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Electromagnetic Nucleon Form Factors: perspectives and challenges for the future

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The study of electromagnetic nucleon form factors is object of experimental and theoretical studies since decades. At moderate values of the momentum transfer squared, q^2, the individual determination of the electric and magnetic FFs strongly constrain the nucleon models, whereas at larger q^2 the validity of analyticity and of the asymptotic properties predicted by QCD can be tested. New possibilities are opened by the recent advances in accelerator technology and polarimetry. The challenges opened by FFs measurements at high values of transferred momentum and/or in the search of better precision are related to the validity of radiative corrections, the modelization of the background and to the interpretation, which is related to the description of the internal structure of the nucleon. At the accelerator complex FAIR (Darmstadt, Germany) a program of measurements of electromagnetic proton form factors is foreseen in the time-like region, with the detector PANDA. The high intensity and high energy antiproton beams will open the possibility to determine these form factors in a wide kinematical range, through the annihilation reaction pbarp -> e+e- and also accessing for the first time the unphysical region. In the space-like region, the polarization method has been recently applied. The very precise data show an unexpected behavior, in contradiction with most of the nucleon models. The time-like data, together with the information from the space-like region, will provide the experimental ground for a unified view of the electromagnetic structure of the proton as observed in scattering and annihilation reactions. The present status and future perspectives in this field will be presented.

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