Discussion: Do we have the Software tools for ILD optimization studies

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optimization w/ existing simulation

- a number of interesting optimization studies can be done with existing simulation models (and samples):
  - changes only done at digitization step
- study variations of the tracking system
  - pt and impact parameter resolution
    - w/ reduced TPC radius (and length)
    - w/ and w/o SET
    - vary single point resolutions in all tracking detectors (VXD, SIT, TPC,.....)
  - PFA (jet energy performance)
    - see above - except reduced TPC dimensions
    - thinner AHcal (simply ignore last layers)
  - flavor tag performance
    - vary single point resolutions in all tracking detectors (VXD, SIT, TPC,.....)

optimization of reconstruction

- overall performance is combination of raw detector resolutions and software algorithms
  - there is probably room for improvement in some (all ?) of our algorithms
  - some things also simply have not been done yet
- tracking
  - improve standalone VXD/SIT, FTD
  - improve V0 finder (show potential of TPC)
  - improve kink finder
  - study dE/dx capabilities - more general PID
- calorimetry
  - non-pointing photons, further tune Pandora (?)
- flavor tag
  - vertex charge

- need to study effect of improved algorithms w/ relevant metric (JER, flavor tag,...) - ideally complete physics analyses

optimization studies w/ model changes

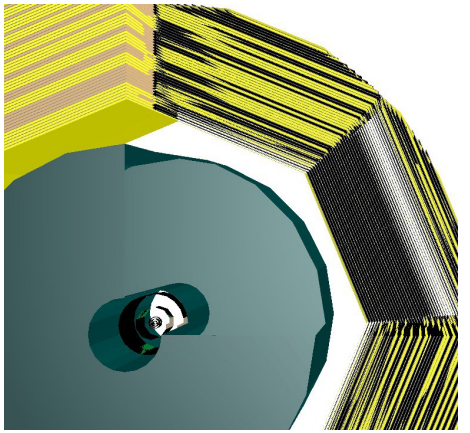
- many studies for variations of to the ILD detector that require new simulation models (parameter changes) and possibly even code development:
  - reduce overall size of ILD (R,Z) **
  - change aspect ratio ? **
  - compare 6 to 5 layer VXD *
  - study geometry (more discs) of FTD ***
  - vary calorimeter properties:
  - granularity, #layers, layer thickness, ... **
  - structure of sensitive cells (guard rings, pcb thickness) **
  - ...

effort:
* little
** more
*** significant

- seen excellent examples already in this meeting (Ecal) using current Mokka models
- new simulation models for ILD detectors could simplify some of these studies
- -> however they don't come for free !!

New ILD simulation models

- will use DD4hep for geometry definition
- if new DD4hep geometry done right this should greatly simplify optimization studies by allowing:
  - flexible scaling of overall ILD dimensions
  - exchange of detector technologies
  - in straight forward way: modify xml parameters (and code)



- effectively three ways of doing this:
  - straight forward (if tedious) porting of existing Mokka drivers by replacing MySQL queries w/ parsing xml dump from Mokka DB
  - rewrite existing Mokka drivers by keeping all detail but pay attention to scaling properties (and fix *'known issues'*)
  - create new - simplified - ILD model by keeping relevant parameters (dead material, gaps, etc.) with high flexibility
- need to decide which to follow and find people to do it