Minutes task-force meeting, Physics@Phase-C, November 22, 2018, Vibe

Present: Miriam Fritsch, Ralf Kliemt, Andrzej Kupsc, Johan Messchendorp (chair), Lars Schmitt, Egle Tomasi, Magnus Wolke

JM introduced the motivation, boundary conditions, and questions that need to be addressed by the committee. The slides can be found on the Wiki site. The outcome of this committee will be used in the FAIR review discussion. Hence, the work needs to be concluded before February 2019!

The maximum available momentum is the same as planned for antiprotons, namely 15 GeV/c, corresponding to a center-of-mass energy of 5.5 GeV. The luminosity will be limited by the capabilities of PANDA, not by the accelerator. Hence, a luminosity of 10^{32} $cm^{-2}s^{-1}$ is technically possible, although one has to realize that the detectors and DAQ will be in commissioning phase and tuned towards Phase-1 constraints, which will be one/two-orders less in luminosity.

A brainstorming of potential physics cases followed. The main items that came up are:

- Strangeness physics with connection of the origin of hyperon polarization and strangeness contents of the nucleon. Both |S|=1 and |S|=2 can be produced in p+p collisions at HESR. Cascade-N interaction studies can be performed, preferably close to threshold. A challenge for |S|=2 case is that one has at least four bodies in the final-state, which hampers a rigorous interpretation. For the production of |S|=1 hyperons, one has the advantage of dealing with three hadrons in the final state (K Lambda p), which allows a partial-wave analysis/Faddeev calculation. In this case, the added value compared to COSY is the extended energy range that will be available at HESR. In general, the hyperon production studies are nicely linked to the antiproton program, in particular to the hyperon dynamics and hypernuclei/atom programs. Moreover, it would energetically be possible to produce charmed baryons (Lambda_c D p final state) providing access to the |C|=1 hyperon sector as well.

- Another physics item to consider is to carry out spectroscopy studies in the light meson sector, thereby focusing on OZI forbidden channels (pp->phi phi pp, etc..). This connects to a similar program that is foreseen with antiprotons, i.e. glueball/exotic searches.

- The production of hidden-charm states is limited to the eta_c/J/psi. Although the production cross section will be small, it will nevertheless be an interesting case to provide data to validate/improve hadronic models and event generators in their charm-production part, beneficial for the antiproton program.

- Finally, the topic of N* spectroscopy was mentioned. The energy range covered at HESR might give new insights here. The connection to the antiproton program of PANDA is in this case not very strong.

To do list:

- Provide information on cross sections of various channels in p+p (Egle).
- Create a Wiki page at which all the relevant information will be stored (JM).
- Search for human resources to carry out some basic occupancy/resolution studies of PANDA in p+p and p+A. A letter will be send to the CB to ask for support (JM).

Next meeting:

The next meetings will be chaired by Miriam Fritsch and will take place every two weeks. The next one is scheduled on **December 6, 16:00 Vibe**.

Johan Messchendorp, November 26, 2018