

# Feasibility study of the proton time-like form factors measurements with PANDA

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The physics program of the future FAIR facility covers a wide range of topics that address central issues of strong interactions and QCD. With the new antiproton high energy storage ring HESR to be built at FAIR in Darmstadt it will be possible to produce antiproton beam of unprecedented quality in the momentum range from 1.5 GeV/c to 15 GeV/c. The PANDA detector, installed in this ring will allow to make high precision and high statistics measurements. This will include charmonium and open charm spectroscopy, the search for exotic hadrons, study of in-medium modifications of hadron masses and electromagnetic structure of nucleon.

The talk will illustrate the predictions for the outcome of the measurement of the proton form factors in the time-like region with PANDA. While giving a (brief) overview of the current status in this field, the possibility to improve definitely the data quality at high momentum transfer, thus coming closer to the QCD perturbative regime, will be presented on the basis of realistic simulations. The impact of these measurements on the understanding of the nucleon structure and of the reaction mechanism will be discussed. At moderate values of the 4-momentum squared  $q^2$  the individual determination of the moduli of the electric —GE— and the magnetic —GM— form factors will strongly constrain the nucleon models, which are today only very weakly constrained by the very low data quality in the time-like region. At larger  $q^2$  the validity of asymptotic properties predicted by QCD will be tested. These data, together with the information from the space-like region, will provide the experimental ground for a unified view of the electromagnetic form factors of the proton as observed in elastic ep scattering and pbar p annihilation reactions.

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