

## Physics in America at Crossroads and in Crisis, Panel Says

*Read it and weep. Spending money on toys rather than on theoretical understanding.*

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Physics in America is at a crossroads and in crisis, just as humanity stands on the verge of great discoveries about the nature of matter and the universe, a panel from the National Academy of Sciences said yesterday.

The United States should be prepared to spend up to half a billion dollars in the next five years to ensure that a giant particle accelerator now being designed by a worldwide consortium of scientists can be built on American soil, the panel said. If that does not happen, particle physics, the quest for the fundamental forces and constituents of nature, will wither in this country, it said.

"That is a risky investment," Harold T. Shapiro, an economist at Princeton and chairman of the 22-member commission, said yesterday at a news conference in Washington.

But, Mr. Shapiro added: "It's least risky path we could find. To stay where we are is equivalent to folding our cards."

Failure to locate the machine, known as the International Linear Collider, in the United States, the panel said, would force American particle physicists to do their research in Europe, where a major machine is to come online next year, and other places, perhaps Japan.

The blow to American physics would erode the base of science and technology that has fueled innovation, provided intellectual and cultural inspiration and bolstered national security over the last century.

The collider recommendation, along with others, was in a new report, "Revealing the Hidden Nature of Space and Time, Charting the Course for Elementary Particle Physics." Among its other recommendations, the group said the United States should energetically pursue international collaborations in high-energy physics, expand programs in related fields of research like cosmology and underground experiments and take steps to make a long-term plan for particle physics research and then carry it out.

The report says: "The committee has concluded that the price the United States would pay by forfeiting a leadership position in particle physics is too high. Leadership in science remains central to the economic and cultural vitality of the United States."

The report comes on the heels of a widely publicized National Academy report last year, "Rising Above the Gathering Storm," which is credited with spurring the Bush administration to propose increasing money for physical science in the president's most recent budget.

The International Linear Collider will shoot electrons and their antimatter opposites, positrons, at each other through a tunnel some 20 miles long. Working in tandem with the Large Hadron Collider, another giant machine to begin operating at the European Center for Nuclear Research, CERN, outside Geneva, next year, the linear collider will enable physicists to explore "revolutionary new physics," probe the origins of mass and

investigate the nature of the mysterious dark matter that dominates the universe, scientists say.

Dr. Shapiro said, "We concluded that this might be the most exciting moment in particle physics in a generation."

However, just as things are getting exciting in particle physics, support for such work in the United States has stagnated and many large projects are closing down.

The most powerful accelerator now operating, the Tevatron at the Fermi National Laboratory outside Chicago, is scheduled to shut down in 2010, leaving Fermilab with an uncertain future.

An even larger accelerator that would have been the world's largest, the Superconducting Supercollider, under construction in Waxahachie, Tex., was canceled by Congress in 1993.

The report was commissioned two years ago by the Department of Energy and the National Science Foundation. Dr. Shapiro said that, as a non-physicist, his education on the state of particle physics was sobering. "We almost invented this area half a century ago," he said.