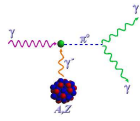


Characterization and Subtraction of Timing Accidental TAGM Background Contamination in π^0 Yield

Dustin McNulty
PrimEx Collaboration
MIT/Jlab
mcnulty@jlab.org

October 7, 2005

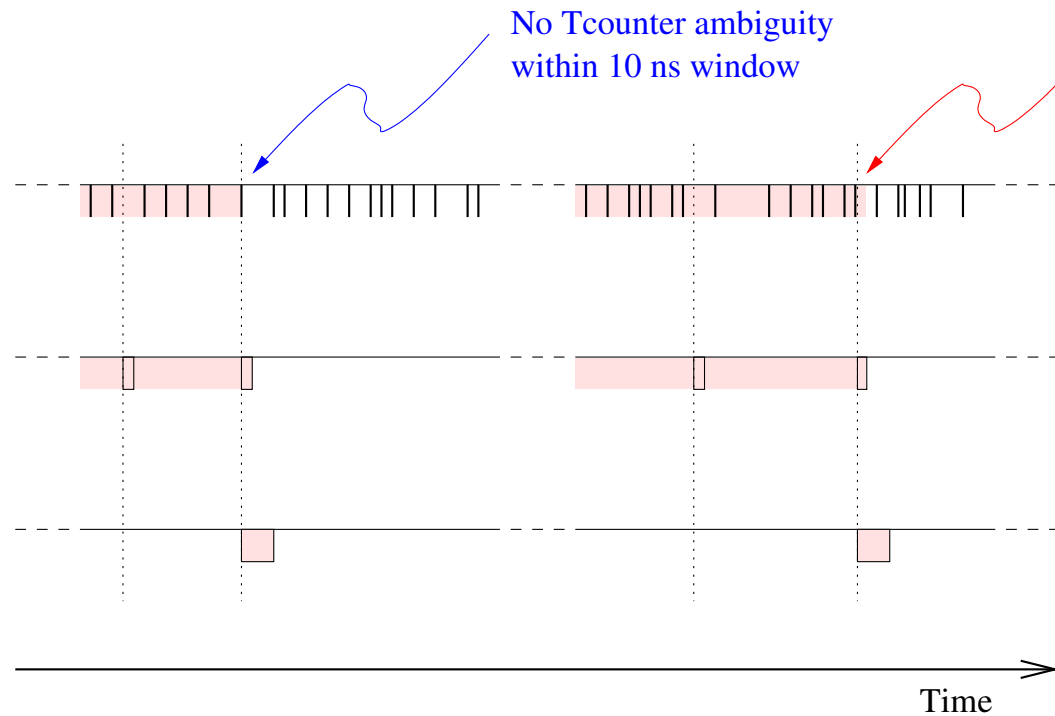


Basis for Accidental Timing Background

MOR
 (top 11 Tcounters)
 Average Rate: ~5MHz

HyCal Total Sum
 (TS bit 9)
 Average Rate: ~2kHz

HyCal + MOR
 (TS bit 10)
 Average Rate: ~1kHz



Multiple Tcounter hits within 10 ns of each other

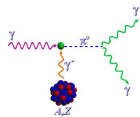
Coincidence TS bit 10 Initiates Event Readout; MOR defines time

Example Event 1

Ideal event with minimal TAGM confusion

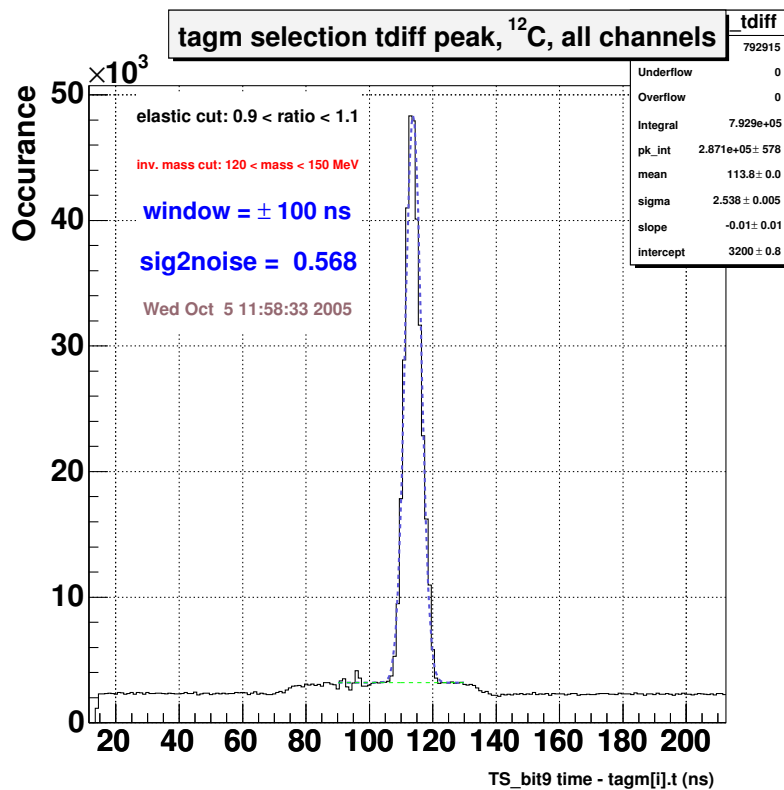
Example Event 2

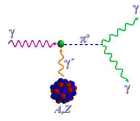
Non Ideal event with potential for TAGM confusion



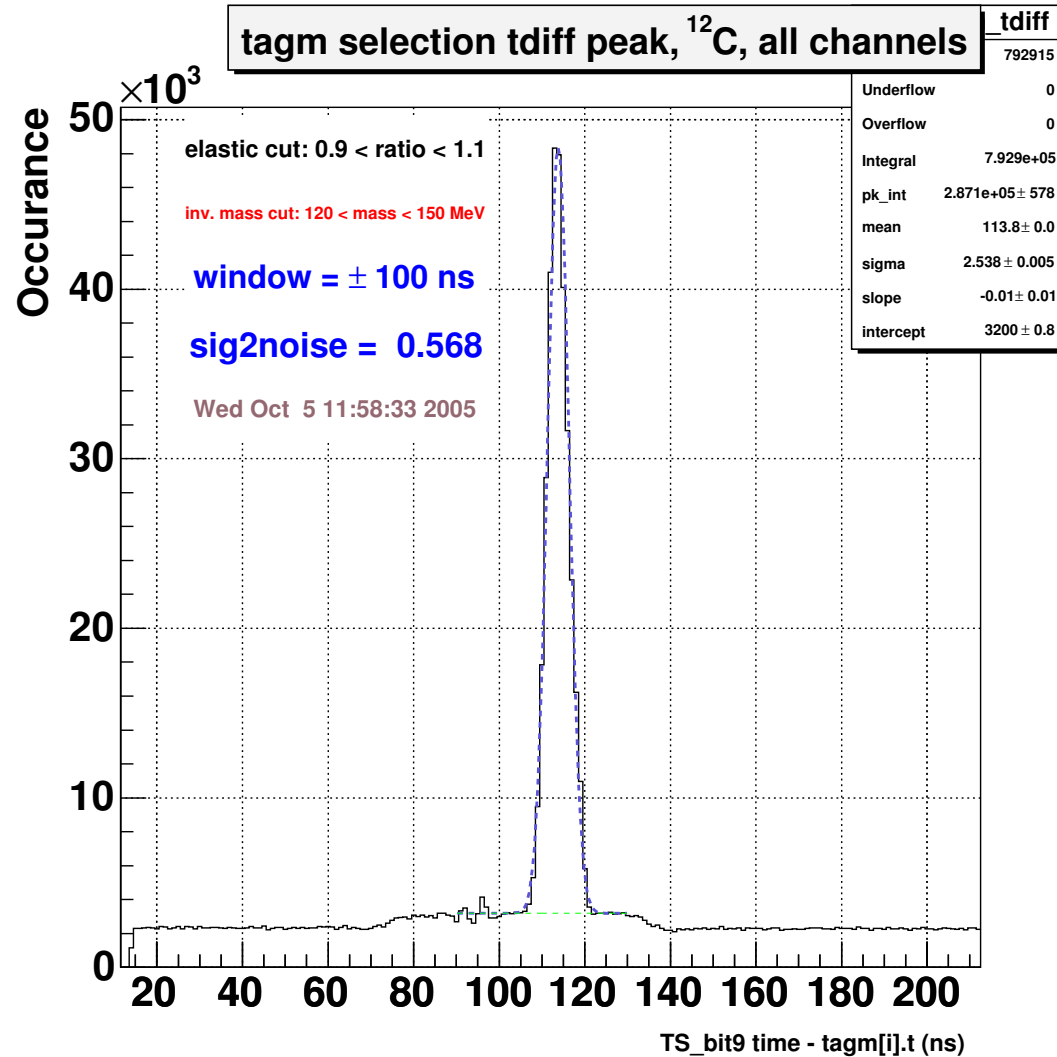
TAGM selection

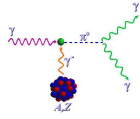
- For each event, a list of TAGM candidates is compiled.
- Candidates are added to the list if the difference between their time and the readout-correlated TS bit 9 event time is equal to the peak time difference within some timing window (say for example ± 30 ns).



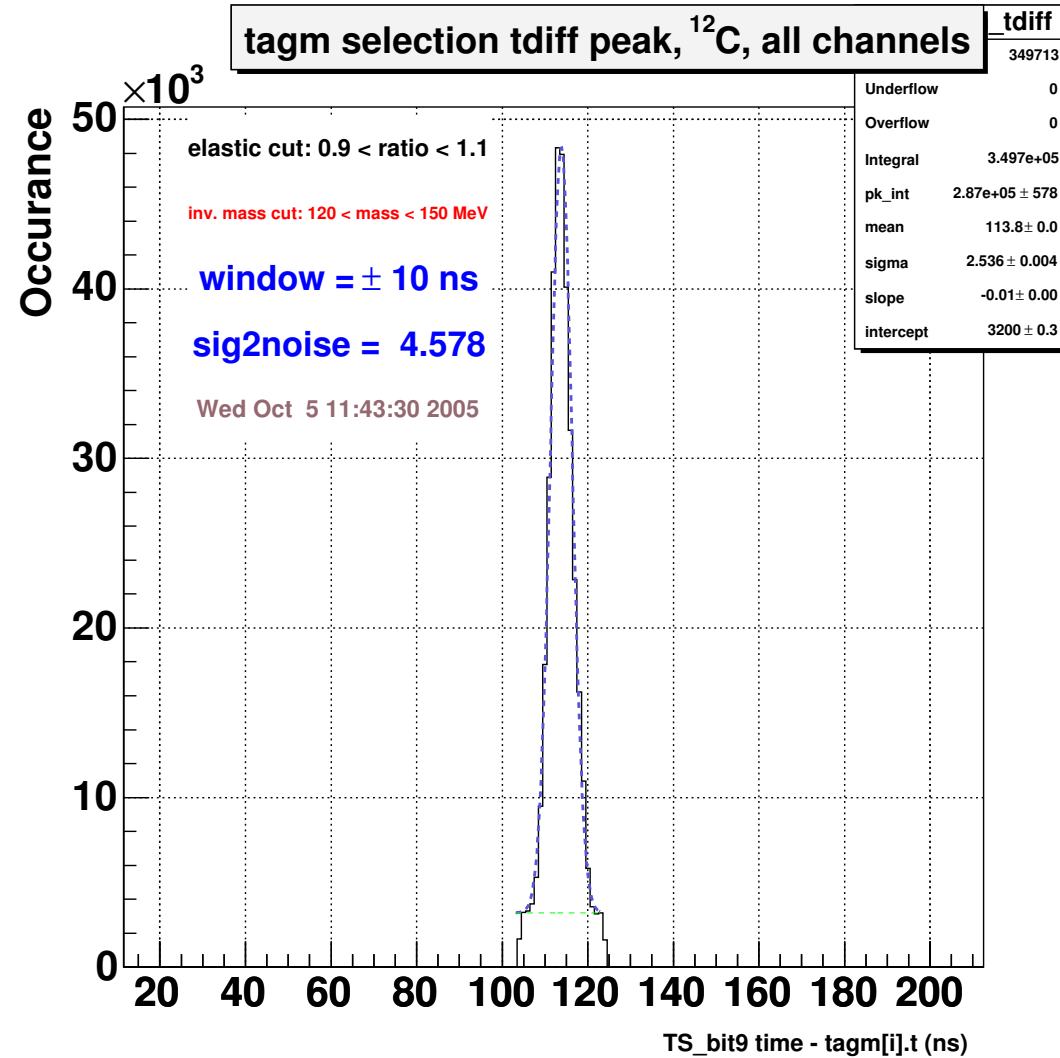


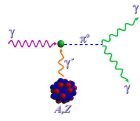
TAGM selection: Peak time difference



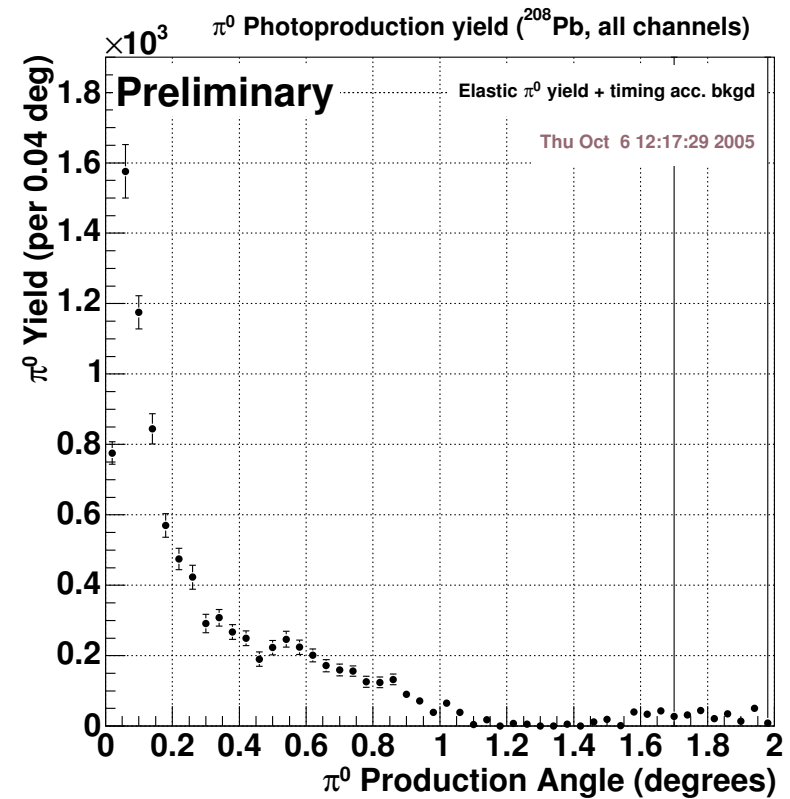
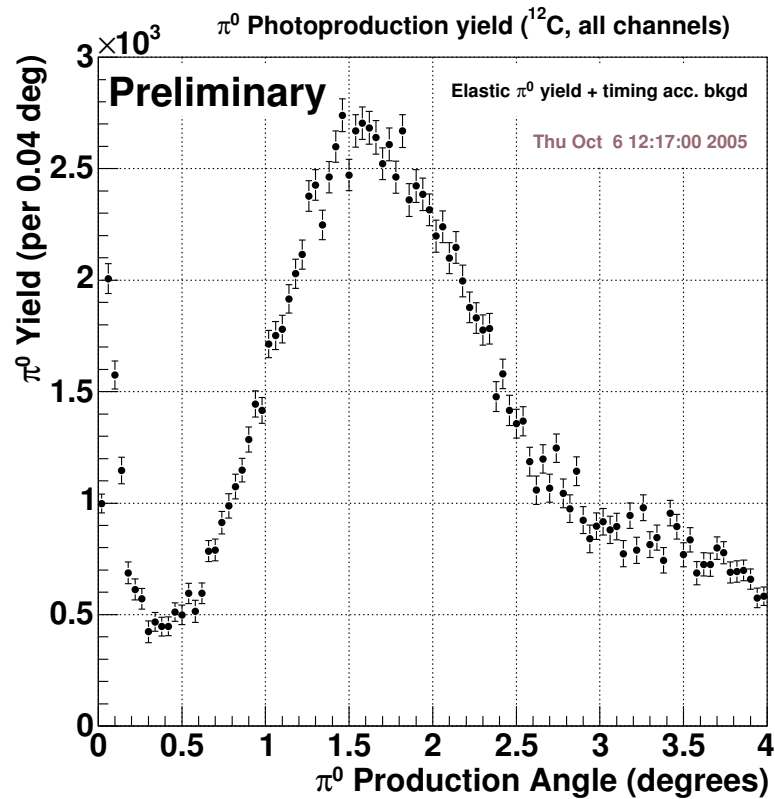


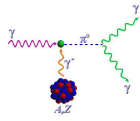
Candidates passed through 'in-time' π^0 yield analysis





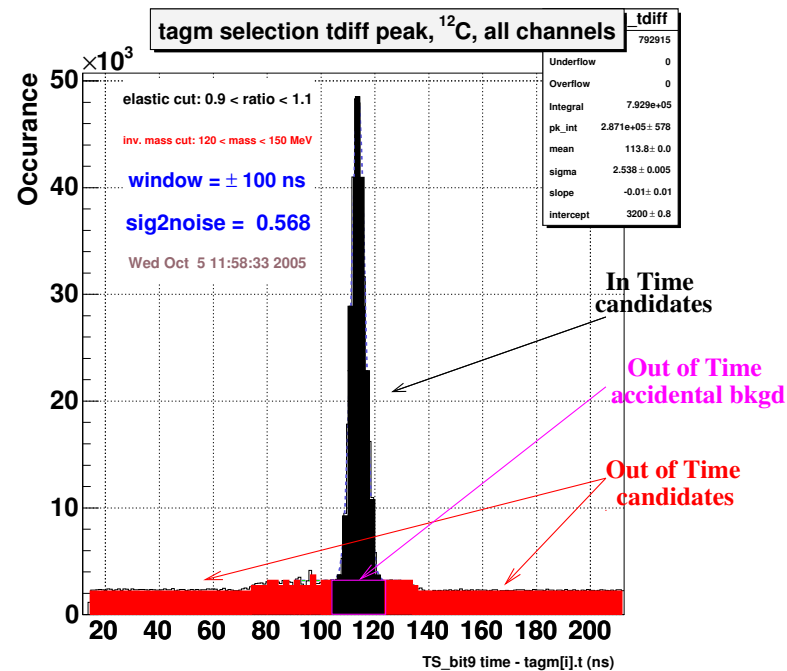
'In-time' Elastic π^0 yields with ± 10 ns time window

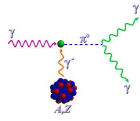




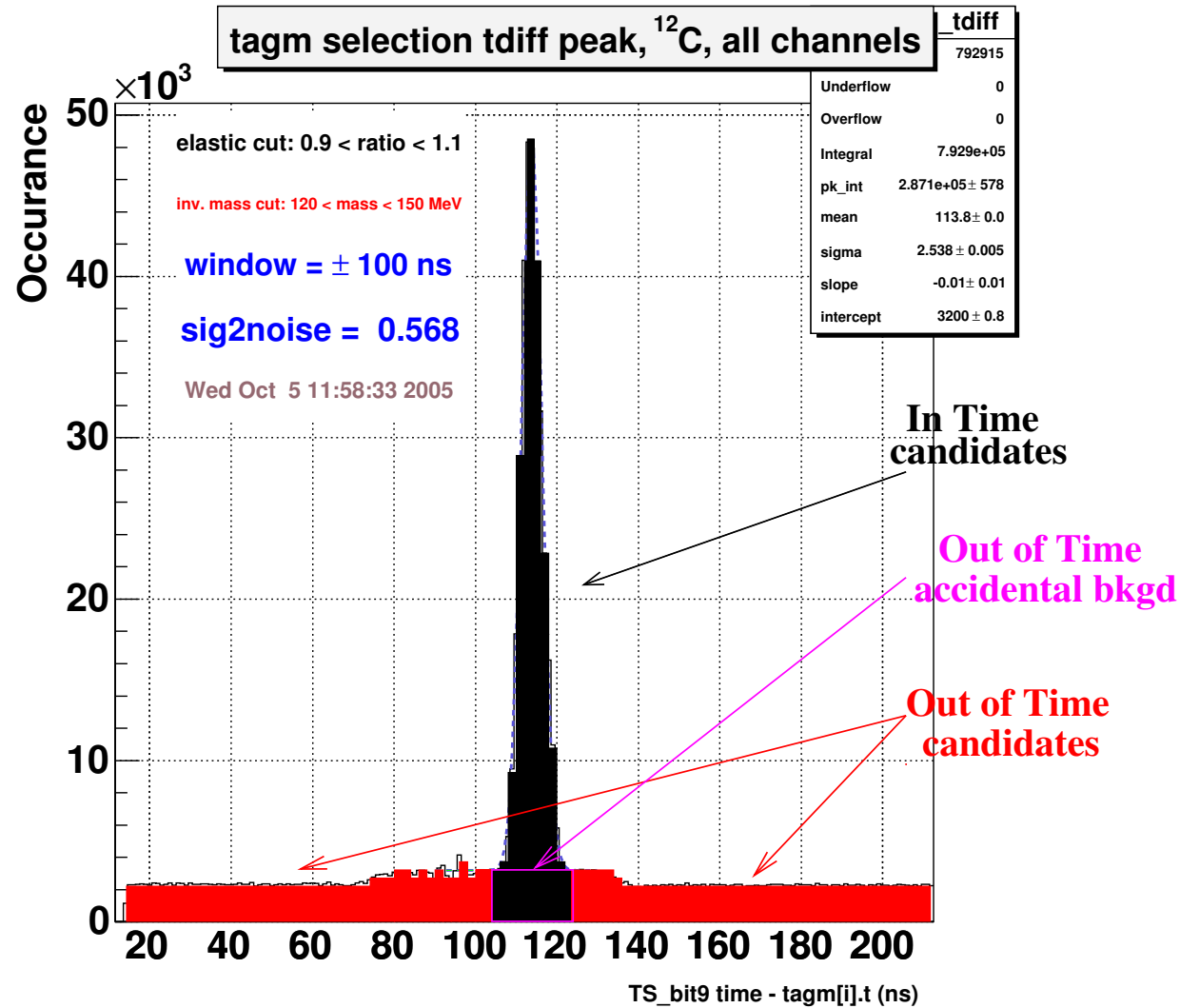
Subtraction of Accidental Timing Bkgd

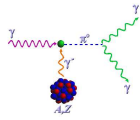
- First identify and quantify bkgd contamination (ratio of signal to noise for ± 10 ns cut is ≈ 4.6)
- Second, use out-of-time candidates to characterize the shape of bkgd.
- Third, scale the out-of-time spectra to the proportionate size and subtract it from in-time yield.



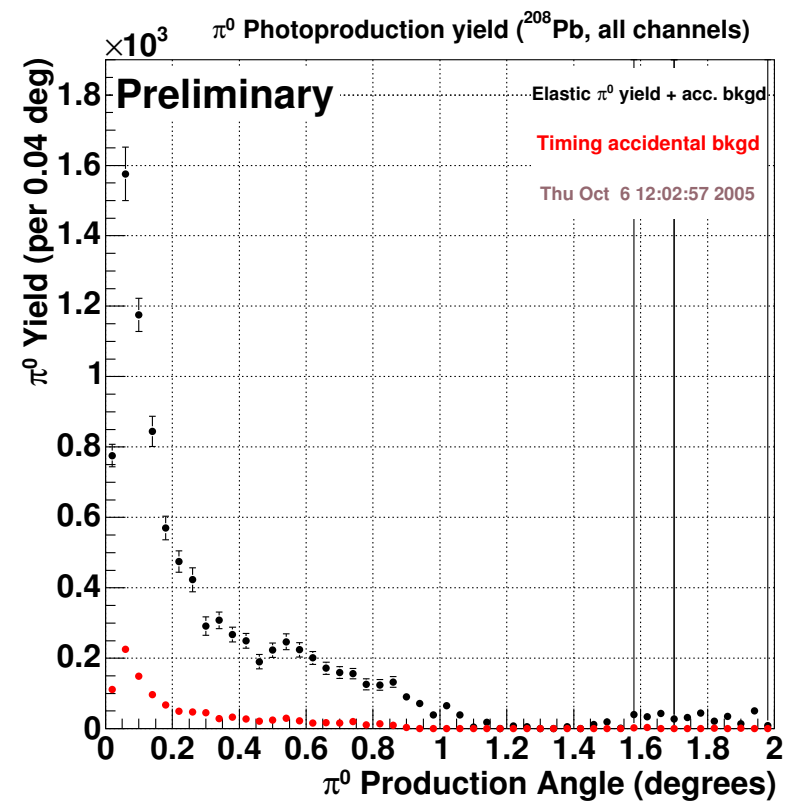
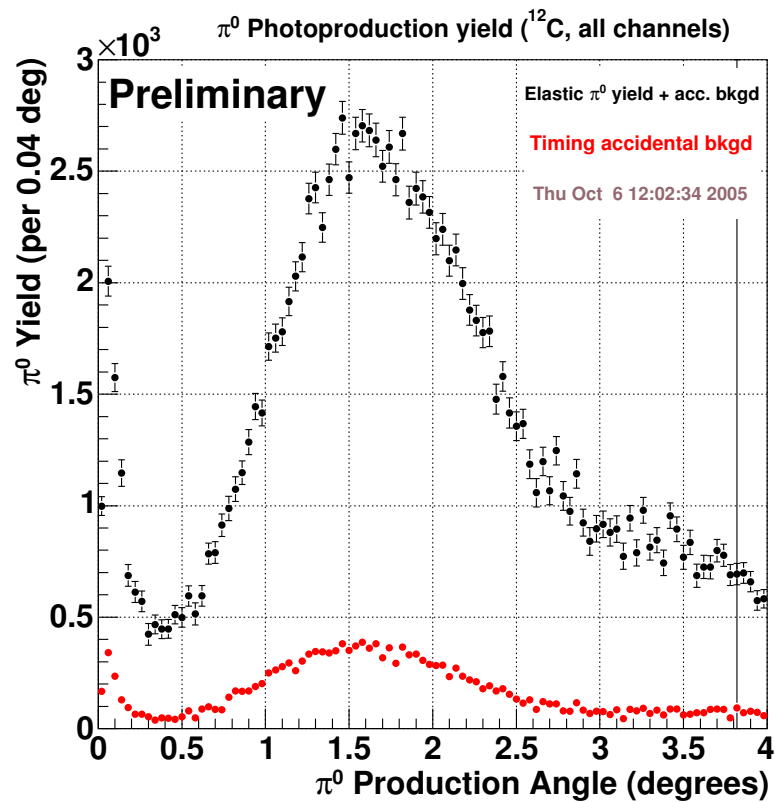


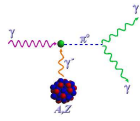
Subtraction of Accidental Timing Bkgd





'In-time' Yields Shown with Out-of-Time Contamination





Final Corrected π^0 Yields

