A Special History Session -- Franklin and the Future
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Lay-language description of session VT1
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A special history session called "Franklin and the Future" was held to celebrate the 300th anniversary of Benjamin Franklin's birth. Only Albert Einstein, says session keynote speaker and Harvard historian of science Joyce Chaplin, has ever entered people's "lives and
consciousness" in a way that matched that of science's first international celebrity, Benjamin Franklin. In "The First Scientific American: Benjamin Franklin and the Pursuit of Genius," Chaplin wrote that each man "redefined the very fabric of reality, Franklin by using electricity to reexamine the nature of matter and Einstein by using mathematics to redefine time and space."

Chaplin believes that Franklin's science has been widely misunderstood as merely "an odd, private hobby, which he managed to do somehow (and somewhere) alongside his work in politics." But, in fact, she and other historians of science agree that Franklin was not only a founding father of the United States, but a founding father of modern science. That judgment may not be known widely enough in the present, but it was well known in the past, when science was classed as central to philosophy. Concerning the scientist Franklin, Thomas Jefferson wrote in 1782 that "no one of the present age has made more important discoveries, nor has enriched philosophy with more, or more ingenious, solutions of the phenomena of nature."

Franklin established that lightning is electrical and that electricity involves charge. He simplified electrical theory and opened the way to new discoveries. Those discoveries in due course led to the future-oriented science and technology to be engaged in the presentations planned for the AVS Franklin history session.

To begin the session, Chaplin had set the context in a presentation titled "Benjamin Franklin and the Meaning of Public Science." She described how Franklin's scientific and political efforts were interconnected and explained why Franklin and his contemporaries fit their science comfortably into public life.

One thing that Chaplin noted in advance about her keynote presentation was particularly telling. "Franklin," Chaplin wrote, "helped to found a learned society, the Library Company of Philadelphia, which for some time used rooms in the state house's west wing."

"There, the company hosted a series of scientific lectures, including demonstrations with an air pump, which created an experimental vacuum; there, as well, Franklin and his collaborators did most of their famous electrical experiments."

Though the combination of vacuum and high voltage was not unknown in the late 18th century, it had no practical application. In the 21st century, however, that combination of technologies enables particle accelerators to serve as something analogous to supermicroscopes for looking in ever finer detail inside the atom's nucleus. Especially since Franklin subscribed to the particle theory of matter, the combination calls to mind

Chaplin's statement that, like Einstein, Franklin "redefined the very fabric of reality" and that Franklin used "electricity to reexamine the nature of matter."
Then Geraldine Richmond, a materials scientist at the University of Oregon, recalled a famous Franklin experiment as context and precedent for her presentation on "Monolayer Films, from Franklin's Oil-Drop Experiment to Self-Assembled Monolayer Structures." A film of oil on water is one example of a monolayer. Franklin once reported to the Royal Society about such a film's calming effect on rough water. Monolayers -- single, closely packed layers of atoms, molecules or cells -- have recently been increasingly studied, thanks in large part to their usefulness in technological, biological and environmental processes.

Next, independent consultant and former Xerox and IBM research scientist Lawrence Schein highlighted the range of Franklin's scientific contributions in yet another way in a presentation called "The Science and Technology of Electrophotography." The technology in copiers and laser printers -- electrophotography -- is the best-known modern application of electrostatics, the physics of the forces exerted by a static, or unchanging, electric field on charged objects. Schein placed the technology into context as a descendant, in various ways, of Franklin's studies using the then-ubiquitous electrostatic generator, popular for public science demonstrations in Europe and America.
Then Robert McGrath, senior vice president for research at Ohio State University, presented "From Lightning to Lighting: Physics and Technology Discharged from Franklin's Kite Experiment." McGrath described how "rich ideas" from Franklin, "each grounded in meticulously devised and executed demonstration experiments," led to "250 years of subsequent theory, experimentation and understanding of electricity and discharge physics."

Examples of the practical results include micro-discharges in plasma TVs, discharges that drive fluorescent lights, reactive chemistry discharges in electronics manufacturing processes, and even discharges involved in research that seeks to make nuclear fusion a practical source of power.

The session's final speaker was Fred Dylla, chief technology officer at Thomas Jefferson National Accelerator Facility, in Newport News, Va. His presentation, "Progress and Prospects in the Generation of High Voltage," engaged the ways in which Franklin helped light the way to countless not-then-foreseen modern applications of high voltage, from cathode-ray and photomultiplier tubes, to huge systems for

electrical power distribution, to the coming generation of accelerators.

Benjamin Franklin founded America's first learned society, the American Philosophical Society. The AVS special history session to celebrate his tercentenary also celebrated Franklin's purpose for that organization: to pursue "all philosophical Experiments that let Light into the Nature of Things, tend to increase the Power of Man over Matter, and multiply the Conveniences or Pleasures of Life."

This Franklin tercentenary session was sponsored by the AVS Vacuum Technology Division, the AVS History Committee and the Center for the History of Physics at the American Institute of Physics.