

## Editorial

### *America in Decline*

From the end of World War II until the mid-1980s, young physicists who aspired for greatness and dreamed of a Nobel Prize frequently chose elementary particle physics as the focus of their research. This area of physics seeks to identify the most fundamental building blocks of matter and to understand how they interact to produce the physical universe we all inhabit. It is the stuff of high drama. Through generous grants, the federal government opened the door for these bright young scientists to pursue their dreams: there were federally-supported particle accelerators on the East Coast, West Coast, and in between. And the payoff for the American taxpayer has been enormous.

In 1993, the dreams of young particle physicists suddenly became nightmares. In October of that year, the United States Congress killed the Superconducting Super Collider (SSC) then under construction in Texas. In human terms the consequences of that decision are staggering: the dreams of a generation of young physicists were essentially dashed.

During the golden years of particle physics, the imaginations of American physicists were fired up by empirical data emerging from accelerator laboratories east to west as well as laboratories in other countries. In some cases these data verified earlier predictions, in other cases these data suggested provocative new ideas that often led to new predictions, and these predictions often led not only to new fundamental knowledge about the material universe, but also to new practical applications. However, by the mid-1980s larger accelerators—that is, higher energies—were needed to provide the data required to respond to questions begging for answers. That is why the SSC was proposed long before 1993.

New data were needed for another reason. Data are restrictive. Data put a short leash on the mind, or as Richard Feynman said, imagination in physics is imagination in a straightjacket. Data are the straightjacket.

When members of Congress killed the SSC, they stanching the flow of data about elementary particles to a meager trickle and, in so doing, took off the leash and unzipped the straightjacket. As a result, physicists have been free to speculate about strings, branes, and multiple universes; none of these speculations has a single data point to support them. With the European Large Hadron Collider coming on line, data may come...or it may not. In either case, some of America's most talented young people have been marking time for over 25 years waiting for data to provide guidance. If no unanticipated data comes from the LHC, America

will look back and be forced to recognize that a generation of brilliant young people was sacrificed during their most productive years. In human terms that is an enormous loss. Who knows what discoveries this generation of physicists might have made and the practical benefits that most likely would have followed? With the death of the SSC there will be no accelerator laboratory in the United States for American physicists to pursue their research; rather, they will have to go to the Large Hadron Collider, which resides on Swiss soil. America in decline.

Thank you, members of Congress; you served us well.

On July 8, 2011, the space shuttle Atlantis slowly rose over the Kennedy Space Center for the last time; it was on its final trip into near-Earth orbit. One can argue about the merits of NASA's shuttle program as well as the need for manned flight into space, but throughout the life of the shuttle program, America was the leader in space science. In the months ahead, American astronauts will become space-bound hitchhikers: If the Russians give them permission to occupy seats on a Russian space-bound vehicle, American astronauts will be able to continue space-based investigations. It is out of America's hands. America in decline.

Now, 18 years after the SSC shutdown, members of Congress may be about to repeat their 1993 mistake. On July 6, 2011, members of the House Appropriations Committee proposed to kill the James Webb Space Telescope. Just as the SSC was designed to build on and to extend the spectacular successes of Fermilab in Illinois, so the Webb Telescope is being designed to exploit the awe-inspiring work of the Hubble Space Telescope that is nearing the end of its life. One cannot exaggerate the astrophysical, astronomical, and cosmological knowledge gained by means of the Hubble; nor can one exaggerate the beauty of the celestial images transmitted to Earth by the Hubble. How many young people have been inspired by these pictures and, as a result, turned their attention toward science? How many adults have been intellectually and emotionally moved by the majesty and beauty of stellar and galactic images that the Hubble made possible? If Congress kills the Webb telescope, inspiration in the form of spectacular images coming from the depths of space will end. It is widely recognized that the United States needs to produce more scientists and engineers, but by killing future science programs, members of Congress are obviously indifferent to that need.

Thank you, members of Congress.

Funding the SSC in 1993 would have represented a vision for the future; similarly, funding the Webb in 2011 would represent a vision for the future. Have members of Congress lost this vision? Investment in the future is a sign of vitality, a sign of confidence, a sign of hope. We wonder whether Congressmen and Congresswomen have become so myopic that they cannot see the long-term consequences of cutting the nation's support for science.

A nation is in decline when it loses its vision for the future.

John S. Rigden  
Roger H. Stuewer