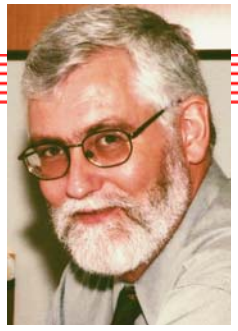

A Time to Celebrate

Stephen G. Benka

If ever physics had a golden age, a case could be made that it is now. The 17th through 19th centuries saw the great developments in mathematics, instrumentation, and ideas that brought us to the 20th-century revolutions of relativity and quantum mechanics. Today, many historical threads are meshing in a wonderfully entangled web of knowledge, discovery, and technology that rivals and may well surpass in beauty any tapestry of other scientific heydays.

In our world, physics is all encompassing. It spans the broad plain between the immeasurably tiny electron and the immensity of the universe. It covers the impossibly hot Big Bang and the impossibly cold Bose–Einstein condensates. It makes time meaningful from yoctoseconds to gigayears. And throughout that scientific realm, at all scales, at all levels of simplicity or complexity, wonders abound.

The intellectually stimulating world of physics today is curiously bimodal. One world is the popular perception of academic physics, focusing deeply on diverse and profound questions of matter, energy, forces, and fields. In this world, much new understanding of the physical realm is first elucidated, previously unthought-of technologies are born, and new generations of physicists are trained. It is here that, for example, our understanding of the universe is again being challenged, now with an unexplained accelerating expansion.

The other world inhabited by physicists is where the knowledge, techniques, and tools of physics get diffused throughout society. New physical understanding leads to new approaches and progress in areas such as medicine, energy, various industries, manufacturing, the environment, and the military. This other world of physics rarely exists by and for itself. Rather, it stands on an equal footing with other disciplines and other human endeavors.

Here is a small sampling of places where physics and physicists are playing new roles in the wider society:

▶ We are rapidly gaining new knowledge of Earth and the operation of its physical systems, and of various perturbations to those systems.

▶ The messy but fascinating world of biology is increasingly enlightened by physics, and physicists, in turn, are learning lessons from nature's machinery.

▶ Our illumination of the world at the atomic scale is growing rapidly, along with our ability to manipulate matter at that scale to create new structures and materials to take on as-yet-unknown tasks.

▶ Even such an esoteric topic as quantum entanglement is slowly wending its way from the ivory tower to the halls of commerce—for example, as a new encryption paradigm.

New research tools are among the many contributions of physics. One new tool in particular is worth your attention: Called "Research Today," it is available at http://www.physicstoday.org. This new and sophisticated tool puts at your fingertips abstracts from more than 100 journals and from the entire arXiv e-print server at Cornell University. In the subject areas of your choice, relevant papers appear *as they are published*. Research Today is updated three times every day so you can easily stay abreast of developments as they occur.

Today's exhilarating world of physics needs no excuse to celebrate. Yet, a convenient 100 years ago, Albert Einstein single-handedly changed the face of physics with his seminal papers on relativity, radiation, molecular dimensions, and Brownian motion. The centennial of those remarkable achievements and the realization of Einstein's legacy provide the global impetus for celebrating a World Year of Physics in 2005. The concept behind the World Year of Physics is to raise awareness of physics within the broad population. And droves of physicists and physics societies have come up with myriad ways to do just that. For a sampling of the planned events at sites around the world, see page 28.

Special items in every issue of PHYSICS TODAY during 2005 will be flagged by the "World Year of Physics" logo seen on this page and on the cover. Those items are intended to celebrate physics in its broadest context as part of the human experience. Over the course of the year you will find commentary on religion (see page 32 of this issue), literature, music, and of course, science. Einstein himself will speak out in our Letters department throughout the year (see page 17). Essays on other topics will also appear (see page 51). We will look back, we will look ahead, and we will have some fun. Please join us, with the rest of the world, in celebrating physics. ■