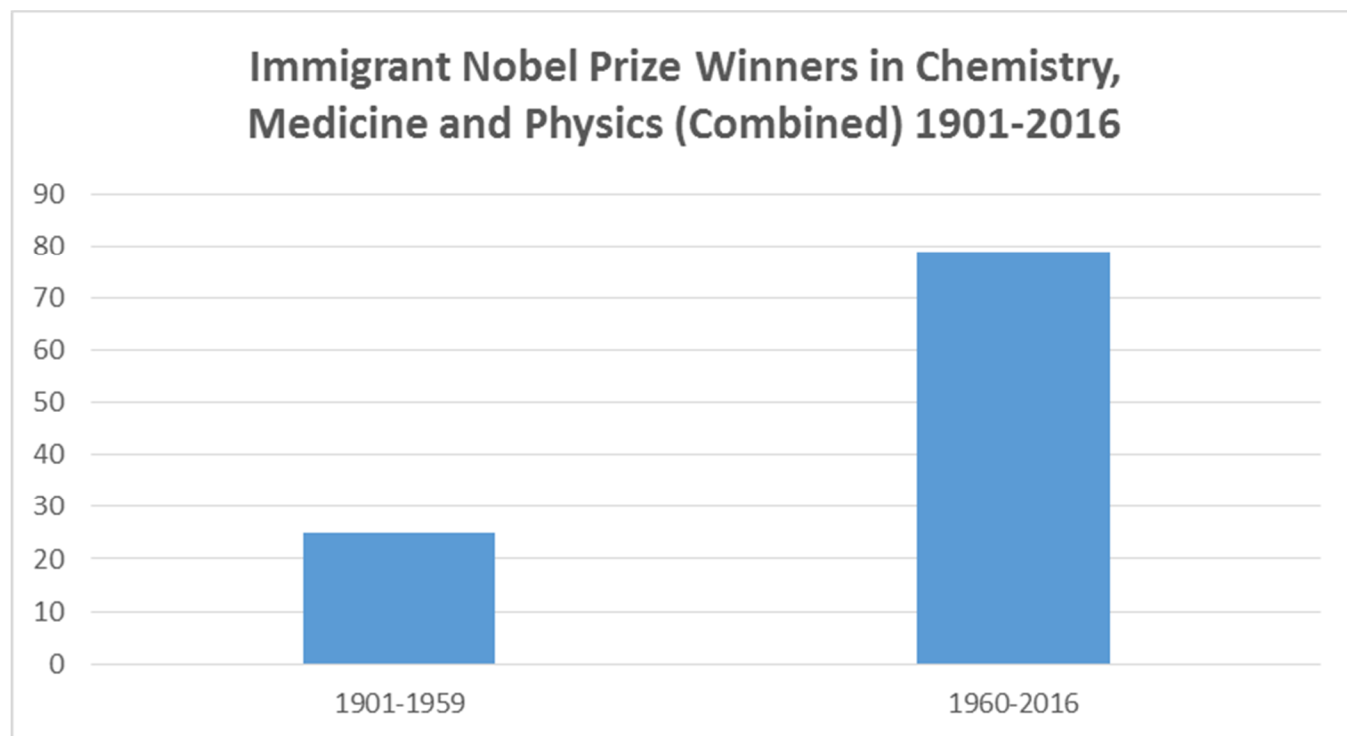
Reflected in the Nobel Prize winners, one can see the increasing influence and importance of immigrants on science in America. Between 1901 and 1959, immigrants won 25 Nobel Prizes in Chemistry, Medicine and Physics but won 79 prizes in these fields – *more than three times as many* – between 1960 and 2016. 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 most 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.

³ “Chapter 5: U.S. Foreign-Born Population Trends,” in *Modern Immigration Wave Brings 59 Million to U.S., Driving Population Growth and Change Through 2065*, Pew Research Center, September 28, 2015.

⁴ Bob Dylan, born in Minnesota, won the Nobel Prize for Literature in 2016.

Figure 1



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

CHEMISTRY

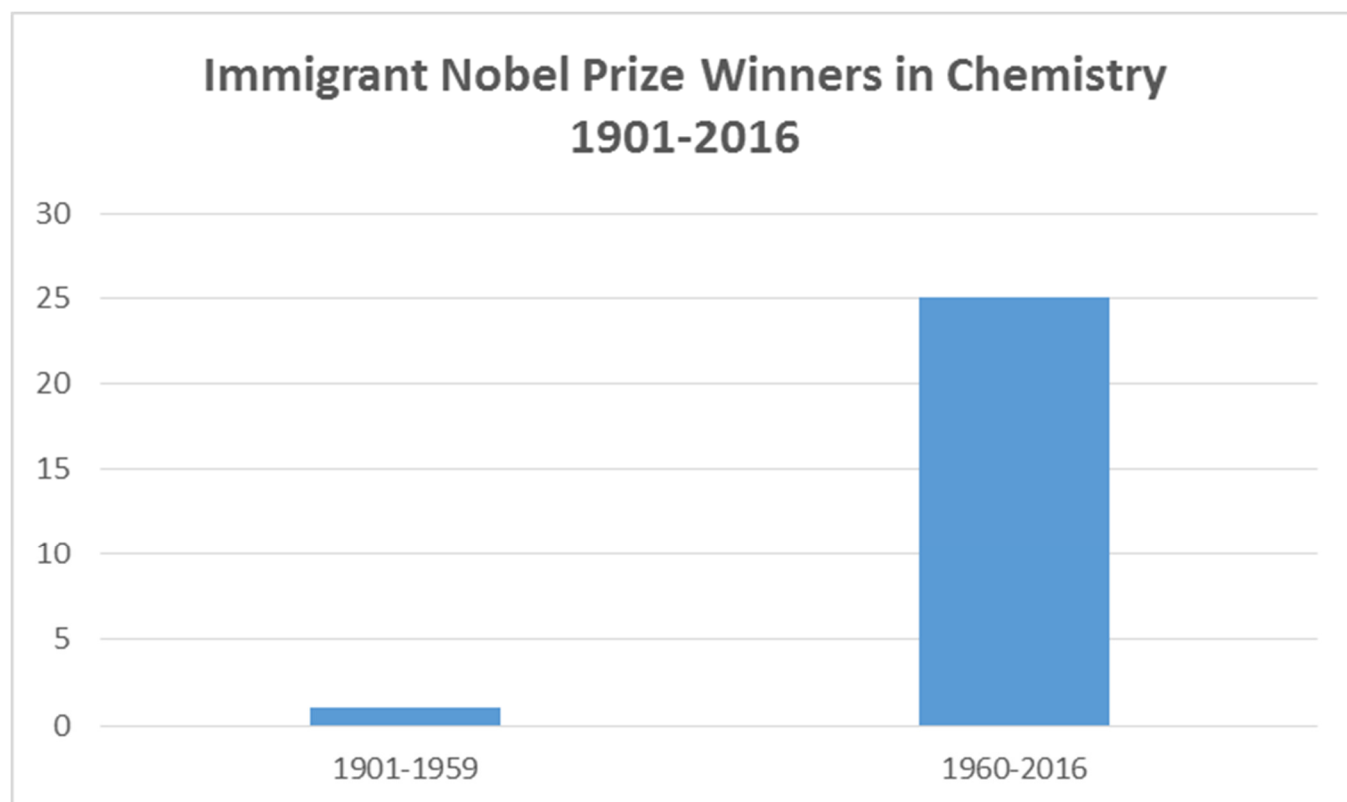
Sir J. Fraser Stoddart was awarded the Nobel Prize in Chemistry 2016. He was born and educated primarily in the United Kingdom and came to UCLA to teach nearly 20 years before winning the Nobel Prize. He currently is a professor of chemistry at Northwestern University in Illinois. "The laureate told *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."⁵ 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

⁵ Zhai Yun Tan, "Why Nobel-Winning Scientists Are Talking About Immigration Policy," *Christian Science Monitor*, October 11, 2016.

Immigrants and Nobel Prizes

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.”⁶

Figure 2



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

“The Nobel Prize in Chemistry 2016 is awarded to Jean-Pierre Sauvage, Sir J. Fraser Stoddart and Bernard L. Feringa for their design and production of molecular machines,” reported the Royal Swedish Academy of Sciences. “They have developed molecules with controllable movements, which can perform a task when energy is added. The development of computing demonstrates how the miniaturisation of technology can lead to a revolution. The 2016 Nobel Laureates in Chemistry have miniaturised machines and taken chemistry to a new dimension.”⁷

⁶ Rafael Bernal, “Amid debate, all 2016 American Nobel laureates are immigrants,” *The Hill*, October 10, 2016.

⁷ Press Release: The Nobel Prize in Chemistry 2016, The Royal Swedish Academy of Sciences, October 5, 2016.

Immigrants and Nobel Prizes

The major contribution made by Fraser Stoddart was his development of a *rotaxane*.⁸ “He threaded a molecular ring onto a thin molecular axle and demonstrated that the ring was able to move along the axle,” according to the Royal Swedish Academy of Sciences. “Among his developments based on rotaxanes are a molecular lift, a molecular muscle and a molecule-based computer chip.”⁹

Between 1901 and 1959, only one immigrant to the United States (William Francis GIAUQUE) won the Nobel Prize in Chemistry, while between 1960 and 2016, 25 immigrants won the Nobel Prize for Chemistry.

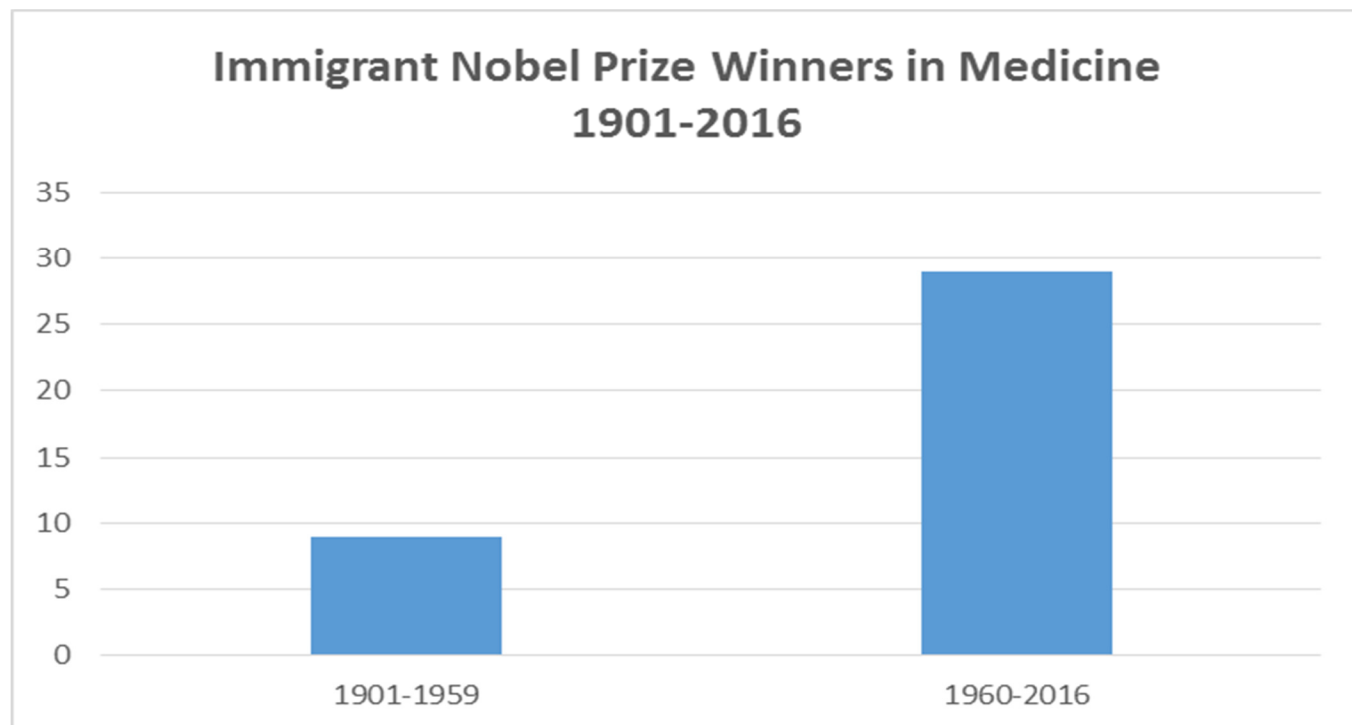
Table 3
Immigrant Nobel Prize Winners in Chemistry Since 2000

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

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

⁸ A rotaxane is “a compound with two or more independent portions not bonded to each other but linked by a linear portion threaded through a ring and maintained in this position by bulky end groups.” “Rotaxane.” *McGraw-Hill Dictionary of Scientific & Technical Terms*, 6E. 2003. The McGraw-Hill Companies, Inc. 15 Oct. 2016
<http://encyclopedia2.thefreedictionary.com/Rotaxane>.

⁹ Ibid.

Figure 3

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

MEDICINE

The most recent American winner of the Nobel Prize in Medicine was William C. Campbell, who was born in Ireland and is a professor at Drew University in New Jersey. He won the award in 2015 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 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.”¹⁰

¹⁰ Press Release: The Nobel Prize in Physiology or Medicine 2015, The Royal Swedish Academy of Sciences, October 5, 2015.

Immigrants and Nobel Prizes

From 1901 to 1959, 9 immigrants to the United States won the Nobel Prize for Medicine, but 29 immigrants were awarded the Nobel Prize for Medicine from 1960 to 2016.

Table 4
Immigrant Nobel Prize Winners in Medicine Since 2000

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

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."¹¹ Blackburn is 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 1990.¹²

Dr. Blackburn and Dr. Szostak were able to establish that "repeated DNA sequences make up the tips of each chromosome."¹³ 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.¹⁴ 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

¹¹ Goutam Naik, "U.S. Cell-Aging Researchers Awarded Nobel," *The Wall Street Journal*, October 6, 2009, A5.

¹² Dr. Elizabeth Blackburn, Blackburn Lab, University of California San Francisco.

¹³ Ibid.

¹⁴ Ibid. See also Stuart Anderson, *Immigration* (Greenwood, 2010).

Immigrants and Nobel Prizes

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.”¹⁵

PHYSICS

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). “This year’s Laureates opened the door on an unknown world where matter can assume strange states,” according to the Royal Swedish Academy of Sciences. “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.”¹⁶

Table 5
Immigrant Nobel Prize Winners in Physics Since 2000

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

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

¹⁵ Linda Marsa, “Scientist of the Year Notable: Elizabeth Blackburn,” *Discover Magazine*, December 6, 2007.

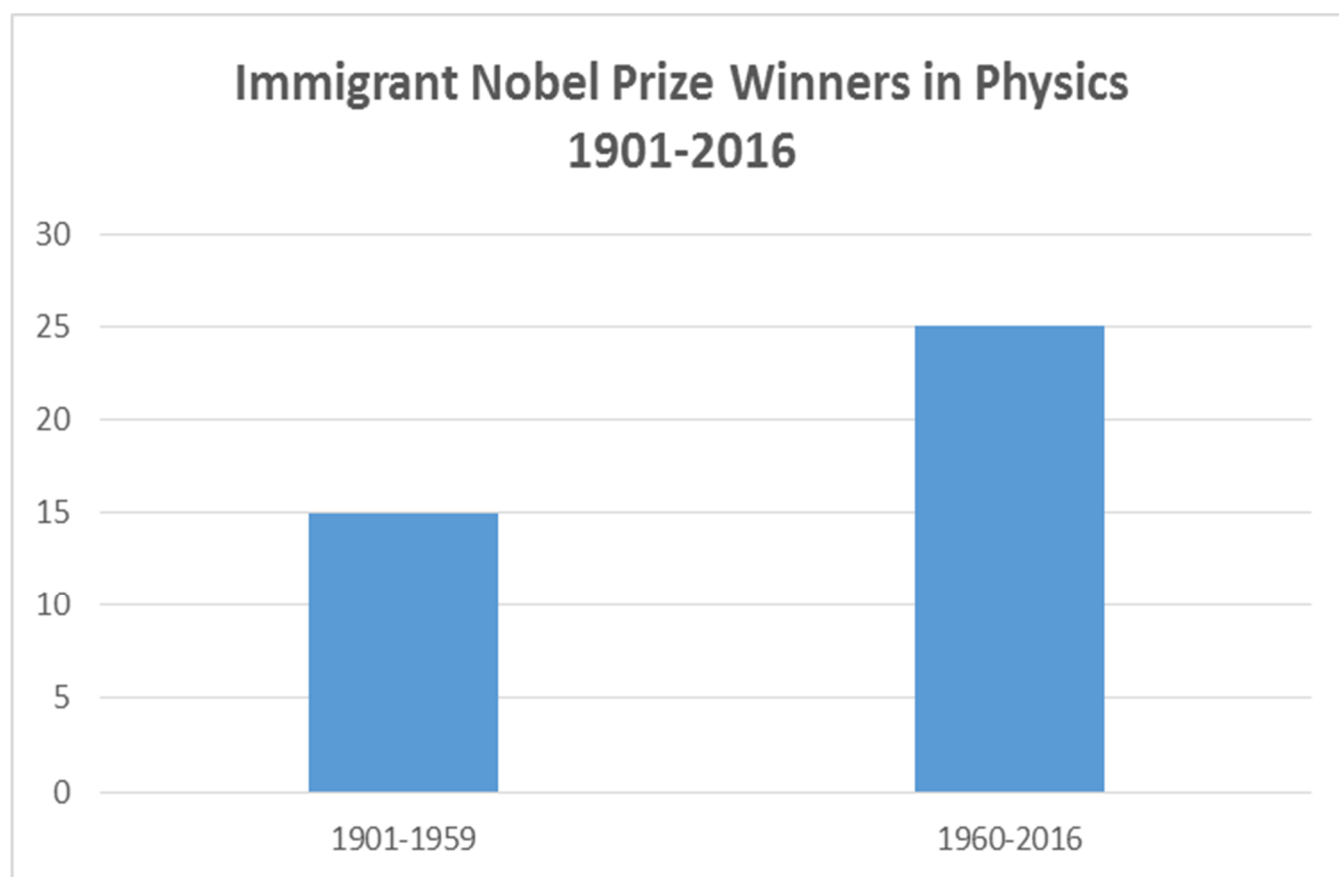
¹⁶ Press Release: The Nobel Prize in Chemistry 2016, The Royal Swedish Academy of Sciences, October 5, 2016.

Immigrants and Nobel Prizes

In Physics, 15 immigrants won the Nobel Prize from 1901 to 1959, while 25 immigrants won the Nobel Prize for Physics between 1960 and 2016.

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 the field of 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 5 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.

Figure 4



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

ABOUT THE NATIONAL FOUNDATION FOR AMERICAN POLICY

Established in 2003, the National Foundation for American Policy (NFAP) is a 501(c)(3) non-profit, non-partisan public policy research organization based in Arlington, Virginia, focusing on trade, immigration and related issues. The Advisory Board members include Columbia University economist Jagdish Bhagwati, former U.S. Senator and Energy Secretary Spencer Abraham, Ohio University economist Richard Vedder, former INS Commissioner James Ziglar and other prominent individuals. Over the past 24 months, NFAP's research has been written about in the *Wall Street Journal*, the *New York Times*, the *Washington Post*, and other major media outlets. The organization's reports can be found at www.nfap.com.