

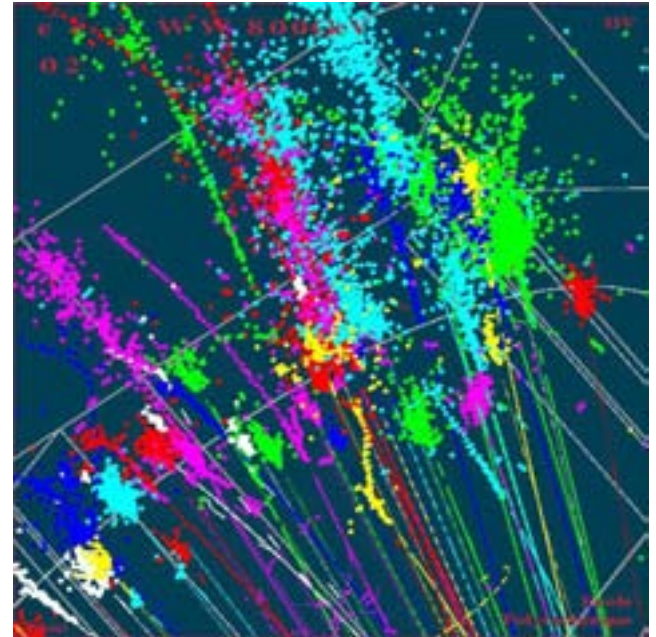
PFA Progress and Priorities

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(for Steve Magill, Felix Sefkow, Mark Thomson and Graham Wilson)

This talk:

- ★ Progress at Snowmass (Alexei)
- ★ Some personal perspectives
- ★ Summary of discussions of priorities
- ★ **Suggestion** for short-term LDC priorities
 - looking towards Vienna ECFA meeting
- ★ Getting slightly more organised... another suggestion



Personal Perspective

- ★ Until recently we did not have the software tools to optimise the detector from the point of view of Particle Flow
- ★ **This has changed !**
- ★ The basic tools are mostly there:
 - ★ Mokka : now has scalable geometry for the LDC detector
 - ★ MARLIN: provides a nice (and simple) reconstruction framework
 - ★ LCIO: provides a common format for worldwide PFA studies
 - ★ SLIC: provides a G4 simulation framework to investigate other detector concepts (not just GLD, LDC and SiD)
 - ★ Algorithms: in MARLIN framework already have ALGORITHMS for TPC tracking, clustering + PFA



We are now in the position to start to learn how to optimise the detector for PFA

Some Caution:

- ★ This optimisation needs care: can't reach strong conclusions on the basis of a single algorithm
- ★ A lot of work to be done on algorithms + PFA studies
- ★ Not much time : aim to provide input to the detector outline



Need to get a little more organised + get more people involved

Prioritised PFA list

(from discussions + LDC, GLD, SiD joint meeting)

The A-List (in some order of priority)

- 1) B-field : is BR^2 the correct performance measure (probably not)
- 2) ECAL radius
- 3) TPC length
- 4) Tracking efficiency
- 5) How much HCAL – how many interactions lengths 4, 5, 6...
- 6) Longitudinal segmentation – pattern recognition vs sampling frequency for calorimetric performance
- 7) Transverse segmentation
- 8) Compactness / gap size
- 9) HCAL absorber : Steel vs. W, Pb, U...
- 10) Circular vs. Octagonal TPC (are the gaps important)
- 11) HCAL outside coil – probably makes no sense but worth demonstrating this (or otherwise)
- 12) TPC endplate thickness and distance to ECAL
- 13) Material in VTX – how does this impact PFA

The B-List

- 1) Impact of dead material
- 2) Impact (positive and negative) of particle ID - (e.g. DIRC)
- 3) How important are conversions, V^0 s and kinks
- 4) Ability to reconstruct primary vertex in z

Goals for Vienna

(OPEN FOR DISCUSSION)

Longer-term goals:

- ★ Understand B, R and L dependence
- ★ Understand impact of transverse granularity and longitudinal segmentation

BUT:

- ★ Vienna is only 2.5 months away
- ★ Be realistic – main thing is to get this effort underway

General points:

- ★ performance metric : jet-energy resolution
 - ★ Z at 91 GeV
 - ★ W^+W^- at 1 TeV
- ★ Try and attach names to goals...

Vienna goals

Goals for Vienna:

- ★ **B-field dependence:**

- ✦ Requires realistic forward tracking (HIGH PRIORITY) – Who ?

- ★ **Radial and length dependence:**

- ✦ Ideally with > 1 algorithm

- ★ **Complete study of “perfect particle flow”**

- ★ **Try to better understand confusion term**

- ✦ Breakdown into matrix of charged-photon-neutral hadron

- ★ **Study HCAL granularity vs depth**

- ✦ already started (AR)
- ✦ how many interaction lengths really needed ?

- ★ **ECAL granularity**

- ✦ how much ultra-high granularity really helps ?
- ✦ granularity vs depth

Getting (a little) more organised

Proposal:

- ★ Arrange monthly PFA phone conferences
- ★ Forum for people form to present / discuss recent progress
- ★ Goal : realistic PFA optimisation studies for Bangalore (and beyond)
- ★ Try and involve all regions : need to study EACH detector performance with multiple algorithms
- ★ First xday of each month 1600-1800 (CET)
 - not ideal for all regions but probably the best compromise
- ★ If people are in agreement – will set up an email list immediately after Snowmass



- ✦ We can make **real** and **rapid** progress on understanding what really drives PFA
- ✦ Provide significant input into the overall optimisation of the ILC detector concepts