

A quick look at kerrors in the pnn2 pass2 ntuples. JSF 06mar06

Several months ago, there was a flurry of attention (mosly in email exchanges) given to events with kofia errors. These can occur, for example, if an event has too many words in a given TDC module, or if there is an unpacking error in the adcs. In the current pass2, Joe installed some ntuple quantities to monitor these kofia errors. Encoded were variables nbad, iss_bad(i), and ifc_bad(i), where iss_bad is the system in which a kofia error was detected, and ifc_bad was a code word telling what error was found in system iss. The list of systems, iss, can be found in \$KOFIA_INCLUDE/ss_index.cmn.

Prior to running the new pass2, there was some work done about this problem. Some events were found, for example, in which the number of tdc words exceeded the number allowed. Some of these ran out of words before the time of the trigger. A possible consequence of this might be that a converted kp2 photon might not be seen in the tdc in one (or both) ends of a given physical module.

I decided to examine events that were found by Kentaro in his search for pi0 to nothing. I wanted to see if events with kofia errors were enhanced in his sample of events in which no photon activity was found, in spite of the tightest cuts. If so, it might indicate that the photon veto ability of the detector might be better than we claimed.

Method: Setup cuts on the pass2 1/3 sample were 'BAD_RUN', 'DELC', 'COS3D', 'TGQUALT0', and 'KPI2BOX_MOD'. I examined the 21 events that failed Kentaro's tightest PV cuts. As a pseudo-normalization, I also examined the 21 runs in which these 21 events occurred. 20 out of the 21 events passed the setup cuts. (I have not examined why one event failed the setup cuts.) Recall that Kentaro's 1/3 sample had 21 events, whereas the 2/3's sample had 99 events. This discrepancy probably indicates a bias in the cuts used to arrive at the 21 events.

I ignored the iss_bad flags that were in the UT or TT system. These systems had a substantial fraction of events with kofia errors, and should have little effect on the ultimate PV rejection.

	# events	Number of kofia errors	Fraction of kofia errors	Number expected, if no correlation
excluding evts in the pi0->nothing sample	39740	1173	.0295	
in the pi0->nothing sample	20	3	.15	0.6

Though not very significant, there is an indication that perhaps eliminating events with kofia errors (in systems excluding the UT and TT) may help with the ultimate PV rejection. In addition, since we have a chance at two photons, perhaps there would be a gain in the acceptance/rejection curve if the setup cuts eliminated events with kofia errors.

If there is a significant effect seen in PV acceptance/rejection with using this setup cut, we should consider adding code to examine the errors in more detail in order to gain some acceptance back. For example, we should not reject an event if the number of TDC words is exceeded at a time well beyond the trigger time.