

## **Preface**

Particle accelerators are engines of discovery and innovation. Design, construction and use of particle accelerators have made numerous scientific and technological achievements in recent decades, having an undeniable influence on society. In medicine and pharmacy, particle accelerators provide in more efficient treatment with fewer side effects. Disease diagnostics are how much straightforward with the help of radio isotopes, accelerators have made it possible to develop new antibiotics with providing the ground for research in molecular biology and discovering new protein structures and live cells. Accelerators also provide better quality electrical microchips for the market, by processing and producing semiconductors. They provide cleaner water and air by helping in research on pollutants and have unexampled achievements in archaeology and archaeometry. Today, there are more than 35 thousand accelerators of different types around the world from which 65% are working in industry, more than 30% in medicine and about 5% in large-scale laboratories and research centers.

Considering various applications of accelerators in different scientific and engineering fields, developing different types of accelerators and introducing their different applications to the scientific society, can result in developing industrial potency, enhancing economic power and even improving life in the society. Large-scale facilities have always been the target of the best researchers and scientists around the world in different fields of studies, with the purpose of conducting the most advanced scientific projects. Some beneficiary companies and science institutions employing new strategies will develop from those projects. Of course, the management and financing methods will be new and different in such laboratories.

Iran, a country of about 85 million populations with an outstanding scientific quality in the Middle-East, has had a poor record in the use of particle accelerators. Nearly 5 million students are studying in 470 universities, 2 million are studying in basic science, engineering and medicine. Such a big number of students and researchers have little access to particle accelerator laboratories, as a modern and efficient tool for research and innovation. The most optimistic estimation has counted 50 accelerators being utilized by Iranian researchers in medical applications, and just two to three accelerators are being used for non-medical purposes, while the first laboratories of this kind have been employed more than 40 years ago in Europe and USA, and are being exploited more widely each day. Without enough laboratories and experimental tools, new generations of researchers would not have an appropriate grasp of measurement and experimental science. It can be stated that the most important reason for this lag in developing accelerators technology is the absence of recognition and enough motivation on the part of universities and scientific institutions, not the lack of scientific qualification.

It should be noted that scientific capability of Iran is now envied by many developed countries, those who have enough hardware but are in need of young researchers for utilizing and scientific management of these laboratories. The lack of attention and delaying in setting up scientific plans, such as Iranian Light Source Facility (ILSF), and similar projects deprives the country from the opportunity of attracting the best graduates and scientists. Building large scale facilities for such a huge human capacity in the country, would enable educated and talented

individuals to seek better and professional opportunities in our country and to stop " Brain drain" to occur.

Constructing a national large-scale laboratory, such as Iranian Light Source Facility (ILSF) targeted for interdisciplinary research, with no doubt enhances the quality of research in Iran. Furthermore, it should be pointed out that new political condition after resolving sanction against Iran should concentrate more on scientific and technological independence and self-sufficiency of the country and prevent from over purchasing form abroad.

Organizers of *the second national conference on particle accelerators and their applications*, endeavor to demonstrate a precise and genuine picture of what is going on in Iran regarding construction and application of particle accelerators, to connect researchers and to encourage commercial companies to assist Iranian researchers in developing accelerator science and technology. It is hoped that in the near future, Iran experience a productive period in producing science and technology, especially in constructing and applying particle accelerators.

We invite all scientists, from all over the country, as well as Iranian experts working abroad, working up in this area, to this national gathering.

The availability of educated individuals at the present scale in Iran is indeed exceptional. This is a unique opportunity which should not be missed by science policy makers at the political levels.

Javad Rahighi

Director of Iranian Light Source Facility

Institute for Research in Fundamental Sciences

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