

# Slides for TV Meeting

Pi0nn summary documents are being prepared ...

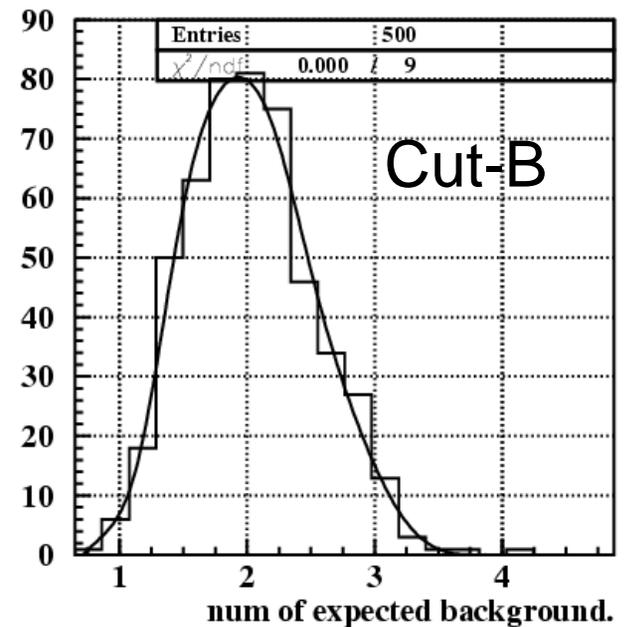
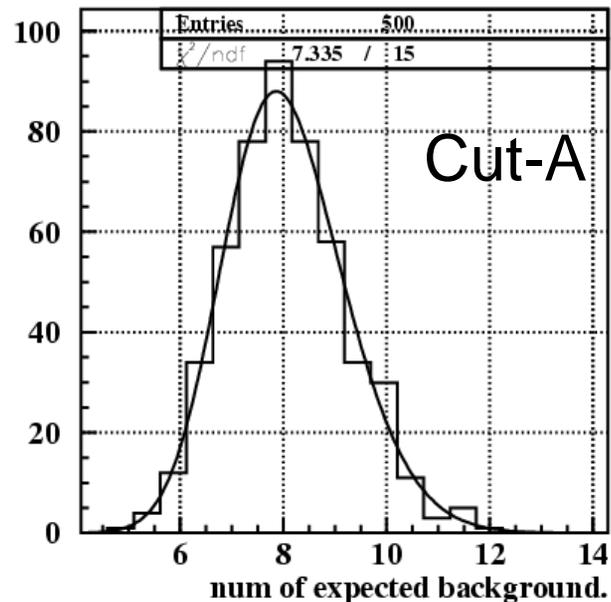
So, quickly show the digest.

- (1) PV cut sets were prepared. One for the conservative method.  
Several for background subtraction.
- (2) Expected number of backgrounds.  
Done for the several PV sets.
- (3) Systematics in the acceptance measurement.
- (4) Statistical technique and discussion.

# Expected Number of Backgrounds

Background expectation was done for the several PV cut sets.

For example, if we have 10 M pi0s, background will be



Fitted curve (called “F(bkgnd)”) will be used as a background probability function.

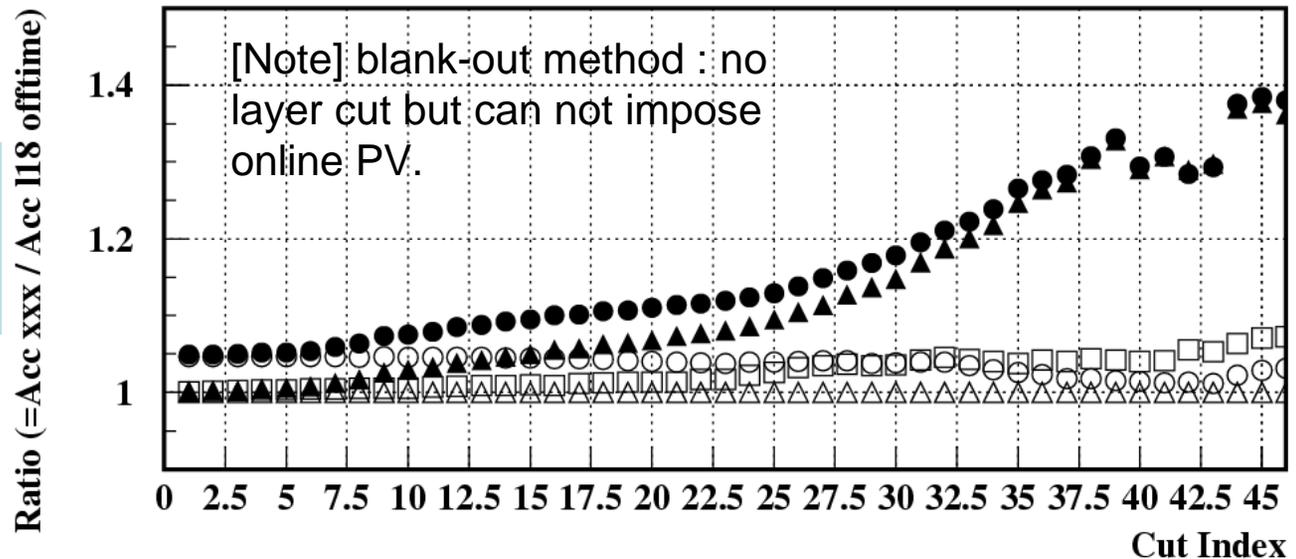
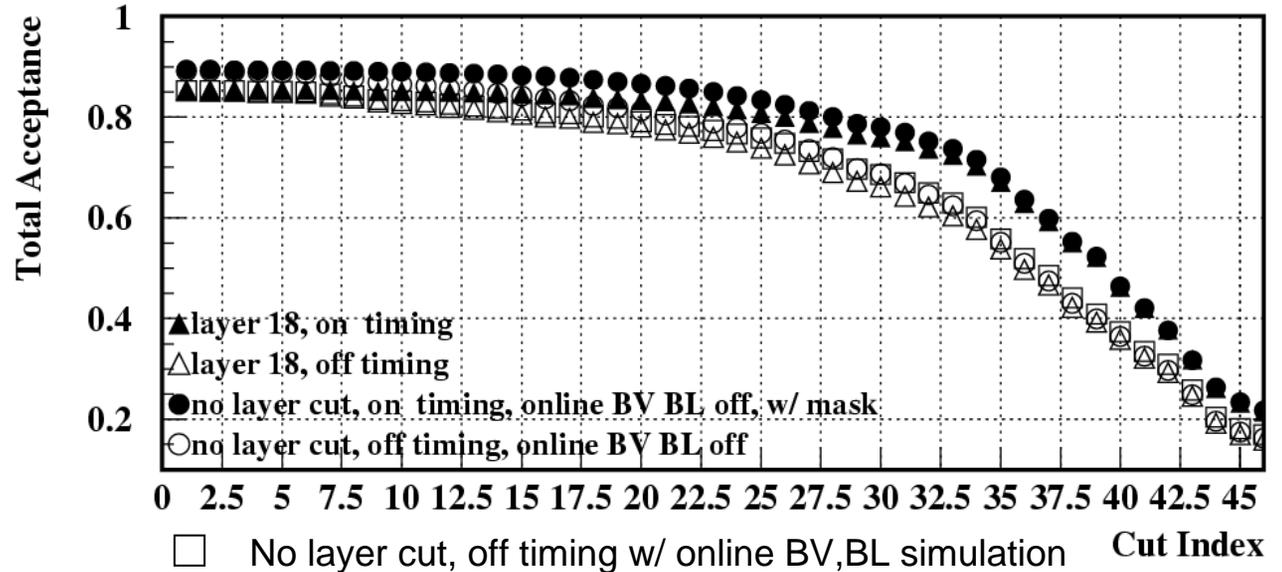
# Systematic error in acceptance

RS-lay20,21 removed  
=> difficulty in the  
acceptance  
measurements.

We have 2 methods.  
Layer18 and blankout  
method.

Layer 18, blank-out  
method well converges,  
if offline cut getting tight.

Difference < 5%

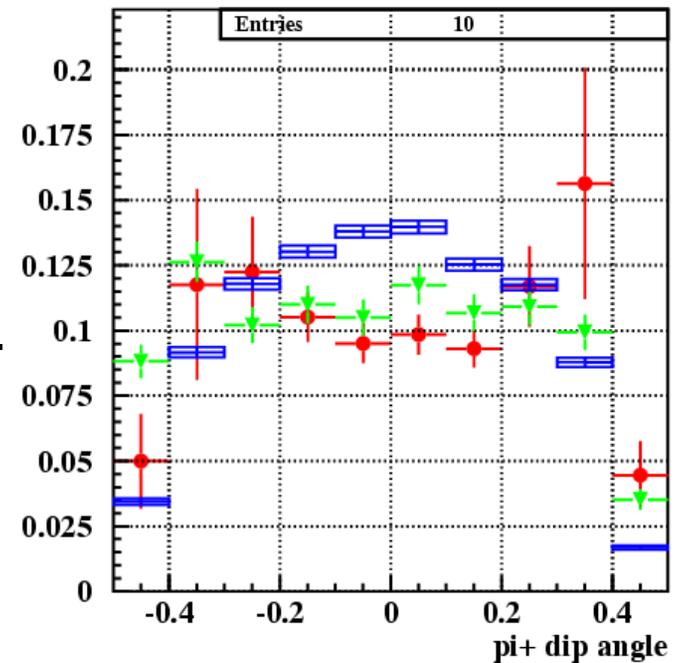
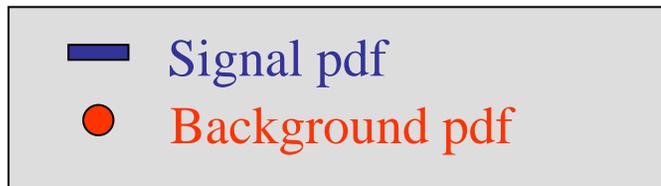


# Statistical Techniques and Discussion

We have two background information;

F(bkgnd) and “background shape in  $\cos 3d$ ”.

See a right plot.



## (1) Unbinned Extended Maximum Likelihood Fit

$$L = \frac{e^{-(s+b)}}{N!} \prod_{i=1}^N (sS_i + bB_i)$$

N : number of events

$S_i$  : Signal distribution function

$B_i$  : background distribution function

s : number of signals

b : number of backgrounds

My comments : errors on  $B_i$  can not be considered in this method, neither  $F(\text{bkgnd})$ .

## (2) Chi square fit and its probability.

Green histo fitted by  $sS(\cos 3d) + bB(\cos 3d)$  Find the best (s, b) and also get a probability for the given (s,b).

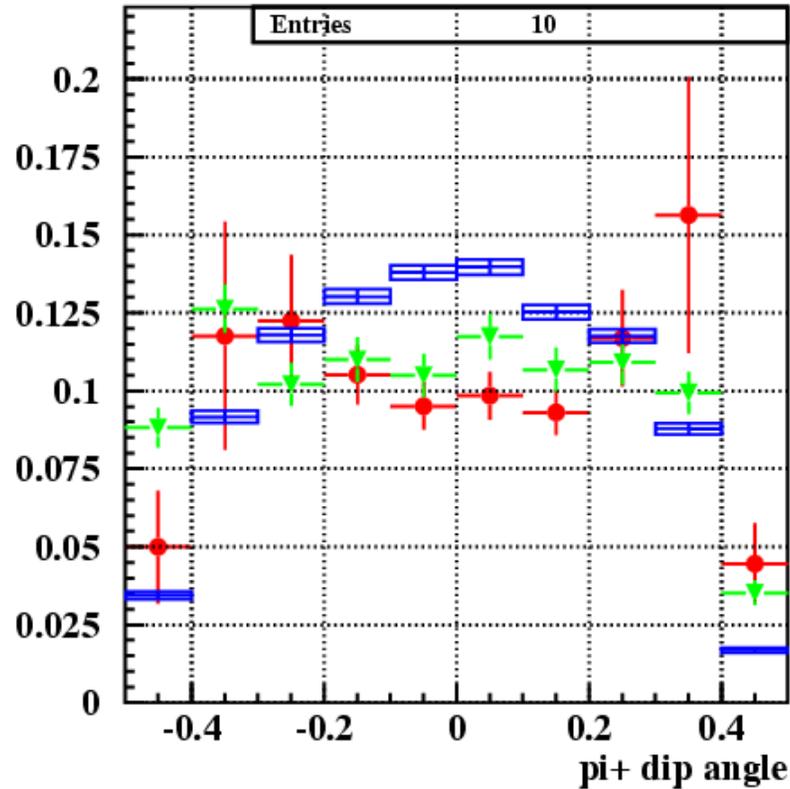
My comment :  $F(\text{bkgnd})$  can not be taken into account.

# Chi square fit and probability

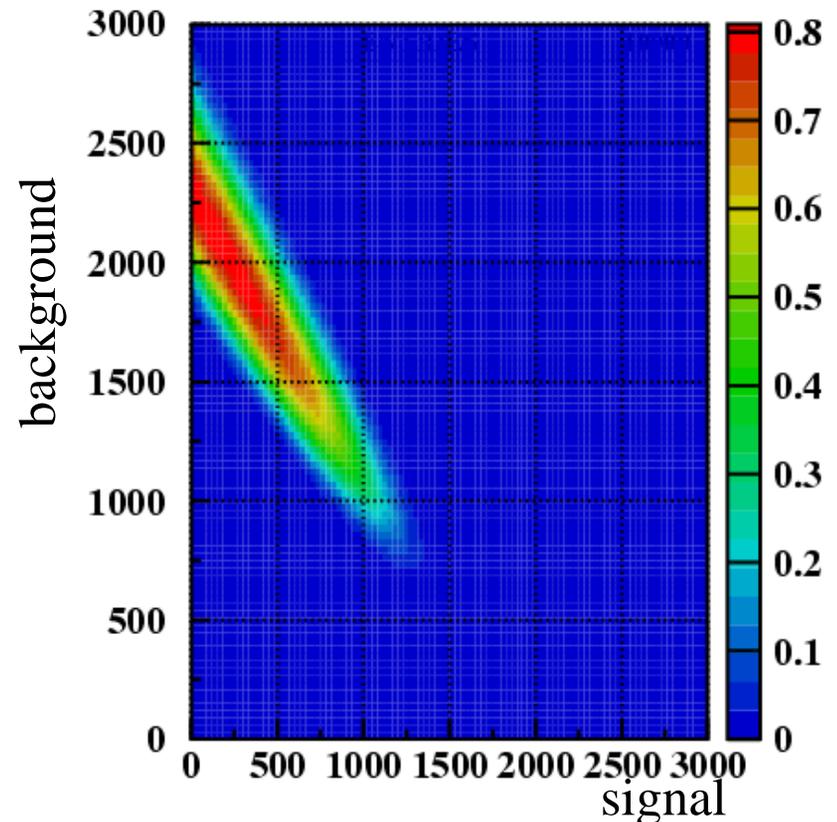
Sample Point : Fairly loose cut position

Rejection  $10426 * 103 = 1.07e6$

2153 events remaining in the box



Chisquare probability



Best fit : signal=147,

background = 2147

My comments : the best fit gives us a good improvement (say, ~1 order more rejection) but unfortunately contour slope is gentle. Even if the signal = 1000, we can find out the good fit.

# Discussions

Is there any good statistical approach other than these ?

How about the convolution of  $F(\text{bkgnd})$  and Extended ML ?

Many comments from David, George, Laurie, Steve, Takeshi ...

(1) Just use simple statistical method.

Poisson and  $F(\text{bkgnd})$

(2)  $\cos^3\theta$  dist  $\Rightarrow$  combine into single bin and use  $\# \text{event}$  in the different cut sets as PDFs.

What else is required to proceed to 2/3 study ?

Systematic errors.  $\Rightarrow$  systematics in acceptance OK.

Next is systematics in SPI table.

$\Rightarrow$  Use MC.