Neutrals Corrections for 18 series

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Questionnaires to AWGs

• We sent out a list of questions to AWGs, including:
  – Can you successfully use the neutrals corrections?
  – How good do you need the pi0 efficiency systematic?
  – Is the energy smearing we currently use appropriate for you?

• Thanks to those who responded
Pi0 efficiency

- Current method of efficiency estimation uses double ratio:
  \[
  \frac{(T\rightarrow\rho)_{DATA}}{(T\rightarrow\rho)_{MC}} \div \frac{(T\rightarrow\pi)_{DATA}}{(T\rightarrow\pi)_{MC}}
  \]

- Has been in use for > 1 year
  - Proven method, works well
  - Needs full repeat for 18 series
  - Good to 3% systematic
Pi0 efficiency – <3% systematic

• A year ago, 3% was good (champagne winning)
• 3% is now unacceptably high for some analysis
• Immediate plan: most systematic uncertainty can be attributed to low energy photons:
  – Recommend $E_\gamma > 100$ MeV cut, which will drop systematic to ~2%
  – Lower energy photons can be used if higher systematic is accepted
  – Meanwhile, we will continue to push down systematic as far as possible
Pi0 efficiency cont.

- Also looking at alternative methods of studying efficiency:
  - ISR $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$
  - $D^0 \rightarrow K^+\pi^-/K^+\pi^0\pi^0$

- Additionally – with the systematic dropping, we will need to re-evaluate the effect of a high multiplicity environment (currently relying on a really old study)
Energy scale and resolution

- We will provide corrections for both new and old calibrations.
- Currently we rely on measurement from $\pi^0$ with checks for consistency from other sources.
- Want to move to full integration of information from $\pi^0$, $\eta$, and $e^+e^-\rightarrow\mu^+\mu^-$.

Resolution measured with $\mu^+\mu^-\gamma$. 

![Resolution graph](image)
Energy Scale and Resolution

• Currently correction is applied as a shift + a (gaussian) smear to the energy value of MC photons
• Gaussian smearing is not really a good analogue for the difference between data and MC (especially at high energy)
• **We will move to a more complex smearing scheme to provide a more effective correction (making use of existing basic smearing mechanism)**
Summary

• Many improvements planned
• We think we have priorities right for what to put effort into
• Let us know if you need something not shown here
• Plenty of work to do – if you rely on this work, the time to volunteer is now