pnn2 analysis

Basics

1. Use pnn1 cuts as baseline for comparison/validation if possible
2. Attain previous pnn2 S/B $\sim 1/7$
3. Can we increase R and/or A?

Strategy

1. pnn2 cuts start from pnn1 cuts
2. Modifications based on Bipul/Milind analyses
3. Check R,A of **each** cut

Reminder of backgrounds from Bipul's 1997 analysis:

Bkgd	1997(2/3)	?	Tools	
$K_{\pi 2}$-scat	0.39 ± 0.15		PV	CCD
$K_{\pi 2\gamma}$	0.006 ± 0.002	MC	PV	
μ	0.009 ± 0.009		PV	TD
2beam KK	0.030 ± 0.030		timing	PID
2beam Kπ	0.003 ± 0.003		timing	PID
K_{e4}	0.026 ± 0.026	MC	PV	CCD
CEX	0.013 ± 0.013	MC	timing	PV

1beam bkgd was negligible

Photon veto (Ilektra, Dima)

1. Verify R vs A on pnn1 2/3
2. Prepare kink sample (max kink events $\sim$ 10K)
3. Measure R(PV pnn1) on kink sample (baseline)
4. Tune PV on kink sample to create PV(pnn2)
   - Early BV hits
   - BVL TD hits
   - AD
   - other?
5. Measure R(PV pnn2) on $\overline{\text{CCDPUL}}$ sample

CCDPUL (Jim)

1. Examine/modify CCDPUL cut components to take into account new fitter
2. Measure R on $\overline{\text{PV(pnn1)}}$ and A on $K_{\mu 2}$ sample
3. Bipul increased A by $\sim$ 10%(relative) to $\sim$ 0.43 while maintaining R. Can we do better?

TD/μ background (Sasha)

1. I estimate we can gain $\sim 5\%$ acceptance by loosening TD cuts based on Bipul's and Tetsuro's theses (gain in 2002 FITPI is offset by L1.n losses due to higher rate)
2. Verify A(TD pnn1) on pnn1 2/3 sample
3. Measure pnn2 μ-bkgd with pnn1 TD cuts
4. Remove/loosen EV5, TDVARNN, ELVETO cuts and remeasure pnn2 μ bkgd

Signal box size (?)

1. Generate signal MC (can we use pnn1 signal MC?)
2. Assess potential acceptance gain by loosening P,R,E, cuts
3. Assess potential acceptance gain by loosening DELCO cut
4. Define and **blind** "large box" that includes current (P,R,E,DELCO) signal box

Beam background (Benji)

Strategy based on assumption that 2beam background dominates.

1. Measure N_{KK} and $N_{K\pi}$ with pnn1 cuts in pnn1 box
2. Measure N_{KK} and $N_{K\pi}$ with pnn1 cuts in pnn2 box
3. Check rejection of pnn2 DELCO, target cuts and TGPV on 2beam bkgd
4. Measure N_{KK} and $N_{K\pi}$ with pnn2 cuts in pnn2 box

Note: 1beam, 2beam background estimate limited by normalization sample (no events left)

$K_{\pi 2\gamma}$ (Wang?)

1. Generate $K_{\pi 2\gamma}$ MC
2. Compare $K_{\pi 2\gamma}$ and $K_{\pi 2}$ A and BR
3. Evaluate R(PV single γ) for radiative γ given measured single photon inefficiency as function of angle and energy and given accepted radiative photon spectrum

K_{e4} and CEX background : Later