Minutes of the 69th SiD optimization meeting

2016-06-15

Present:

Tim Barklow (TB)
Marty Breidenbach (MB)
Chris Potter (CP)
Ross McCoy (RM)
Christopher Milke (CM)
Andrew Myers (AM)
Bruce Schumm (BS)
Malachi Schram (MS)
Anne Schütz (AS)
Jan Strube (JS)

Previous Work Items:

- Pro-forma items for background note
    - Detector description (JS) → DONE
    - Processes (TB) → Dedicated Meeting to clarify details
- Work items for tracker calibration
    - # tracks at different collision energies (JS and TB)
    - Cosmics efficiencies, tracking efficiencies with different power pulsing modes. (MS) (some progress)
    - Alignment precision with different #tracks (JG)

Agenda and points of discussion:

- Brief report from TB's stay at KEK
    - Meeting between generators group and Whizard authors on a number of items:
        - Tau polarization
        - Photons in final-state electrons
        - Low-energy tail in beamstrahlung distribution
    - Main outstanding item is now tau polarization.
- Higgs self-coupling at linear and circular colliders
    - Work at KEK focussed on details of systematic uncertainties on the measurement
    - EFT treatment with at most dimension 6 operators leaves 5 free parameters (others are constrained from EWPT and ILC TGC measurements).

- ○ At the ILC, measurement of double Higgs production is sensitive to gHHH and gHHZZ. gHHZZ is related to gHZZ and gHWW, which are measured to 0.3% and 0.4%, respectively in the H-20 scenario. Therefore, the uncertainty due to gHHZZ in the Higgs self-coupling measurement is very small.
  - ○ One free parameter related to anomalous Higgs self-coupling is only accessible in the process e+e- → ZHH.
  - ○ At circular e+e- colliders, the Higgs coupling can be measured in loop contributions to ZH production. Two subtleties:
    - ■ The error at CEPC (240 GeV collisions) is 36%. This is under the assumption that ghZZ is at the SM value.
    - ■ The error can be reduced to 30% only in combination with an assumed HL-LHC measurement of 50%.
  - ○ See Tim's slides for more details
- ● Single particle studies (UTA):
  - ○ Measured PandoraPFA performance of single pions (10 GeV) with scintillator HCAL. Two notable effects:
    - ■ Amount of backscatter particles surprisingly high.
    - ■ Energy distribution has some very high-energy outliers. These are usually particles with very little backscatter activity. They look like MIPs, but are identified as neutrons.
  - ○ Effects were communicated back to PandoraPFA developers. Only partially reproducible. In the end, effects were attributed to software versions. Next step is to move to DD4HEP simulation and to re-do studies there, while keeping an eye out for these effects.
  - ○ Report on using Atlassian tools for these studies is forthcoming.

New Work Items:

- ● tracker calibration
  - ○ # tracks at different collision energies (JS and TB)
  - ○ Cosmics efficiencies, tracking efficiencies with different power pulsing modes. (MS) (some progress)
  - ○ Alignment precision with different #tracks (JG)