



Contribution ID: 234

Type: **Plenary talk**

The FAIR Facility – Status and Perspectives

Monday, 8 July 2024 12:10 (40 minutes)

The Facility for Antiproton and Ion Research (FAIR) in Darmstadt, which is being built close to GSI Helmholtzzentrum Darmstadt, makes significant progress in its mission to provide unique opportunities for a rich and multidisciplinary research program. The mission of FAIR comprises the investigation of QCD-Matter and QCD-Phase Diagram at highest baryon density; nuclear structure and nuclear astrophysics investigations with nuclei far off stability; QCD studies with cooled, high-intensity antiproton beam; precision studies on fundamental interactions and symmetries; high density plasma physics; atomic and material science studies; radio-biological investigations and other application oriented studies.

The accelerator complex of FAIR will provide high intensity beams of protons, (radioactive) ions and finally anti-protons. The heart of the FAIR facility is the SIS100 synchrotron, which is currently being installed in a tunnel with a circumference of 1.1 km. The fragment separator Super-FRS will be provide high intensity, high energy exotic beams for the study of nuclei far off stability employing in-flight fragmentation and subsequent identification of the produced radioactive nuclei.

FAIR is realized in steps: Early Science will make use of beams from the GSI synchrotron SIS18 and the Super-FRS; First Science includes operation of the SIS100 synchrotron and will provide excellent research opportunities for the investigation of structure and reactions of exotic nuclei. In the next step, intense high-energy beams will be made available for the study of QCD matter at highest baryon densities. Research facilities for atomic physics, plasma physics, materials and biophysics research are completed afterwards provided sufficient funding will be made available by the international FAIR shareholders. The final goal is the building of a High-Energy Storage Ring for antiprotons and exotic ions (HESR), which will offer novel research possibilities for hadron, nuclear and atomic physics.

Researchers from over 50 countries are actively involved in experiments at FAIR, contributing to the development and construction of large variety of different detectors. The FAIR Phase-0 program at the GSI accelerator facilities offers excellent opportunities to test detectors and concepts developed for FAIR and a staged approach to FAIR science and smooth transition from GSI to FAIR operation.

In the talk, the status and the perspectives for science at FAIR will be discussed and the current planning for the commissioning phase of FAIR will be presented.

session

A. Facilities and Detectors

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Session Classification: Plenary session