

Discussion on SIDIS analysis in ePIC and ePIC-INFN milestone

- **Salvatore's email - 20/12/2024**

"Realizzazione di studi di performance dei PID detectors nella estrazione delle TMDs che vengono riportati nel Cap. 2 del TDR"

The following institutes are committed to this milestone: Bologna (BO), Cosenza (CS), Pavia (PV), Salerno (SA), Turin (TO), and Trieste (TS), to which Ferrara (FE) was later added after Lorenzo joined the PhD program. A possible involvement from LNS is also expected.

It was agreed that it is essential to make ourselves visible within the SIDIS PWG and, at the same time, to coordinate our work internally in close contact with the theoretical support group and Marco Radici (from PV).

- **Susanna's email to SIDIS conveners - 8/4/2025**

"interest in SIDIS studies on unpolarised and polarised cross sections with identified pions and kaons"

- **Ralf's reply - 8/4/2025**

As you can imagine, there are **several groups and people involved since the yellow report exercises or even longer in various TMD topics involving pion and kaons. We have people looking at Sivers, Collins and unpolarized TMD measurements. Other types such as di-hadron measurements, higher twist components, or nuclear TMDs are not particularly looked at at this point.**

Obviously, as we are moving to more and more realistic simulations, there are many aspects that need to be worked on even in the covered topics such as understanding the radiative corrections, unfolding of kinematic smearing and preparing for correction for particle mis-identification. **We were thinking that as the Italian groups are already involved in the dRHIC on the hardware side, it would be the best choice to concentrate on particle (pi/k/p) identification and subsequent correction.** At the moment the simulations are not very sophisticated as they only give us the most likely particle type while we eventually need **full likelihoods from all possible PID detectors** and all particle hypotheses. So, we would appreciate if you could **work with the PID detectors and the software/reconstruction group to improve this situation.** Naturally, looking at the PID efficiencies and purities as a function of (SI)DIS variables is the connection to SIDIS

TMD analyses where one can look at the implementation and possible improvements.

You can see how the current implementation looked like here

https://indico.bnl.gov/event/24574/contributions/96142/attachments/56989/97797/2024_08_28_ePIC_PID.pdf, for example.

- **Brian Page's suggestion:** contact Chandra, participate to the software/reconstruction group meetings. Huge work, a "collaboration-wide effort" is needed to understand what's there and what is missing and needs to be integrated in eic-recon.
- **How can we align the conveners' request with our milestone, considering the timeline and the status of the software ?**