The effect of the BGV on sample purity

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S. Teige

Department of Physics, Indiana University, Bloomington IN 47405

Five photon events were selected from a data sample spanning approximately 24 hours. Initial selection requirements were that more than 4.5 GeV and less than 6.5 GeV was deposited in the lead glass and that no two photon clusters were closer together than 8 centimeters (two block widths). The value of the χ^2 for the $\pi\pi\gamma$ hypothesis was determined for all possible assignments of the photons to parent pions. If the best χ^2 was less than 15, the event was considered to be a $\pi\pi\gamma$ candidate.

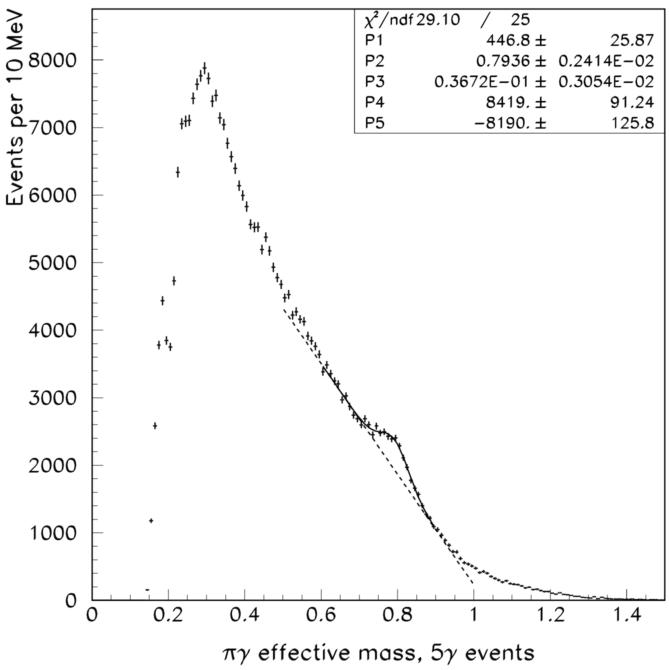
Figure 1 shows the resulting $\pi\gamma$ effective mass distribution. There are two entries per event. A clear enhancement at the mass of the ω is seen. The distribution has been fitted to a gaussian plus linear form to allow the number of ω events over background to be counted.

The $\pi\pi\gamma$ final state is subject to large backgrounds due to the more copious $\gamma p \rightarrow p3\pi^0$ reaction where one of the photons from a pion decay is lost. This fact makes this final state useful to study the effects of selection cuts designed to enhance the fraction of well contained events. The lower distribution in figure 1 shows the effect of one such cut. In addition to the initial selection requirements it was required that no BGV element have a large signal. [1] Table 1 summarizes the effect of this cut. Improvements ins signal to noise ratio are achieved while a large acceptance is maintained for the desired signal events.

[1] At this writing the BGV is not calibrated *absolutely* only a relative calibration has been done. This relative calibration makes the response of all BGV modules the same with an average value of 1.0. A "large" signal is one greater than 0.4

	Without cut	With cut	
Number of $\pi\pi\gamma$ events	165,300	18,670	11% survive cut
Number of $\omega\pi$ events	4,110	1,750	43% survive cut
Background at peak	1,920	240	
Signal over peak	446	147	
Signal:Noise at peak	0.23	0.62	improves $\times$ 2.7

Table 1: The effects of the BGV cut on the $\omega\pi$ data sample



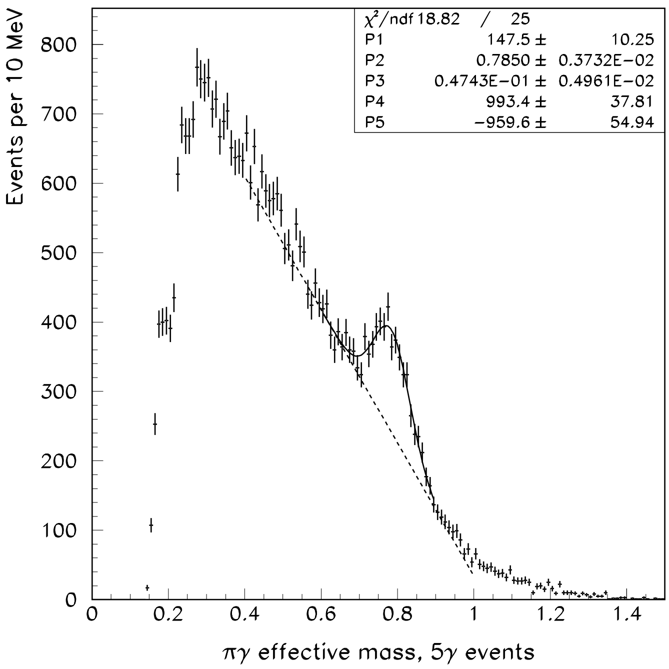


Figure 1: The effect of the BGV on sample purity