

Minutes Phys/PubCom, June 6, 2017, PANDA Collaboration meeting GSI

General items

- The new theory advisory group (TAG) will convene this Thursday. The meeting will be closed. Klaus Peters has been invited to give a 10 minutes introduction. Johan will check with Matthias Lutz (present chair of the TAG) to allow the presence of the physics coordinators as well. A new chair of the board will be elected during the Thursday meeting and one person has so-far been nominated. Moreover, the board consists of seven new members. Four persons have left the TAG due to retirements and other commitments. For the meeting on Thursday, a large participation is to be expected (~10).
- Summary was given of the recent bugs related to common analysis activities. One of them, discovered by Albrecht, the unphysical observation of zero width resonance in the FTF generator, was explicitly discussed. A letter has been send to the Geant4 collaboration by the PANDA collaboration. A first response of the Geant4 collaboration has been received. It was noted that by solving this unwanted feature, Geant4 and FTF will both be improved.
- The question of which transport model to use for the phase-one simulation campaign, G3 or G4, was discussed. The overall goal is to move to G4 in the course of time. However, some of PWG dedicated their development of analysis code based on G3 output. It was clear that validation studies are urgently needed to build confidence on using G4. The computing group is asked to pick this item up. Moreover, during the recent central production of MC data, samples were generated with both G3 and G4 as transport model. These data can be used for comparison.
- The recent central production of background MC data appears to be successful. The decision on which channels and at which energies to generate, will be left to the individual PWG. The PWG convenors are content with the activities of Paul Buehler (production manager). Users are released from taking care of technical aspects (installation, etc.) and focus on analysis tasks.
- The PC urges all the PWG to regularly update the tables on the status of the various analyses which can be found on the wiki site.

Status ongoing physics analysis

The various PWG convenors reported on the status of the phase-one analysis activities. A summary of the update can be found in the table below. Items in red are critical, since these have either no subscription or no activity to priority reasons. The items in blue are those which have started, but no new updates in the past months. In light green, the items for which activities are known to be ongoing with significant amount human resources. The dark green items are in a very good stage, close to publication.

A few new ideas were mentioned during the discussion that could be looked at as well. This includes the decay of exotic X/Z states to hyperon final states, whereby

one could exploit spin degrees of freedom to learn more about their structure. Moreover, it was mentioned that, already at phase-one, PANDA will produce a wealth of eta mesons which could be used for CP studies .

| Topic | Observable | Beam momentum | Subscription | Priority |
|---|---|---|---------------------|----------|
| Charmonium | | | | |
| hc scan | xsecs | scan: 5.6 GeV/c | no subscription | MED |
| Angular chi_c(1,2) distributions | diff. xsecs | 5.54 and 5.72 GeV/c | no subscription | MED |
| High spin 3D2 state | diff. xsecs | 3.678 GeV/c | Zhiqing Liu / Mainz | HIGH |
| Charmonium Exotics | | | | |
| X(3872) energy scan | xsecs | 7 GeV/c | GSI | HIGH |
| X->Z(3730) transition | branching fraction | | FZJ | MED |
| X(3872) open-charm decays | branching fraction | | JINR | MED |
| Zc(3900) production in pbar+d | xsecs | | NSU | MED |
| Heavy-light Systems | | | | |
| DDBar production | (diff) xsecs | >6.5 GeV/c | KVI-CART/FZJ | MED |
| Hyperons structure | | | | |
| Cascade and Omega spectroscopy | missing states, branching fractions, JP | ~4 to ~9 GeV/c (various dep. on specific state) | FZJ, Bonn | HIGH |
| Hyperons dynamics | | | | |
| Lambda-Lambdabar | (diff) xsecs, pol. pars | 1.64 GeV/c | Uppsala | HIGH |
| Cascade-Cascadebar | (diff) xsecs, pol. pars | 4 GeV/c | Uppsala | HIGH |
| Omega-Omegabar | (diff) xsecs, pol. pars | 7 GeV/c | Uppsala | MED |
| Light-meson spectroscopy | | | | |
| XYZ in light-quark sector: Y(2175) | xsecs (PWA) | 3.75 GeV/c | no subscription | MED |
| light glueball searches: G->... | xsec, PWA | 3.75 GeV/c | no subscription | MED |
| tensor glueball searches: ppbar->phi phi scan | xsecs, PWA | scan: up to 2.7 GeV/c | no subscription | HIGH |
| KKpi molecule: a1(1420)->3pi in ppbar -> 4pi | xsecs, PWA | 3.75 GeV/c | no subscription | MED |
| Time-like FF | | | | |
| EMFF in ppbar->e+e- | GE, GM, R | ~up to 4 GeV/c | Mainz/Orsay | MED |
| EMFF in ppbar->mu+mu- | GE, GM, R | ~1.5 GeV/c | Mainz/Orsay | MED |
| EMFF in unphysical regime | GE, GM, R, phase | parallel to XYZ studies | Mainz/Orsay | HIGH |
| Hard exclusive processes | | | | |
| ppbar->gg | GDA | | no subscription | MED |
| ppbar->gpi0 | GDA | | no subscription | HIGH |
| Hadrons in nuclei | | | | |
| Hyperon - Antihyperon production | Ybar potential | 1.6 GeV, 2.9 GeV | Mainz | HIGH |
| Color transparency | nuclear CT for various mesons and p, pbar | ~8 GeV/c, up to 15 GeV/c for p, pbar | Gauhati (prelim) | MED |
| Short range correlations | nucl. high mom. pn, pp, N-Delta and Delta-Delta SRC | ~8 GeV/c | FZJ | MED |
| Delta-Delta component in deuteron | (p pi+) (pi- pi-) with large pz gap | ~8 GeV/c | FZJ | HIGH |

Day one and risk assessment

The Phys- and PubCom were informed about the recent discussions that are ongoing with the FAIR management concerning the readiness (in particular in terms of funding) of PANDA at day-one of phase-one. As input for these type of discussions with Paolo Giubellino and with the JSC, benchmark simulations were carried out by Klaus Goetzen and Alaa Dbeyssi for a few channels with the aim to study the impact on efficiency and background reduction in the case of a reduced barrel EMC. Various scenarios were considered on how to reduce the number of EMC crystals (in theta or phi, etc.). Some of the results of these studies were presented (see the online presentation on indico). In general, a reduced EMC setup will not be a big show-stopper for the channels considered in the case the reduction is limited. Klaus Peters has asked Klaus G. and Alaa to prepare plots of their studies for a reduction till about 30%. A more extensive simulation

campaign for such a risk assessment is not opportune at present because of the complexity in parameter space (EMC, MVD, DIRC, ...), but is to be expected to be requested in the near future when the funding situation is much more clear than now.

DAQ and software “trigger”

The DAQ has requested to have a better definition of the phase-one detector setup and corresponding physics ambitions, in order to have guidelines in view of the writing of their TDR. For the selection of typical physics channel for phase one, three cases were requested such to represent the variation in event topology and variation in the requirement concerning luminosity. A reduction of factor 50-100 for the online data processing has to be demonstrated for those cases. The channels that were discussed and decided upon are:

1. $\bar{p} + p \rightarrow \bar{\Lambda} \Lambda$
2. $\bar{p} + p \rightarrow J/\psi \pi^+ \pi^-$
3. $\bar{p} + p \rightarrow (\pi^0) e^+ e^-$

This will be communicated to the DAQ group by Klaus Goetzen on Thursday (update: done and agreed upon during the DAQ session).

December meeting

The slot for the cancelled December collaboration meeting, will likely (update: approved by CB) be used for a lecture week with focus on hardware, software, physics aspects. In addition to this week, the PhysCom will convene to work on the “phase-one” paper. It is important that at this time, the analyses have proceeded sufficiently (in particular those with high priority) in terms of an available memo. There will be more regular meetings organized between now and December to help in this process.

JM, June 10, 2017