

LARGE SCALE ACCELERATOR FACILITIES FOR NUCLEAR RESEARCH AND PRACTICAL APPLICATIONS

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Charged particle accelerators are one of the main tools for basic research into the modern nuclear and elementary particle physics. The vast majority of fundamental results in particle physics and nuclear physics have been obtained in experiments by using accelerator of protons, ions, electrons and positrons. Accelerator technologies are progressing rapidly providing high-brightness beams with unprecedented parameters useful for practical applications.

Applications derived from basic Nuclear Physics Research have a large impact on many aspects of everyday life. Nowadays, it is obvious that society largely benefits from the vast investments done in basic Nuclear Physics research driven by accelerator technologies.

Nuclear Physics is in the forefront of many applications which cover the range of the needs of Humanity in terms of energy, health, food and agriculture, environment, biology, medicine, forensics, stewardship and security, cultural heritage, materials science, and many other areas. This is due to the peculiar properties of nuclear interactions with matter but also to the developments and the expertise developed by Nuclear Physics groups in accelerator technology, radiation detector technologies, high-performance computing, event reconstruction and ‘big data’.

Overview of the rapid progress in development of large-scale accelerator facilities and verity of related practical applications and spinoffs is presented.