BCAL Reconstruction in MC: current status

- For details see: http://argus.phys.uregina.ca/cgi-bin/private/DocDB/ShowDocument?docid=2324
- Reconstruction efficiency and resolution are about where we expect for single-photon events
- We understand where and why we are losing photons and gaining extra “photons”
  - e+e- conversion in FDC packages causes both lost photons and extra clusters
  - Missing photons at low energies, forward angles when not enough energy deposited in BCAL
  - Extra clusters due to noise can be eliminated by energy threshold, timing cuts
  - True EM “splitoffs” at high photon energy

BCAL Reconstruction in MC: current status

- Energy resolution about as good as expected
- Systematic shift in reconstructed energy
  - Need to update energy correction procedure
- Time/z resolution better than expected
  - Need to smear times more in mcsmear
- Slight offset in reconstructed z/time from truth
  - Need to implement corrections for this?
- Cluster error matrix needs work

BCAL Reconstruction in MC: current status

- Pretty good performance separating photons from hadrons
  - Small number of discriminated variables
  - Simple cuts remove 83% of “bad” clusters while preserving 92% of “good” clusters
  - Needs to be incorporated with analysis tools
- Do not have perfect algorithm to deal with “curving showers”
  - But it works “well enough” for real (MC) data

Future Work?

- Start physics analysis of channel with neutral particle(s)
  - Incorporate photon reconstruction sanely into standard analysis software
  - Stage 1: Eliminate obviously “bad” non-photon clusters before kinematic fit and other analysis (BDT probably not necessary)
  - Stage 2: Sophisticated photon/hadron discrimination (BDT may be necessary) (see work at IU on η'π+n: https://halldweb1.jlab.org/wiki/images/4/42/Event_selection_etaprime_pi.pdf)
  - Let problems discovered in high-level analysis guide work on low-level reconstruction

Future Work?

- Reconstruction code
  - Accurate error matrix for photons
  - Fix corrections for E,z
  - Fix whatever problems high-level physics analysis reveals
  - Continue to test reconstruction code with single-photon events in addition to more complex events
  - Low priority: new code to handle “curving particles”

Future Work?

- Calibration
  - Incorporate calibrations DB into code
  - Needs to wait until calibration procedure has been determined
- Simulation work
  - TDC times from mcsmear need more smearing
  - FADC times from mcsmear also not correct (waiting on fADC firmware implementation)