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Status and perspectives for PANDA at FAIR

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The Facility for Antiproton and Ion Research (FAIR) is an international accelerator facility which will use antiprotons and ions to perform research in the fields of nuclear, hadron and particle physics, atomic and anti-matter physics, high density plasma physics, and applications in condensed matter physics, biology and the bio-medical sciences. It is situated in Darmstadt (Germany) and it is under construction. It is expected to provide beams to the experiments from 2018.
FAIR will be based upon an expansion of the GSI Helmholtz Centre for Heavy Ion Research. Roughly 3,000 scientists from more than 50 countries are already working on the planning of the experiment and accelerator facilities.
Among all projects which are under construction at FAIR in this moment, the PANDA experiment (Antiproton Annihilation at Darmstadt) will investigate fundamental questions of hadron and nuclear physics, studying the interactions of antiprotons with nucleons and nuclei. The physics program of PANDA is wide and ambitious: the hadron spectroscopy is one of the highlight physics topic, searching for gluonic excitations, charmonium and baryon spectroscopy, and D meson spectroscopy, which is interesting either from the point of view of the Strong and the Weak interactions; nucleon structure will be under investigation, with the study of parton distributions and the time-like form factor of the proton; then hadrons in matter and hypernuclei physics program are in the list of the topics under study as well. PANDA will focus attention on the phenomenon of the confinement of quarks and the generation of the hadron masses.
Gluonic excitations and hadrons composed by strange and charm quarks could be abundantly produced and their features will be accessible with unprecedented accuracy, thereby allowing high precision tests of the strong interaction theory in the intermediate energy regime. PANDA is designed to reach mass resolution 20 times better than attained at the B factories, which is essential to extract the width of very narrow states (such as DsJ mesons) from the excitation function of the cross section of those. An overview of the PANDA experiment and the PANDA physics program will be presented.
PANDA is designed for measurements of reactions induced by high intensity antiproton beams with a momentum between 1.5 GeV/c and 15 GeV/c interacting with hydrogen as well as nuclear targets. Basic subsystems of PANDA including magnets and target, tracking detectors, particle identification system, calorimeters and data acquisition are described.
The technique to measure the width of very narrow states in Charm and Charmonium Physics will be presented in this context, stressing on what is the original contribution of PANDA in this field and how competitive these measurements are in comparison with other experiments.

Summary

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