



AAAS NEWS & NOTES

Kip Thorne accepts the Nobel Prize in Physics in 2017 for his “decisive contributions to the LIGO detector and the observation of gravitational waves.”

Science diplomacy leverages alliances to build global bridges

History of U.S. and Soviet scientific research collaborations and exchanges offers lessons for today

By **Anne Q. Hoy**

Nobel laureate and theoretical physicist Kip Thorne counts his decades-long collaboration with Russian experimental physicist Vladimir Braginsky as pivotal to scientific research that led to the first detection of two colliding black holes in the distant universe.

The 2015 detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatory (LIGO) was not only the birth of a whole new way of studying the universe, a realization predicted by Albert Einstein’s general theory of relativity, and a discovery that earned Thorne and two other physicists the 2017 Nobel Prize in Physics. It also validated the enduring benefits of science diplomacy across the globe.

“Braginsky was my principal mentor on research at the interface between theory and experiment. His mentoring made possible many of my contributions to LIGO, and our tight collaboration led to his own major LIGO contributions,” said Thorne. “He became the ‘conscience’ of LIGO in the 1990s and 2000s, identifying a series of sources of noise that we had not been aware of, and triggering the LIGO Scientific Collaboration to scope out those noise sources and devise ways to deal with them.”

Thorne and Braginsky, who died in 2016, traveled to each other’s laboratories, coauthored scientific papers, shared findings, traded questions, and formed a lasting friendship that began with Thorne’s first visit to Braginsky’s lab in 1968 and extended into the 2000s.

As scientists forged such cooperative relationships despite tensions between their governments, the American Association for the Advancement of Science (AAAS) was pioneering efforts to spread the global reach of science and technology by engaging in scientific leadership initiatives through international exchanges and scientific partnerships.

In 2008, AAAS formally established the Center

for Science Diplomacy to advance the value of what then AAAS CEO Alan I. Leshner described as a program “guided by the overarching goal of using science and scientific cooperation to promote international understanding and prosperity. AAAS believes this use of scientific collaboration and communication is essential both to the advancement of science and its use for the benefit of our global society.” Leshner is now serving as AAAS’s interim CEO.

At the center’s opening, Vaughan Turekian, then AAAS’s chief international officer, said the center would “contribute to the long and methodical building of relationships” and pursue advances to address global challenges such as climate change, sustainability, and health care innovation.

A year later, AAAS joined five representatives of other leading scientific organizations in a meeting with North Korea’s State Academy of Science. During the rare visit, U.S. scientists met with their counterparts, toured government research institutions, and reached an agreement to pursue cooperative issues that paved the way for a reciprocal visit of North Korean scientists to U.S. laboratories.

AAAS has continued to develop such scientific agreements, including a 2013 agreement with China’s Association for Science Technology, a 2014 pact between AAAS and the Cuban Academy of Sciences, a 2017 agreement with Mexico’s Presidential Science Advisory Council, and a 2018 agreement with the Science Commission of Chile’s Senate.

It also has tapped into long-standing collaborations to offer training sessions and expand global scientific alliances. Last year, for instance, AAAS held a regional training workshop with The World Academy of Sciences and the Academy of Science of South Africa to introduce regional scientists to scientific collaborations that inform science and advance diplomacy.



Vladimir Braginsky, left, meets with Kip Thorne at his Pasadena, California, home.

The AAAS Center for Science Diplomacy also provides training for scientists and graduate students in the U.S., and, since 2014, it has cohosted international sessions with The World Academy of Sciences at its headquarters in Italy.

Throughout the ebb and flow of relations between the United States and the Soviet Union, then Russia, scientists, like Thorne, continue to build professional relationships and keep in touch with their foreign counterparts.

“The Cold War Iron Curtain was not a significant barrier to my collaborations with Braginsky and other Russian scientists,” said Thorne. “I hope the soaring paranoia in Washington about China does not create major barriers to the very fruitful collaborations that my colleagues today have with Chinese scientists.”

The parallel with China was not raised during a 16 July AAAS symposium hosted by the AAAS Center for Science Diplomacy that centered on the history of U.S.-Soviet scientific activities. In examining scientific interactions between the two powers, Gerson S. Sher, author of *From Pugwash to Putin: A Critical History of US-Soviet Scientific Cooperation* and former coordinator of the National Science Foundation’s U.S.-Soviet and East European program, used the U.S.-Soviet relationship as a case study of what drives, benefits, and sometimes interrupts international scientific collaborations.

Today, six decades of formal bilateral exchanges between U.S. and Soviet scientific academies have “all but descended to zero,” after Russia’s annexation of the Crimean Peninsula and its intervention in the Ukraine crisis in 2014, said Sher during the symposium held at AAAS’s Washington, D.C., headquarters.

Sher walked through earlier collaborations during post-World War II, post-Joseph Stalin and post-Soviet periods to demonstrate that despite any strained relations between governments, scientific cooperation endures in strengthening civil relationships, improving understanding of each society, and advancing science.

Among early U.S. collaborations was President Dwight D. Eisenhow-

er’s “people to people” exchange initiative. Backed by private sponsors, it amplified the scientific communities’ prevalence to nurture relationships with fellow researchers. This led to the emergence of multiple public and private scientific efforts designed to support international scientific alliances in the wake of the Soviet Union’s demise in 1991.

The U.S. National Science Foundation, for instance, established the nonprofit U.S. Civilian Research and Development Foundation (CRDF) in 1995 to provide scientists grants, technical resources, and training support for global scientific and technical collaborations. Sher served as its founding president.

CRDF’s emergence came amid heightened U.S. concerns about unsecured weapons of mass destruction and set off calls for nonproliferation programs, said Sher. Particularly unsettling was the sidelining of Russian nuclear weapons experts under the weight of a stagnant Soviet economy and amid the chaotic fallout of the Soviet Union’s collapse.

In remarks at the AAAS symposium, Cathleen A. Campbell, who also served as a CRDF president beginning in 2006, underscored the importance of such nongovernmental organizations in fostering scientific collaborations through science and technology agreements between the United States and the former Soviet Union and its republics.

“That was a unique period in history that I don’t think we will ever see again anywhere,” said Campbell, a former visiting scholar at the AAAS Center for Science Diplomacy and now a board member of the U.S.-Israel Bilateral Science Foundation. “It’s just an incredible interconnection of opportunities and challenges and issues we were facing that prompted this whole array of programs.”

Turekian, now executive director of policy and global affairs at the National Academies of Sciences, Engineering, and Medicine, said the Cold War had a profound impact in shaping science diplomacy, then and today.

“The creation of the AAAS Center for Science Diplomacy was a response to the need to refocus how science and science cooperation could be better utilized as a bridge outside of a polar world and to deal with complex issues at regional and global scales,” said Turekian. “But it also looked to the U.S.-USSR science diplomacy experiences to understand how to make science diplomacy work.”

Interactive early education builds STEM literacy in children

AAAS programs introduce STEM careers through hands-on activities and interaction with scientists

By **Andrea Korte**

Wildlife biologists have turned to creative solutions like 3D printing technologies to fashion prosthetic beaks, limbs, and shells to aid injured animals. A group of Maryland elementary school students were given their own opportunity to tackle a similar project, designing and printing shells for turtles, hermit crabs, or snails under the guidance of a retired scientist.

Throughout the process, systems biologist Gertraud Robinson encouraged the students to think like a scientist. “You have a problem; you think about the solution; you test it out; and you improve,” she coached.

Robinson has leaned in to science education after retiring from the National Institutes of Health, trading her laboratory for elementary school classrooms and forgoing a full retirement. She participates in the American Association for the Advancement of Science’s STEM Volunteer Program, which pairs scientists and engineers with elementary, middle, and high school teachers at nine school districts in the Washington, D.C., area, including those in three Virginia coun-

ties and three cities, and two in Maryland. In support of primary and secondary education, the volunteers work to spark interest in science, technology, engineering, and mathematics (STEM) with an eye toward drawing students into relevant careers.

Nearly 200 volunteers visit classrooms throughout the school year, helping teachers set up experiments, answering student questions, and drawing connections between classroom projects and the real-life research and activities scientists pursue.

The program is one of several AAAS initiatives that foster science literacy in children and cultivate interest in STEM careers. Along with Science in the Summer, a seasonal enrichment program, and Family Science Days, a public event held at the AAAS Annual Meeting, the STEM Volunteer Program complements an array of AAAS education and public engagement activities that take a hands-on approach.

“In the face of AAAS’s goal to foster education in science and technology for all, we have worked to improve K–12 STEM education at a system level and have coupled this work with direct engagement with students,” said Shirley Malcom, AAAS senior adviser



Participants extracted DNA from strawberries among the many hands-on activities offered at the 2019 Family Science Days in Washington, D.C.

and head of the SEA Change program, a AAAS initiative to spur institutional change at colleges and universities to support diversity and inclusion. “Through these programs, the value of STEM education has been reinforced for students and parents alike, and we are encouraged by engagement activities through the positive changes we realize.”

The STEM Volunteer Program dates to 2004, when Alan I. Leshner, then AAAS CEO and now AAAS’s interim CEO, penned a relevant editorial for *Science*. “Reaching out to the public is not a strong tradition for the science community, perhaps because we may think that nonscientists cannot understand our work. We’re wrong about that,” Leshner wrote.

The editorial inspired Donald Rea, a retired NASA Jet Propulsion Laboratory scientist, who joined other AAAS members in volunteering as science educators at public schools in Maryland’s Montgomery County, the state’s largest school district. Together, they launched what was then called the AAAS Senior Scientists and Engineers program.

In 2016, the program became the STEM Volunteer Program to reflect a broader volunteer base that expanded beyond senior citizens. Today, about 20% of participants in the program take time away from their STEM jobs to volunteer in classrooms, according to Betty Calinger, senior project director at AAAS.

AAAS activities for children do not end with the school year. Science in the Summer is a free, hands-on program geared toward 2nd through 6th grade students. Launched in the Philadelphia area in the 1980s by pharmaceutical company GSK, Science in the Summer expanded nationwide with the help of AAAS in 2015. AAAS now oversees Science in the Summer at dozens of sites in Washington, D.C.; Maryland; and Virginia, bringing local teachers to libraries, museums, and Boys & Girls Clubs to lead students in hands-on science experiments.

The goal of this program is to keep children from losing skills and knowledge during summer breaks, Calinger said, and instill perspectives that extend beyond the next school year. Children get excited about science and build science literacy for the long term, she said.

Each summer’s curriculum is centered on a theme to demonstrate the relevance of science in their everyday lives and interests. A sports-focused curriculum, for instance, taught children how their

favorite athletes benefit from quick reflexes. They also were given an opportunity to be scientists in testing their own hand-eye coordination. First, though, they had to establish a hypothesis and collect data before they could draw conclusions.

Last summer, educator Monica Padgett led Science in the Summer participants in experiments related to space travel. To learn about rocket propulsion, Padgett guided students as they used film canisters to create their own miniature rocket ships. When the fuel—a mixture of water and Alka-Seltzer—was added, the rockets zoomed toward the ceiling, just one part of a curriculum that is “hands-on and exciting for the kids,” said Padgett.

Experiencing fun science firsthand is a hallmark of AAAS’s Family Science Days, the AAAS Annual Meeting’s well-attended public event. Since 2004, the event has offered children and their parents opportunities to hold a real human brain, pilot a robot and build their own pinball game at activity stations run by museums, universities, laboratories, and other science organizations.

Older children are particularly interested in exhibits about virtual reality, 3D printing, and computer programming, while younger children crowd around areas that feature anything they can touch, said Stacey Baker, public engagement associate with AAAS’s Center for Public Engagement with Science and Technology.

Stage shows featured at Family Science Days also are interactive. Scientists give a short presentation and answer questions from the audience before heading to the “Meet a Scientist” area, where children can ask scientists questions in a one-on-one setting. Children engage in conversations with a diverse slate of scientists across genders, races, and ethnicities and from a variety of STEM careers. Children realize that “they, too, can be scientists,” said Baker.

From the start of her transition from NIH to the classroom, Robinson recognized an inspiration along with the importance of bringing science to elementary schools. As a STEM Volunteer, she wanted to represent science diversity. The participation of female scientists in the program sends many students a powerful message by their presence as a volunteer. “That was one of my motivations—to show them that there are women working in this job,” she said.

The goal was validated when students, as part of a class project, were asked to draw a scientist. The majority of the drawings depicted women. Robinson said, “I was pleased.”

Science

Science diplomacy leverages alliances to build global bridges

Anne Q. Hoy

Science **365** (6456), 875-876.
DOI: 10.1126/science.365.6456.875

ARTICLE TOOLS

<http://science.sciencemag.org/content/365/6456/875>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 2019 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works