



The Institute of Modern Physics (IMP) of the Chinese Academy of Sciences

A Brief Introduction

Supported by the Chinese Academy of Sciences, the Institute of Modern Physics (IMP) of the Chinese Academy of Sciences was founded in 1957. After a half century of development, IMP has become the most important research center for heavy ion sciences and its applications in China. We have established active and fruitful collaborations with more than 40 institutions worldwide.

The Heavy Ion Research Facility in Lanzhou (HIRFL) is one of the major accelerator complexes operated by IMP. HIRFL consists of a Sector Focusing Cyclotron, a Separated Sector Cyclotron and a Cooler Storage Ring (CSR). As a national laboratory, HIRFL is open to domestic and international users. HIRFL produces medium and high-energy ion beams from proton to uranium. In recent years, HIRFL has operated for about 7000 hours each year and delivered 5000 hours of beam time for experiments. To improve HIRFL's beam intensity and operating efficiency, IMP has devoted much R&D efforts on accelerator physics and technology.

Using HIRFL, we conduct fundamental researches in nuclear as well as atomic physics. IMP's main research activities focus on nuclear reactions, nuclear spectroscopy, the properties of nuclear matter, the chemistry of super-heavy elements and synthesis of new super heavy isotopes, key reactions in stellar evolution, high energy density physics and highly charged heavy ion interactions.

After the CSR was commissioned in 2008, precision measurement of masses for short-lived nuclides has become the highest priority program at HIRFL. A batch of nuclear masses were measured with a precision of up to 10^{-7} using isochronous mass spectrometry,

and the implications for nuclear structures and nucleosynthesis in the rapid proton capture process of X-ray bursts have been investigated. In recent years, supported by the National Science Foundation of China, a new spectrometer: CSR-External-target Experiment (CEE) is under construction. Utilizing heavy ion beams delivered by HIRFL, CEE will study the strong interaction matter phase structure, especially in the high baryon density region.

IMP is the leading institute for a new project: Electron-ion collider in China (EicC). Focused at about 17 GeV in the center of mass energy, the new and high luminosity collider is essential for us to understand the structure of the visible matter in our Universe. For example, the origin of proton mass and its spin. Since 2019, intense research activities on the key physics measurements, conceptual design of the detector and collider, were carried out around IMP. This documented whitepaper is part of the results of the efforts. In the next few years, the focus will be on the Conceptual Design Report (CDR) for the future EicC.

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