© INNOVATIVE RESEARCH THOUGHTS | Refereed | Peer Reviewed | Indexed
ISSN : 2454 – 308X | Volume : 03 , Issue : 09 | October – December 2017

EXPLORING THE MATTER USING NUCLEAR PHYSICS

Shobhit, Govt. P.G. College Hissar

Abstract: This paper provides a long-term assessment of and outlook for nuclear physics. The first phase of the paper articulates the scientific rationale and objectives of the field, while the second phase provides a global context for the field and its long-term priorities and proposes a framework for progress through 2020 and beyond.

ISSN 2454-308X
9 770024 543081

INTRODUCTION:

Nuclear physics today is a diverse field, encompassing research that spans dimensions from a tiny fraction of the volume of the individual particles (neutrons and protons) in the atomic nucleus to the enormous scales of astrophysical objects in the cosmos. Its research objectives include the desire not only to better understand the nature of matter interacting at the nuclear level, but also to describe the nature of neutrinos and the state of the universe that existed at the big bang and that can now be studied in the most advanced colliding-beam accelerators, where strong forces are the dominant interactions.

The impact of nuclear physics extends well beyond furthering our scientific knowledge of the nucleus and nuclear properties. Nuclear science and its techniques, instruments, and tools are widely used to address major societal problems in medicine, border protection, national security, nuclear forensics, energy technology, and climate research. Further, the tools developed by nuclear physicists often have important applications to other basic sciences—medicine, computational science, and materials research, among others—while its discoveries impact astrophysics, particle physics, and cosmology, and help to describe the physics of complex systems that arise in many fields.

In the second phase of the study, developing a framework for progress though 2020 and beyond, the committee carefully considered the balance between universities and government facilities in terms of research and workforce development and the role of international collaboration in leveraging future investments.

This paper describes that nuclear science is a vital enterprise that provides a steady stream of discoveries about the fundamental nature of subatomic matter that is enabling a new understanding of our world. The scientific results and technical developments of nuclear physics are also being used to enhance innovation and economic growth and are having a tremendous interdisciplinary impact on other fields, such as astrophysics, biomedical physics, condensed matter physics, and fundamental particle physics. The application of this new knowledge is contributing in a fundamental way to the health and welfare of the nation.

Exploitation of Current Opportunities

Carrying through with the investments recommended in the 2007 Long Range Plan is the consequence of careful planning and sometimes difficult choices. A number of small and a few sizable resources have been developed since 2007 that are providing new opportunities to develop nuclear physics.

The Facility for Rare Isotope Beams

The Facility for Rare Isotope Beams is a major new strategic investment in nuclear science. It will have unique capabilities and will offer opportunities to answer fundamental questions about the inner workings of the atomic nucleus, the formation of the elements in our universe, and the evolution of the cosmos.

In recent decades, the nuclear science has enabled important experimental discoveries such as the nature of neutrinos and the fundamental reactions fueling stars, often with the aid of carefully designed experiments conducted underground, where the backgrounds from cosmic radiation are especially low.

FOUNDATION FOR THE FUTURE