
Photo by P. A. Moore

FIRST PLACE:
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We watch with wonder the images beamed back to Earth by the Mars Sojourner probe: wonder at the fact that we are seeing pictures of a new, largely unexplored world. It is a great tribute to our space program that we can see these pictures and wonder, that these images lead us to ask important questions about our place in the cosmos. Yet we are also exploring strange new worlds right here on Earth, worlds just as wondrous, worlds that require new and exciting technologies just to visit, worlds that ask and answer even more questions about how our universe came to be. These are the worlds of inner space, as far inside the structure of matter as we can see. Deep inside the atom there exists a world of tiny, invisible particles that are the building blocks of the universe; this is the world of high-energy physics.

If we could send back pictures from this world, it would look far stranger than Mars. We would see particles arise out of nothingness, fluttering into existence for a billionth of a billionth of a second, and then disappearing back into the void. We would see a world of amazing order and predictability, yet one whose fundamental patterns and symmetries are mysteriously broken. And we know that some day this world will give us answers to fundamental questions, such as: Why do things have mass? Why is there so much matter and so little antimatter? And why are there so many of these tiny "elementary" particles, anyway?

When people ask why we should continue to do research about a world so removed, so different from our own, I say the reasons are just the same as in the exploration of space, or any other new frontier. The journey is in some ways an end in itself: you never really know what you're going to find until you go. From Lewis and Clark to Aldrin, Armstrong and Collins we have explored new territories because they were exciting, challenging, and because we learned so many new things just getting there.

No one would have promoted building particle accelerators or detectors because it would save lives—yet much of today's medical imaging is based on technology developed to detect invisible particles. No one would ever have claimed particle physics would change the way we communicate—yet it was particle physicists and their need to share large amounts of information in that gave birth to the World Wide Web.

At the beginning of this century, few would have expected scientific research to fundamentally change the world. But continued and consistent investments in science by the United States have helped make it the economic, technological and research leader of the world at the close of the century. As we head into the new millennium, few would doubt that scientific research will remake our world yet again. It is our choice whether we want to help make this new world or retreat from it. ■