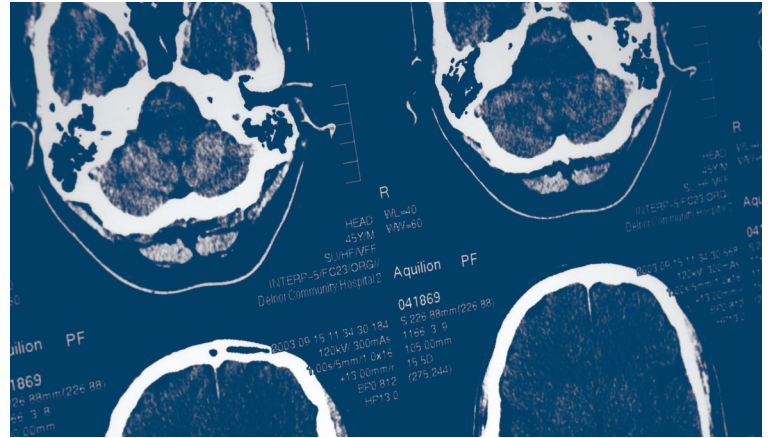


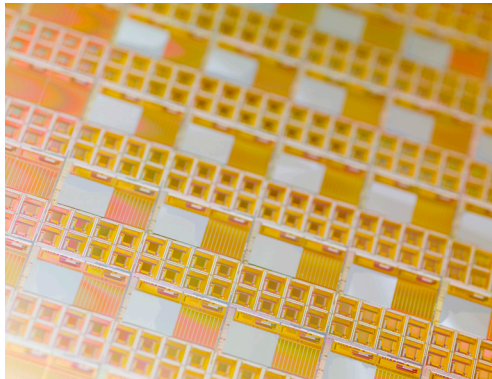
# Benefits of Particle Physics

Each generation of particle accelerators and detectors builds on the previous one, raising the potential for discovery and pushing the level of technology ever higher. The bold and innovative ideas and technologies of particle physics have entered the mainstream of society to transform the way we live.

The production of superconducting magnets at the heart of MRI machines was made economically feasible due to their use in particle accelerators. The World Wide Web was first developed to help particle physicists communicate. Food sterilization and scanning of shipping containers are by-products of physics research. Advances in physics continue to revolutionize our treatment of cancer and other debilitating diseases. Theoretical models developed by physicists are applied to a vast range of scientific disciplines and the world of finance. As time moves forward and understanding grows, so too will the list of practical applications.



Superconducting wire designed for particle accelerators enabled the creation of powerful magnets for MRI scanners. Photo courtesy of Fermilab.



## Medicine

Particle accelerators and detectors first developed for particle physics are now used by every major medical center in the nation to treat and diagnose millions of patients.

## Homeland Security

From scanning cargo in ports to monitoring nuclear waste, the same advanced detector technology that physicists use to analyze particles also better protects the nation.

## Workforce Development

The majority of students who gain their PhDs in particle physics go on to work for high-tech industry, financial institutions and information technology businesses.

## Sciences

Particle physicists need cutting-edge tools; many of these benefit other areas of science.

## Computing

To record and analyze the unprecedented volumes of data generated in particle collisions, particle physicists develop cutting-edge computing technology, making key contributions to solutions in computer science.

## Industry

Particle physicists rely on industry to produce and advance the millions of components that experiments require, putting companies on a fast-track towards new products and life-changing technologies.

## A Growing List

The science and technology of particle physics has contributed to many other areas benefitting the nation's well-being. Simulation of cancer treatments, reliability testing of nuclear weapons, curing of epoxies and plastics, improved sound quality in archival recordings are just a few examples on a growing list of practical applications.



Top: The semiconductor industry relies on accelerator technology to implant ions in silicon chips. Photo courtesy of Fermilab.

Bottom: Accelerator technology is used to create the materials used to make tires. Photo courtesy of Fermilab.