The Civic Scientist – An Introduction to Scientific Citizenship for the 2008 Quadrennial Congress of Sigma Pi Sigma

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With thanks to Neal Lane.

The concept of "civic scientist" or "scientific citizenship" emerged from Congressman George Brown, who was the chairman of the US House of Representatives Committee on Science from 1991-1995. Congressman Brown's ideas gained further footing from the speaking and writing of Neal Lane (see: "Benjamin Franklin, Civic Scientist," by Neal Lane, Phys. Today **56**, 41 (2003), and http://flux.aps.org/meetings/YR03/APR03/baps/abs/S3410004.html), who promoted the concept forcefully, first as the director of the National Science Foundation and then during his tenure as President Clinton's science advisor. Brown and Lane were urging scientists to become more engaged in the process of generating public policy as a natural and necessary extension of scientists' first commitment to science. They recognized that scientists, whether as teachers or researchers, occupy an exalted position in society. Furthermore, given the scientific and technical nature of many of society's most pressing problems, from climate change, to energy, to weapons of mass destruction, to public health, to stem cell research, to global competitiveness, scientists have a necessary role to play in the policy process, as advisors, mentors, teachers, students, and researchers.

At the April 2003 meeting of the American Physical Society, held in Philadelphia, science historian Michael Riordan and I organized a session entitled, "Benjamin Franklin: America's First Civic Scientist," which reflected on the impact of Franklin as a scientist immersed in public service. During this session, Neal Lane described the civic scientist as having a number of qualities, and Lane characterized Benjamin Franklin as America's first scientist to fit his description. The following is derived from Lane's characterization of a civic scientist.

- **A civic scientist should be a credentialed scientist with sufficient professional standing to have credibility among colleagues, policy-makers, students, and the public.**
- **A civic scientist must possess the wisdom and judgment to understand the boundaries of scientific authority and when it is appropriate to apply scientific authority to policy issues.**

- **A civic scientist should be able to communicate effectively with a variety of audiences in order to convey his or her message most effectively.**

- **A civic scientist must not expect to persuade solely by virtue of his or her scientific authority; rather, he or she should understand the nature of political discourse and decision-making and realize that progress is made incrementally through a process of compromise and consensus building.**

- **A civic scientist is committed to applying scientific knowledge and experience to the benefit of the public.**

The 2008 Congress will provide an opportunity to hear from a number of physicists who have applied the civic science model in especially compelling and impactful ways:

Neal Lane served President Clinton as Assistant to the President for Science and Technology and was Director of the Office of Science and Technology Policy. Prior to his work in the White House, he was Director of the National Science Foundation. In academia, he was Provost at Rice University and a professor of physics. Lane's current appointment at Rice takes advantage of his unique perspective and years of experience at the intersection of research, public policy, and teaching. For a profile of Lane and a link to his current work in public policy and civic science, go to: http://www.ruf.rice.edu/~neal/.

Adrian Melott was one of the first to demonstrate the formation of the "cosmic web" of superclusters with computer simulations. As a University of Kansas physicist, he has since moved to award-winning research on high-energy astrophysical effects on the Earth, including possible mass

extinctions. He made his civic science mark when he became involved in the science education debates in Kansas, particularly the issue of creationism and evolution in public school science classrooms. In 1999, he was the founder of Kansas Citizens for Science, which was crucial to having evolution quickly restored. He will discuss the "oscillation syndrome" in the Kansas state science standards, with a new loss expected this November if the pattern continues. Melott's web page is: http://kusmos.phsx.ku.edu/~melott/Melott.html.

Richard Garwin represents the generation of physicists who came of age professionally during and immediately following World War II, and whose perspective on the civic role of physicists was shaped by the emergence of nuclear weapons and the Cold War. This era was also the dawning of the computer age with the invention of the solid state transistor and all that has followed. Garwin's career has consequently been characterized by a distinguished research record at IBM, coupled to decades of service as a high-level advisor to the federal government in the areas of military technology and planning, arms control, and nuclear non-proliferation. A visit to http://fas.org/rlg/ gives a clear picture of 60 years in the life of a very active civic scientist.

To the extent that the 2009 Congress will explore the many dimensions of civic science, one cannot overlook the role played by scientific civicists like **David Goldston**. Goldston spent 20 years on the staff of the Science Committee in the US House of Representatives and was a leader in setting the nation's legislative policy in a broad array of topics important to scientists, from high energy physics funding, to NSF's research and education budget, to NASA's science program, to climate change and our energy future. He has been an ardent supporter of science and an advocate for more effective policy involvement by scientists. Goldston is the director of the Harvard Energy Studies Program, and he recently served as vice chair of the APS study on energy efficiency. Learn more about David at: http://www.nature.com/nature/focus/partyofone/index.html

Julia Phillips has devoted her career to improving energy efficiency through materials science and engineering, first as a researcher at Bell Labs and subsequently as the director of a major research center at Sandia National Laboratory. Phillips is driven to apply science to significant societal problems, while also working on related policy issues such as enhancing the federal government's

role in improving energy efficiency while also encouraging more girls to pursue science and engineering. To learn more, go to: http://www.engineergirl.org/?id=6043

Mike Fortner and Louis Lanzerotti are physicists who have been elected to public office. Fortner is an Illinois state representative, and Lanzerotti has served his home of Harding Township, New Jersey, as a member of the Board of Education, the town council, and as Mayor. Fortner and Lanzerotti are each highly accomplished physicists who became engaged in local politics as a parallel track to their science careers. As with many holding elected office, their drive to public service was inspired by their scientist's desire to solve problems. Fortner's official web site is: http://www.mikefortner.org, and Lanzerotti is profiled at: http://www.nsf.gov/nsb/members/bio/lanzerotti.jsp. In contrast, **Craig Jones** is a citizen who lives in the vicinity of FermiLab. As a central member of the FermiLab ILC Citizens' Task Force, Jones and the Task Force have provided "guidance and advice to the laboratory to ensure that community concerns and ideas are included in all public aspects of planning and design for a proposed future accelerator, the International Linear Collider." This quote is taken from the Executive Summary of the Task Force report, which can be found at: http://www.fnal.gov/pub/neighbors/docs/FermilabILCCitizensTaskForceFinalReport.pdf, and provides a great example of cooperation between scientists, a large federal laboratory, and the lab's neighbors.

Aziza Baccouche started her own science media production company, AZIZA Productions, in 2000, two years before she received her PhD in physics. The mission of AZIZA Productions is to connect science with the human experience. Baccouche's films and stories are infused with a passion to touch peoples' lives with science by telling stories that are personal and meaningful. Perhaps her most compelling script is her own, in which she relates her journey to build a career as an African-American physicist whose medical condition has left her blind since she was a child. To preview a video profile of Baccouche and learn more about her work, go to: www.draziza.com.

Leon Lederman has found a new career in science education by leveraging his status as a Nobel Laureate and Director Emeritus of Fermilab. Lederman is currently a resident scholar the Illinois Mathematics and Science Academy, where he champions reforms in science education. He is also

fiercely outspoken on the need for smarter use of science in public policy, particularly in the areas of climate change, sustainable growth, population, agriculture, and education. Lederman's autobiography for his Nobel Prize can be found at: http://nobelprize.org/nobel_prizes/physics/laureates/1988/lederman-autobio.html.

These speakers will provide their own perspectives on what it means to be a civic scientist. Each of them, in a way that is unique to her or his interests, circumstances, and personality, serves society by using their authority and expertise to work outside of the traditional boundaries of science in order to improve the human condition.

As participants in the 2008 Congress, you will be asked during the workshops to consider the role of the civic scientist in modern society, and how Sigma Pi Sigma can facilitate the impact of civic scientists. Similar to the scientific ethics recommendations from the 2004 Congress which became a road map for action for the honor society, (see, for example, http://www.sigmapisigma.org/radiations/2008/directors_corner_spg.pdf) the outcomes from the 2008 Congress workshops on scientific citizenship will guide Sigma Pi Sigma in developing new programs and policies.