

Date: Mon, 05 Jul 2004 10:15:19 +0200
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Subject: PAX

Dear Dr. Rathmann

Your Letter of Intent ?PAX, Antiproton-Proton Scattering Experiments with Polarization? has been evaluated by the QCD-PAC (see report below). Your LoI has convinced the QCD-PAC a) that Polarization must be included into the design of FAIR from the beginning, and b) that the presently proposed scheme is not optimized as to the physics. You as one of the proponents of polarization experiments with anti-protons and the HESR team are invited and encouraged to design a world-class facility with unequalled degree of polarization of anti-protons. Once the technical feasibility is shown in an interim report we expect to see from the interested $p_{\bar{}}$ community a technical Proposal for a polarization experiment and from the accelerator group a Technical Report, both not later than the 15th of January 2005, please see details of the QCD PAC recommendations.

For any question during this time please do not hesitate to contact either one of us or the chairman of your PAC.

Looking forward to your further collaboration
with best regards

Sidney Gales
Chairman of STI

Hans H. Gutbrod
FAIR project coordinator

QCD-PAC REPORT on PAX and ASSIA - Common report

ASSIA proposes to study Spin dependent Interactions with antiprotons. The collaboration is made of 92 Researchers 13 Institutes and 5 Countries. The letter has been presented by the spokesperson R.Bertini. The main physics goals are:

- a. Spin Physics and Structure Functions.
- b. Asymmetries in Drell Yan processes.
- c. Spin asymmetries in Hyperon Production.
- d. Single Spin Asymmetries.
- e. Electromagnetic Forms Factors.

The collaboration intends to use an antiproton beam $T_p \approx 40$ GeV/c, slowly extracted from SIS 300, and a polarized external target. The detector is a large angle dimuon spectrometer (e.g. first part of the COMPASS spectrometer). An alternative solution could be the use of HESR as a collider with polarized protons and antiprotons.

PAX The collaboration is composed of 116 Researchers 19 Institutions and 7 Countries. The letter has been presented by the spokesperson Frank Rathmann. The primary goal of the collaboration is to study spin physics accessing the Nucleon Transversity distributions by measuring the double spin asymmetry in the Drell Yan process. Other goals are:

- a. Single spin asymmetries.
- b. Electromagnetic Form Factors.
- c. Hard and soft antiproton proton scattering.

The collaboration proposes to use an internal polarized target in HESR accelerator to build a 5% polarized antiproton beam and to measure events of polarized antiproton on polarized proton. The detector is based on a forward spectrometer (similar to the HERMES spectrometer) and a large acceptance spectrometer. The PAC considers the spin physics of extreme interest and the building of an antiproton polarized beam as a unique possibility for the FAIR Project, but does not approve the letters of intent and is asking for a more detailed study of achievable antiproton polarization and the anticipated physics results.

Comments:

The unique physics opportunities, made possible with polarized antiproton beams and/or polarized target are extremely exciting, especially in double spin measurements. These include valence quark transversity distributions and spin observables in antiproton-proton scattering. However no convincing case for the feasibility of any of these measurements was presented. It would be very unfortunate if decisions about the facility, made now, later preclude the science. We strongly encourage the proponents and the laboratory to explore how antiproton polarization capabilities can be incorporated, and given the time constraint, urge the proponents of these proposals to present a detailed case including the statistical and systematic errors on the physics quantities as soon as possible. If this challenge is met by the proponents, it is still unlikely that more than one such polarization experiment could be approved. We also encourage the proponents to explore what can be done with the PANDA detector for example in single spin asymmetry measurements. We note that in the present FAIR design, acceleration of antiprotons to energies above 30 GeV is not included. We are encouraged by the developments during the meeting, which produced new ideas to polarize the antiprotons in a low energy ring; the proponents should vigorously pursue these new ideas.