The PAC report on PAX

The PAX collaboration has made significant progress from the last PAC meeting in developing the concept for polarizing antiprotons at low energy in an antiproton polarization ring (APR) via polarization transfer from polarized electrons, accelerating them to .5 GeV/c in a 2nd ring (CSR) and then injecting them into the HESR for acceleration to 15 GeV/c. Polarized protons could also be stored in the CSR where asymmetric collisions could take place. The PAX collaboration also proposed a staged experimental approach starting with polarized antiprotons on a polarized gas target in the CSR, which could likely run simultaneously with PANDA.

In our opinion the critical h1 measurement requires a minimum *s* of 200 GeV2 and a minimum average **luminosity of 10^{31}** cm-2s-1 to be compelling. At present the projected luminosity at high energy does not reach the 10^{31} goal. **Therefore we believe it is premature to approve the present proposal.**

However the **PAC considers it is essential for the FAIR project to commit to polarize anti-proton capability at this time and include polarized transport and acceleration capability in the HESR, space for installation of the APR and CSR and associated hardware, and the APR in the core project.**

We request the PAX collaboration to:

1- Commit to the construction and testing of the APR (IKP Jülich appears to be the optimal location)
2- Explore all options to increase the luminosity to the target value specified above
3- Prepare a more detailed physics proposal and detector design for each of the proposed stages. These stages may include:
    a- 3.5 GeV/c polarized antiprotons on a polarized proton target
    b- 15 GeV/c polarized antiprotons with the PANDA detector (for single spin asymmetries)
    c- 15 GeV/c polarized antiprotons on a polarized proton target in a dedicated detector

Collisions of 15 GeV/c antiprotons with 3.5 GeV/c polarized protons.
The opportunities and physics case are certainly advanced if the HESR is able to run at momenta higher than 15 GeV/c, as well as improved antiproton production rate and cooling capabilities in CR and RESR, and we encourage initiatives to reach that goal.

The PAC understands this approach places a significant additional burden on the FAIR accelerator team to face the additional constraints and developments associated with this project. The PAX proposed acceleration scheme has been presented to the TAC and a separate report will be provided. It is anticipated that the expertise and facilities of the COSY team could make major contributions.

The PAX collaboration is already strong with about 200 people (in typically 30 labs from 8 countries), who stress their strong commitment in this project. Also there is a strong connection (MoU is signed) between the GSI and FZJ laboratories.

PAC report on ASSIA

The document provided by the ASSIA collaboration is not at the level of a proposal.

They still consider that studies of optimum luminosity and energy requirements should be pursued, in particular to perform measurements of the transversity observables in the so-called safe region (above the J/y resonance region).

At this stage, the detector is not defined due to the unspecified aspects of the acceleration scheme proposed by this collaboration. The PAC reiterates its opinion that there should be only one detector dedicated to spin physics.

The ASSIA collaboration is about 100 people, with 2-3 leading laboratories. Several groups are however heavily involved in other experiments over the next 5 years, and there were concerns for their commitments to the FAIR project.

The ASSIA people are willing to join working groups on acceleration issues. This could initiate a possible future collaboration between PAX and ASSIA, which is strongly encouraged by the PAC.