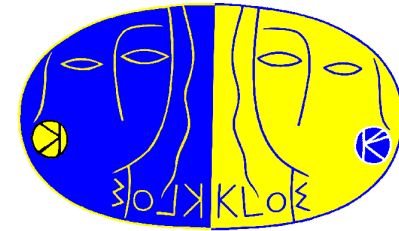# *2003 Run: Offline planning*
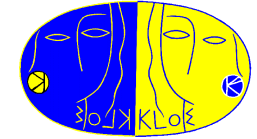
M. Moulson, 15 July 2003

Offline Discussion

Outline:

- *Ideas*

- *Discussion*

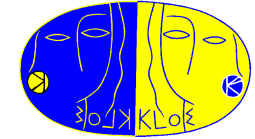- *Priorities*

- *Volunteers*

When do we resume running?

Anyone's guess, but we shouldn't plan offline work
that will go much beyond early September
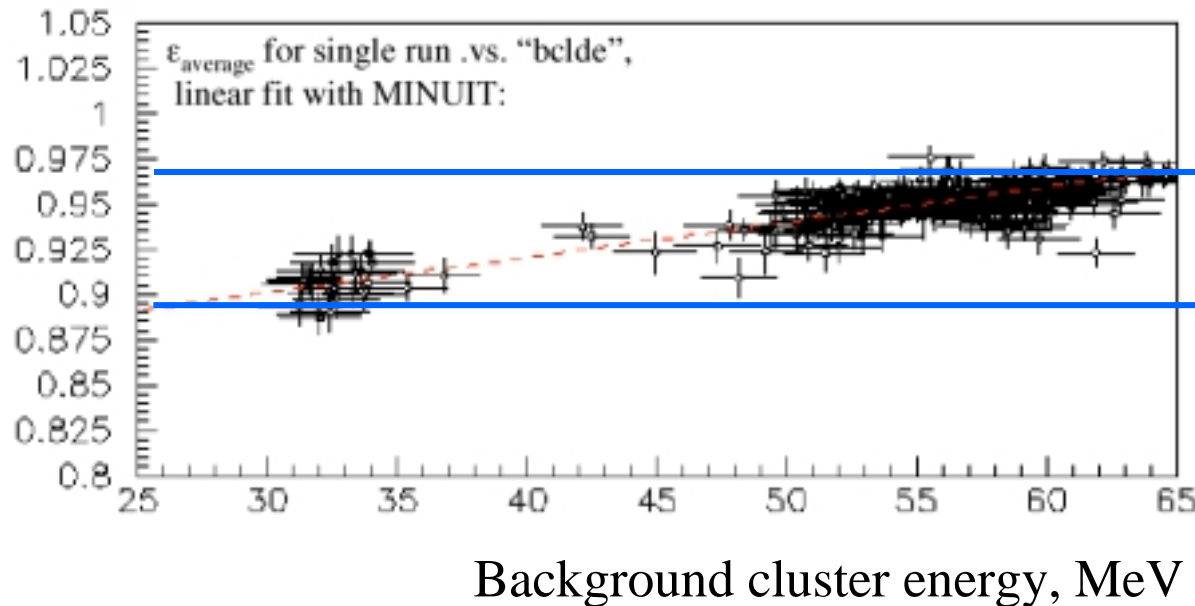
Probably have time to execute only projects that are:
- High-priority
- Reasonably self-contained

Purpose of this meeting is to identify these priorities

FILFO needs an overhaul

1) FILFO inefficiency is non-negligible and highly variable

$\varepsilon_{average}$ for single run .vs. "bclde", linear fit with MINUIT:

Background cluster energy, MeV

S. Mueller
24-Jun-03 $\pi\pi\gamma$ group

6 % variation with background conditions

Reasons for this are understood, but fact remains…

2) FILFO cuts were tuned to eliminate as much background as possible from 1999 and 2000 data and have not seriously been looked at since beginning of 2001

FILFO is complicated!

Most of our events are rejected by the BHABREJ-condition within FILFO:

$$\boxed{\text{BHABREJ}} \quad = \quad \boxed{\text{Nclu} \leq 7} \quad \text{.and.} \quad (\; \boxed{\text{MIN}} \quad \text{.and.} \quad \boxed{\text{ENE .or. ANG}} \;)$$
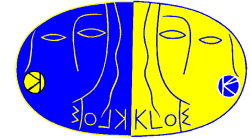
**This gives a correlation
with accidental clusters**   not relevant
for our analysis

$$\boxed{\text{MIN}} \quad = \boxed{\text{Nclu} = 0} \quad \text{.or.} \quad \boxed{\text{Nclu=1 .and. Eclu} \leq 50 \text{ MeV}}$$

.or. $\boxed{\text{Nclu>1 .and. less than 4 clusters with } 45<\theta_{cluster}<135}$

$$\boxed{\text{ENE}} \quad = \boxed{\text{Nclu} < 7} \quad \text{.and.} \quad \left\{ \left(\boxed{\text{Nclu} < 2} \; \text{.or.} \; \boxed{\Delta t(\text{last} - \text{first cluster}) \leq 6\text{-}10\text{ns}} \; \text{.and.} \; \boxed{\text{EMAX} \geq 300\text{-}400\text{MeV}} \right) \right\}$$

EMAX: Cluster with highest energy and $\Delta t(\text{cluster} - \text{first cluster}) \leq 3.5\text{ns}$ and $60^0 < \theta < 120^0$

FILFO suggestions

1. Get rid of it altogether
- Run 26000 reconstructed w/w/o FILFO—preliminary results not encouraging
- ~50% increase in CPU time
- Size of **bhabha** stream increases by factor of ~6, other streams roughly stable

2. Stopgap measure: new downscale policy
- Like **afl** stream but downscaled fraction normally streamed
- Convenience: vetoed events reconstructed, classified, and present in DST's
- Caveat: these events must be removed from analysis sample, or at least handled differently from standpoint of efficiencies
- Pilot study indicates 1/5 downscale would increase CPU 10% and require FILFO to be enforced in the **bhabha** stream

3. First steps towards work on FILFO: identify & eliminate most unstable cuts
- Can we reach tolerable background levels w/ high efficiency by eliminating a few cuts?

4. More comprehensive work on FILFO unlikely on our timescale
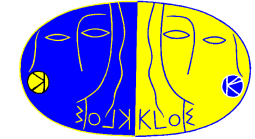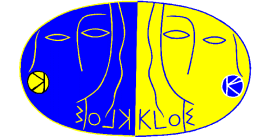
T3 policy and downscaled sample

My own understanding (subject to corrections):

2001 data (as reprocessed)

- Trigger passes 1/5 of cosmic-veto events (C5's)
- Cosmic veto determined by EmC only
- Techniques exist to unbias samples for efficiency studies

2002 data

- Trigger passes all events and only records cosmic-veto decision
- Cosmic vetoes subject to T3, which decides to keep a certain fraction
- 1/64 of cosmic veto events retained by T3 for efficiency studies
- T3 decision determined by both EmC (fast clustering, cosmic-ray TOF) and DC (activity near IR based on clustering of DC hits)
- Overall inefficiencies from cosmic-veto much reduced, but harder to study?
  - Some high-precision analyses would like to eliminate ALL cosmic vetoes, including T3-recovered vetoes, in order to use EmC unbiasing techniques
  - Statistics insufficient in the 1/64-downscaled cosmic veto sample

T3 policy and downscaled sample

Does 1/64 downscale provide enough events for efficiency studies?

- Most CV-efficiency evaluations do not simply obtain CV efficiency from prescaled events, as this uses statistics poorly
  - Probability for a single track to fire a single CV sector can be obtained from non-vetoed events
  - Generally need a sample of vetoed events to get unbiased probability for a track to fire *two* sectors
  - $\pi\pi\gamma$ analysis ran into problems with 1/50 downscale in original 2001 reconstruction
- Not clear that T3 algorithm will *ever* allow single-track methods
  - Even EmC decision correlates information from two clusters
- Is 1/64 downscale sufficient for direct CV-efficiency studies if inefficiency is small?

Is it possible to include more information about T3 decision in data stream?

- EmC decision vs. DC decision?
- Sectors responsible for EmC decision?

Luminosity-scaling background trigger
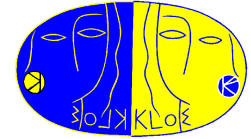
**LSB trigger would automatically provide INSERT events for future MC work:**

- No time-intensive bggmaker pass
- No (hypothetical) problems with background-dependent **bgg** selection efficiencies
- No messy attempts to isolate $\gamma\gamma$ clusters from background clusters

Technical feasibility to be investigated (conversations with F. Bossi, V. Patera)

- Probably possible to combine normal trigger and TORTA pulser in freerun mode
- Implement the luminosity scaling by downscaling in software

Example scheme:

- Currently collect **bgg** events with $\sigma \sim 40$ nb

  Suppose we want 100 nb, assume $L = 10^{32}$ cm^{-2} s^{-1}

  Need to collect 10 Hz of truly uncorrelated triggers
- A/C module counts *e.g.* classified VLAB's from ECLS and streams next background event into **lsb** file (w/o reconstruction) every ~4 VLAB's
- Rest of uncorrelated events are discarded
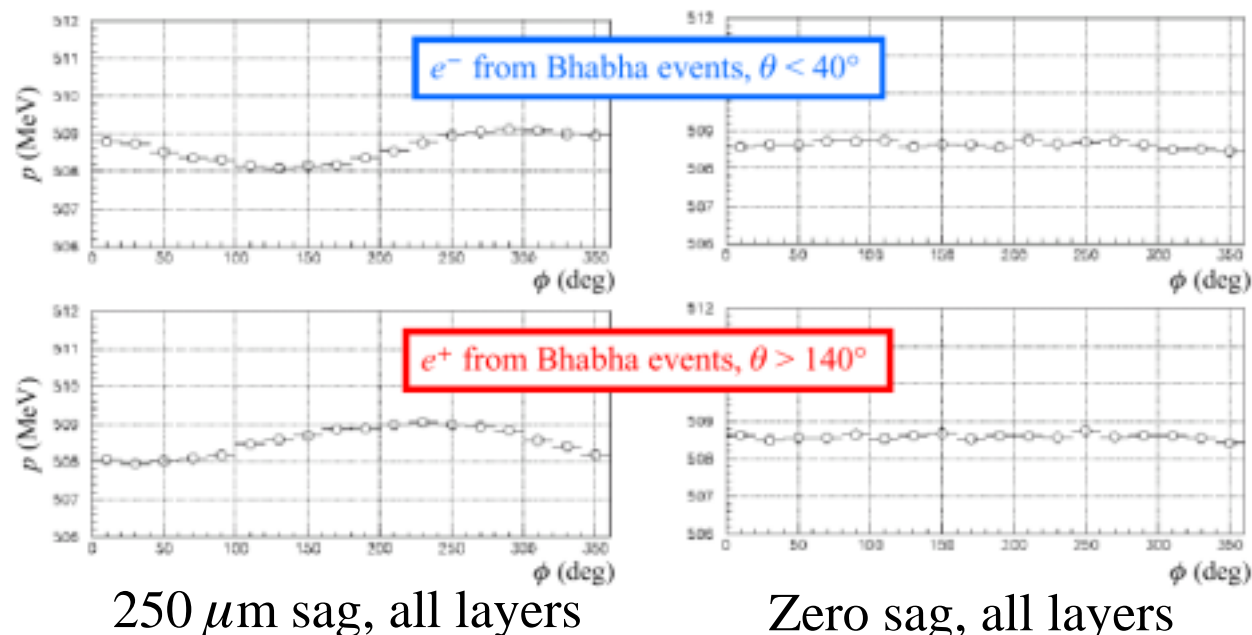- No uncorrelated events in streams
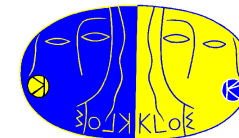
DC wire geometry and sags

Failure to include wire sag in reconstruction results in characteristic distortion of track momenta

For 2001-2002 data:
- Wire sag accurately represented in MC
- Not present in reconstruction at all

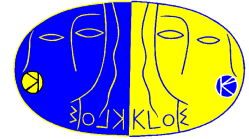250 μm sag, all layers   Zero sag, all layers

Inclusion of wire sag in ATFMOD a high priority!
Must begin very soon:
- Straightforward to include constants in ATFMOD geometry structures
- Unknown how complicated it will be to use this information in DFNEXT

Issues concerning dE/dx and kpm stream

_dE/dx_ and DCDEDX A/C module:

- Do we include DCDEDX in datarec path before streaming?
- Do we want to try to incorporate DCDEDX code into ATFMOD to save time?
- Will we have a new bank format, especially for DST's?
- Other new developments?

kpm stream:

- Proposal to eliminate some old streaming algorithms
- Proposal to develop new streaming algorithm using cuts on p and dE/dx to classify on basis of a single track
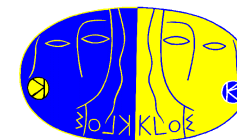
Conclusions

FILFO   Downscale into streams— offline group
               BHABREJ/$\pi\pi\gamma$—S. Mueller, F. Nguyen
               All other work as volunteers become available

T3   Downscale can be adjusted— P.Branchini, trigger group
               Need input from analysis groups for downscale factor to use

MinBi trigger   (or lowered thresholds for eff. studies)
                    To be further discussed

LSB trigger   HW implementation— V. Patera/trigger group
                    SW— offline group

DC wire sags   M. Moulson, A. Antonelli

dE/dx   Put in datarec as-is— offline group
               See what timescale is for DST bank before deciding to put DEDX
               bank in non-**kpm** DST's

kpm streaming   Need results from **kpm** group discussion