E949 Technical Note K-053

TGCUTS: Past and present

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Abstract

This note summarizes the TG quality cuts used for PNN2 in 96-97 by Bipul and Milind, the ones used for PNN1 in 02, and concentrates in their differences (tighter version of every cut in **boldface**).

NAME	PNN1	PNN2	DETAILS
B4TIM		$\vert b4str\vert < 2ns$	Used for better pulse fitter performance - not needed anymore
B4EKZ B4EKZ_IC	$nk\_tg > 2$ for $ek \geq 25MeV$ $lkbeam > 2$ $lkbeam > 12.5$ for $ictpi = 1$	 $\boldsymbol{\vert lkbeam\vert \geq 10}$ $\boldsymbol{\vert lkbeam\vert \geq 20}$ for $ictpi = 1$	Beam likelihood using b4abm_atc (B4 energy), ek and tgz If tpi is given by the IC, cut tighter
TGZFOOL	$tgz \geq -15cm$	$\boldsymbol{tgz \geq -5cm}$	Make sure the K enters the TG (tgz is the z position of the decay vertex from the UTC extrapolation)
EPITG	$epi\_tg(i) \leq 5MeV$	$\boldsymbol{epi\_tg(i) \leq 3MeV}$	Low π energy in EVERY π fiber
EPIMAXK	$epimax < 3.5MeV$	$\boldsymbol{epimax < 3MeV}$	Low energy in the π fiber closest to the K fibers
TARGF	$dist\_targf < 0.7cm$	$\boldsymbol{dist\_targf < 0.6cm}$	Maximum separation between the closest K and π fibers
DTGTTP	$dtgt\_tp < 2cm$		Distance between TG edge π fiber and extrapolated UTC track
RTDIF	$\boldsymbol{rtdif\_tg < 1.5cm}$	$rtdif\_tg < 2cm$	Error in the π path length
DRP	$\boldsymbol{\frac{drpmax-drpmin}{rtg} \leq 0.35}$	$\frac{drpmax-drpmin}{rtg} \leq 0.7$	Maximum minus minimum UTC radius divided by TG π range $\equiv \pi$ swath width
TGKTIM		$2tk(i) - b4str - trs \leq -1ns$ and $\vert tk(i) - b4str\vert \leq 3.5ns$	Time in every K fiber consistent with B4 time and TRS (sort-of DELCO)
EIC	$\vert eicest - eic\vert \leq 5MeV$ and $\boldsymbol{eic - eicest \leq 1.75MeV}$	$\boldsymbol{\vert eicest - eic\vert \leq 4MeV}$	Measured energy in IC near expected one
TIC	$\vert ictime - trs\vert \leq 5ns$		IC time near TRS
TGEDGE	$etg\_edge(i) \leq 5MeV$ for $\vert ttg\_edge(i) - trs\vert \leq 4ns$		Low energy in every edge fiber when it is in time with TRS (safety cut: edge fibers are not used in etg calculation, which is ok only for low energy)
TGDEDX	$rtg < 12cm$, $etg < 28MeV$ and $9.5etg \leq 28rtg$ and $10etg \geq 21.5(rtg - 2)$	$\vert tgdedx\_like\vert > 0.05$	For PNN1, crude selection of "good" pions: low R and E and within π band (included in KCUTS). In PNN2, it is substituted by a likelihood function
TGENR		$1MeV \leq etg \leq 28MeV$	"Good" π
PIGAP	$tgpi\_gap \leq 1.6cm$ $\boldsymbol{tgpi\_gap \leq 1cm}$ for $cos3d < 0$ and $z\_ic < -7cm$	$\boldsymbol{tgpi\_gap \leq 1.5cm}$	Gap between π fibers In PNN1, cut harder for π going US
 TGB4	 $db4 \leq 2cm$ $db4tip \leq 2cm$ $dvxpi \leq 1.5cm$ $dvxtip \leq 0.7cm$	 $\boldsymbol{db4 \leq 1.8cm}$ $\boldsymbol{db4tip \leq 1.8cm}$ $dvxpi \leq 1.5cm$ $dvxtip \leq 0.7cm$	Agreement between B4 and/or various TG points: B4 and nearest K fiber B4 and nearest K tip decay vertex and nearest π fiber decay vertex and nearest K tip
PHIVTX	$phivtx \leq -0.0005$ and $\boldsymbol{phivtx2 \leq 0.001}$	$\boldsymbol{phivtx \leq -0.0028}2$	Difference between smallest K fiber phase angle (on UTC track) and π fiber phase angle (eliminate back-to-back tracks)

NAME	PNN1	PNN2	DETAILS
KIC	calculated $\boldsymbol{dist \geq 3.7cm}$ for $\lvert tdtic(i) - tk \rvert \leq 3ns$	calculated $dist \geq 1.6cm$ for $\lvert tdtic(i) - tk \rvert \leq 3ns$	Cut on the distance between the IC counters hit in time with tk, and TG K fibers
OPSVETO	$\sum epiop\_tg(i) < 2MeV$ for $\lvert tpiop\_tg(i) - tpi \rvert < 3ns$ $\boldsymbol{\sum epiop\_tg(i) \leq 0.5MeV}$ for $beam\_like < 200$	$\boldsymbol{\sum epiop\_tg(i) < 1MeV}$ for $\boldsymbol{\lvert tpiop\_tg(i) - tpi \rvert < 4ns}$	Low energy sum of opposite side π fibers in time with tpi In PNN1, cut tighter for high beam likelihood
TGER	$\boldsymbol{etg > 1MeV}$ for $rtg > 2cm$	$etg > 0MeV$ for $rtg > 2cm$	Some energy deposited in TG for a range above a value
TGLIKE	$like \leq 3.2$ $like2 \leq 2.3$	$like \geq 10^{-50}$	Likelihood based on: tpi(i) and π fiber distance from UTC track π fiber distance from UTC track For PNN2: tpi(i), epi(i) and π fiber distance from UTC track
TIMKF		Consistency between the time and the energy and position of K fibers	
PBG		Veto on lead glass counter hits - to be substituted by AD veto	
NPITG		$npi\_tg > 0$	At least one π fiber
ALLKFIT		All K fibers with $ek\_tg(i) > 3MeV$, must have a CCD pulse fit	
TPICS		Standard deviation of π fiber time distribution $> 4ns$	
EPIONK		Energy in overlapping K/π fiber $< 1.5MeV$ (loose version of CCDPUL)	

The rest of the TGQUAL cuts exclusive to the 96-97 PNN2 analysis will not be discussed here, because they are either under development (CCDPUL) or depend on Toshio's fitter (CHI567, VERRNG, CHI5MAX, ANGLI), thus have not been looked at at this point. For more details, look at Bipul's thesis, pp. 58-62 and Appendix A and B.