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The PANDA Experiment at FAIR

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The new generation hadron physics experiment PANDA at the Facility for Antiproton and Ion Research in Europe (FAIR), Darmstadt/Germany, will combine an unique combination of a modern multipurpose particle detector and a high precision and high luminosity antiproton beam to address and solve actual puzzles in hadron physics. The central goal of the experiment is the elementary understanding of hadrons using the power of gluon-rich and flavor-blind collision reactions between phase-space cooled antiprotons of 1.5 GeV/c to 15 GeV/c from the High Energy Storage Ring (HESR) and dense hydrogen or nuclear targets. The high precision line-shape scans as well as a detector capable to perform a fully exclusive study of practically all final state particles make the project unique, and allows for example to determine the width of the narrow X(3872) with sub-MeV resolution. Not only the hadron spectroscopy feasibilities are complementary to the presently running experiments such as BESIII, Compass, GlueX or Clas12, but also the physics topics of hyperon physics, proton structure and strange hadrons in nuclei. The PANDA detector with its almost 4π angular coverage due to an onion-like structured Target Spectrometer in a supra conducting solenoid and a forward dipole spectrometer provides excellent tracking as well as identification of charged and neutral particles based on innovative Cherenkov counters, time of flight detectors as well as an electromagnetic calorimeter. The PANDA physics programme and the state-of-the-art detector will be addressed in this talk.

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