

Medicine: cancer therapy

Every major medical center in the nation uses accelerators producing x-rays, protons, neutrons or heavy ions for the diagnosis and treatment of disease. The global market for medical linacs is growing by an average of about 7%.

Industry: biomedicine and drug development

Biomedical scientists use particle physics technologies to decipher the structure of proteins, information that is key to understanding biological processes and healing disease. A clearer understanding of protein structure allows for the development of more effective drugs, such as Kaletra, one of the world's most-prescribed drugs to fight AIDS.

Sciences: synchrotron light sources

Researchers use the ultra-powerful X-ray beams of dedicated synchrotron light sources to create the brightest lights on earth. These luminous sources provide tools for such applications as protein structure analysis, pharmaceutical research, materials science and restoration of works of art.

Industry: power transmission

Cables made of superconducting material can carry far more electricity than conventional cables with minimal power losses. Further superconducting technology advances in particle physics will help advance this industry, offering an opportunity to meet continued power needs in densely populated areas where underground copper transmission lines are near their capacity.

Computing: the Grid

The Grid is the newest particle physics computing tool that allows physicists to manage and process unprecedented amounts of data across the globe by combining the strength of hundreds of thousands of individual computing farms. Industries such as medicine and finance are examples other fields that also generate large amounts of data and benefit from advanced computing technology

Medicine: diagnostic instrumentation

Particle detectors first developed for particle physics are now ubiquitous in medical imaging. Positron emission tomography, the technology of PET scans, came directly from detectors initially designed for particle physics experiments sensing individual photons of light.



Computing: the World Wide Web

Particle physicists developed the World Wide Web to give them a tool to communicate quickly and effectively with colleagues around the world. Few other technological advances in history have more profoundly affected the global economy and societal interactions than the Web. Revenue from the World Wide Web Grows, with Exponential Growth Continuing.

Homeland security: monitoring nuclear waste nonproliferation

In nuclear reactors, the amount of plutonium builds up as the uranium fuel is used. Because plutonium and uranium emit different kinds of particles, a particle detector can be used to monitor and analyze the contents of the nuclear reactor core. A prototype detector, originally developed by physicists for experiments, has already demonstrated the potential use of this new monitoring technology

Industry: understanding turbulence

From long distance oil pipelines to models for global weather prediction, turbulence determines the performance of virtually all fluid systems. Silicon strip detectors and low-noise amplifiers developed for particle physics are used to detect light scattered from microscopic particles in a turbulent fluid, permitting detailed studies of this challenging area

APPLICATIONS OF ELEMENTARY PARTICLES

