

A fundamental base for the future

In 2005, more than ever, we must continue to nurture fundamental research if we are to sustain technology, argue **Manjit Dosanjh** and **Hans Hoffmann**.

In 1905 a young man working in the Bern patent office produced three publications on light quanta, special relativity, and the sizes and movements of molecules. The young man was, of course, Albert Einstein and 1905 was later called his *annus mirabilis*. The resulting theories provided insight into the cosmos, elementary particles and states of matter, and paved the way to our current understanding of matter and the universe. However, these papers also helped to lay the foundations for the economy of today, and it is for this reason that we should consider the International Year of Physics of 2005 more about looking forward than looking back.

In his work 100 years ago, Einstein was driven by his innate desire to understand the universe about him. Such curiosity-driven research creates new "breaking" knowledge – discoveries with the potential to have new, revolutionary effects in all domains of human interest. From televisions and electron microscopes to global-positioning systems (GPS) and mobile phones, there are numerous examples of breakthroughs that might not have been achieved through applied research and technology alone.

Nowadays many of the fundamental questions in physics continue to concern the structure of the universe. We can describe many of the features of the matter we know in the universe to considerable precision, but we also know that this "visible" matter constitutes only about 5% of the total energy of the universe. We know almost nothing about the remaining 95% – dark matter and dark energy. Extending our knowledge of this unknown 95% is by itself a good reason for pursuing fundamental research in this direction; and CERN, with the Large Hadron Collider project, is leading one of the efforts to further this understanding. More important, however, is the potential for this fundamental research of today to lead to the technological innovations of tomorrow, possibly as unsuspected as GPS and the World Wide Web were in 1905.

The Year of Physics also offers an important



opportunity to emphasize why continued basic research, particularly in the field of physics, is essential for the 21st century in solving key problems – such as sustainable energy and protecting the environment – and in contributing to health and education, not only in the developed nations, but throughout the world. The late Abdus Salam, a physics Nobel laureate, believed that the gap between rich and poor nations was one of science and technology (*CERN Courier* April 2003 p46). In 1988, he wrote that "in the final analysis, creation, mastery and utilization of modern science and technology is basically what distinguishes the South from the North. On science and technology depend the standards of living of a nation".

The European Union has acknowledged this view of the importance of science and technology, since it wants to become the most advanced knowledge-based economy on the planet before the end of the decade. The US believes itself to be in that position anyway for the foreseeable future. But what of the developing world? With the support of most nations, the UN has declared eight "Millennium Development Goals", which are aimed at cutting world poverty by half in the coming decade and saving tens of millions of lives in the process. However, as Calestous Juma, the coordinator of the Task Force on Science, Technology, and Innovation for the

UN Millennium Project 2005, has stated, "It is inconceivable that the eight Millennium Development Goals can be achieved by 2015 without a focused science, technology and innovation policy."

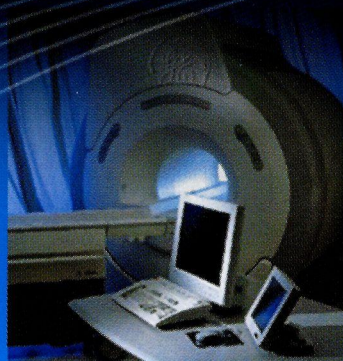
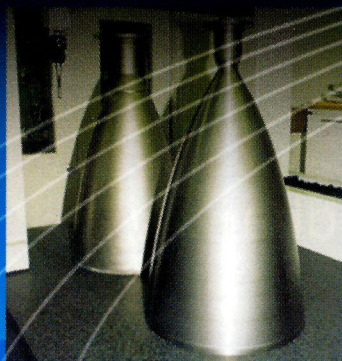
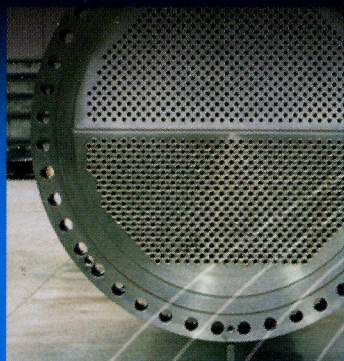
Such a focused effort requires the will of many nations to work together. Fifty years ago, CERN came into being in the wake of the Second World War. A handful of scientists and politicians, in Europe and America, had the vision and energy to launch a unique undertaking: the establishment of a centre of excellence for Europe. Today CERN is known to be open to the world. Forgetting their differences of nationality, religion or culture, scientists from around the globe converge at CERN to work together, all sharing a common goal. This melting pot is one of the keys to the laboratory's success. Based in their own countries, members of collaborations not only provide most of the ambitious experimental apparatus, but they also contribute to a novel, global, powerful information and communication infrastructure using their own countries' industries and talents in a fair and constructive partnership. And the motivation for all this: cutting-edge physics.

Such collaborative efforts can be obviously applied to the current goals of the developed world. Similar collaborative and global scientific efforts also need to be applied to the goals of the countries on the less fortunate side of the digital and other divides. But underlying all must be the will to continue with curiosity-driven research, which will surely bring unknown benefits. We must allow scientists to keep on asking questions and searching for the answers. To quote Einstein: "We shall require a substantially new manner of thinking if mankind is to survive."

Manjit Dosanjh and Hans Hoffmann, CERN.

Further information

www.physics2005.org/
www.un.org/millenniumgoals/
www.unmillenniumproject.org/reports/index.htm



A VARIETY OF APPLICATIONS TAKE ADVANTAGE OF NIOBIUM ALLOYS' UNIQUE PROPERTIES, WHICH RANGE FROM HIGH STRENGTH AND HEAT RESISTANCE TO SUPERCONDUCTING AND CORROSION RESISTANCE.

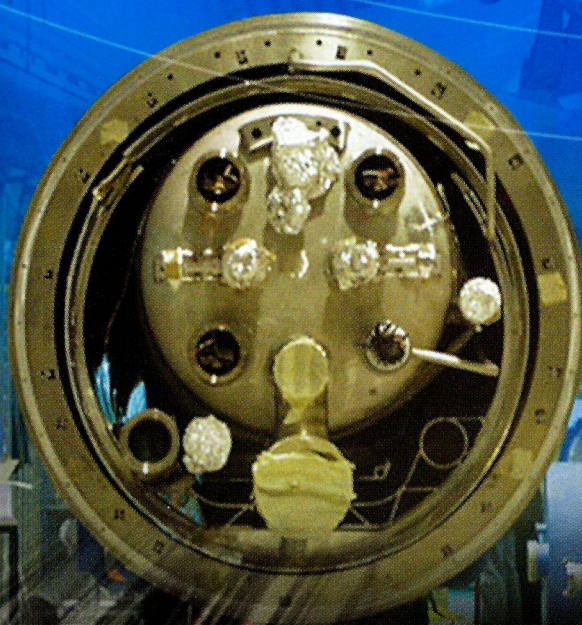
NIOBIUM ALLOYS FOR SPECIALTY APPLICATIONS

ATI WAH CHANG • PO BOX 460 • 1600 NE OLD SALEM ROAD • ALBANY, OREGON 97321-0460
T 541.926.4211 • F 541.967.6994 • WWW.WAHCHANG.COM • WWW.CORROSIONSOLUTIONS.COM

WAH CHANG RECENTLY EARNED CERN'S GOLDEN HADRON AWARD FOR ON-TIME DELIVERY OF QUALITY PRODUCT TO THE LARGE HADRON COLLIDER (LHC) PROJECT.



Wah Chang's Golden
Hadron Award



 **ATI Wah Chang**
Allegheny Technologies

www.wahchang.com

SINGLE SOURCE SOLUTIONS

Where in the world should you look for broadband wireless solutions?



It's this simple: OEM or network operator, you can look to Radio Frequency Systems for the industry's most complete array of space-saving, economical base station antennas, designed to blend unobtrusively into any environment.

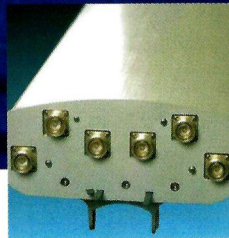
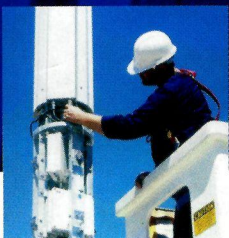
But that's far from all.

RFS is also your source for every kind of site component, including tower-top RF enhancement devices, transmission line necessities—coaxial cable, jumper, connector, accessories—and filter and combiner elements.

In brief, if you know RFS, you know the worldwide source of system solutions that focus on your communication objectives, and the most cost-effective way to achieve them.

Specialists in antennas dedicated to mobile infrastructure, RFS is the best source of variable tilt and multi-band versions, and an industry-leading solutions provider for 3G deployment. And every RFS antenna is optimized for its specific application: PMR, SMR, paging or cellular... regardless of frequency band and standard.

Radio Frequency Systems.
Outstanding customer service, and the assurance of peak network system performance. Visit us at www.rfsworld.com



RADIO FREQUENCY SYSTEMS
The Clear Choice™

