What is the minimum Kpi2-scatter background?

- CCDPUL cut set at 0.5 Mev (for all the kaon fibers) for the secondpulse energy in pion time.

  $N_{bck} = \frac{3\times 40}{219\pm 72} = 0.5479 \pm 0.137$

  $A_{km21} = 0.0598 \pm 0.0005$

- CCDPUL cut at 1.5 MeV for vertex fiber and at 0.5 MeV for the non-vertex fiber and with delayed coincidence cut set at 10 ns. The rejection obtained from DELCO6 is 1.675 (134/80) and the rejection obtained from DELCO10 is 3.268 (134/41). This is the minimum background level that can be achieved and still maintaining the acceptance level of 1996 PNN2 analysis.

  $N_{bck} = \frac{3\times 18}{181.43\pm 68.83} = 0.2976 \pm 0.072$

  $A_{km21} = 0.0473 \pm 0.0004$

  The total background in the case is projected to be about 0.4986 ± 0.12 for the whole 1997 data smaple.

CUTS	KP2 P cut	PNN2 P cut	PNN2 BOX	PNN1 P cut
$\overline{RNGMOM}$	655	297	45	1014
COS3d	631	283	44	914
ZFRF	579	267	44	806
ZUTOUT	576	264	44	803
RSDEDX	377	185	37	494
UTCQUAL	369	179	37	480
CHIRF	280	162	36	324
LAY14	276	162	36	321
TDCUT (no tail_f)	44 (6.27 ± 0.87)	12 (13.5 ± 3.75)	3 (12.0 ± 6.6)	14 (22.9 ± 5.98)
PVCUT	43 (6.42 ± 0.87)	20 (8.1 ± 1.69)	4 (9.0 ± 4.2)	62 (5.18 ± 0.6)

Table 0.1: Rejection Table

Measuring TD rejection as a function of momentum

- The SETUP cut includes RECO, PISCAT, all TARGET (includes TGPV), lead glass cut.

CUTS	KP2 P cut	PNN2 P cut	PNN2 BOX	PNN1 P cut
$\overline{TDCUT}$	735	276	41	1044
COS3d	698	263	41	921
ZFRF	641	249	41	798
ZUTOUT	637	246	41	792
RSDEDX	428	170	35	476
UTCQUAL	419	168	35	459
RNGMOM	110	2	2	3
CHIRF	98	2	2	1
LAY14	98	2	2	1
PVCUT	4	0	0	0

Table 0.2: Normlisation Table

- For PNN2 BOX, muon background is:

$$N_{bck} = \frac{3\times 1}{(12.0\pm 6.6)\times(9.0\pm 4.2)} = 0.027 \pm 0.027$$

- For PNN2 momentum box only (no R and E), muon background is:

$$N_{bck} = \frac{3\times 1}{(13.5\pm 3.75)\times(8.1\pm 1.69)} = 0.027 \pm 0.027$$

- For KPI2 momentum box only (no R and E), muon background is:

$$N_{bck} = \frac{3\times 4}{(6.27\pm 0.87)\times(6.42\pm 0.87)} = 0.298 \pm 0.06$$

- For PNN1 momentum box only (no R and E), muon background is:

$$N_{bck} = \frac{3\times 1}{(22.9\pm 5.98)\times(5.18\pm 0.6)} = 0.025 \pm 0.025$$

	1996(1/3)	1996(2/3)	1997(1/3) [Old TD]	1997(1/3) [New TD]
KP2-sc(tg)	0.35 ± 0.10	0.62 ± 0.17	0.6083 ± 0.15	0.6083 ± 0.15
KP2-sc(rs)	0.004 ± 0.006	0.007 ± 0.007	0.0023 ± 0.0022	0.0021 ± 0.002
$K^+ \to \pi^+\pi^0\gamma$	0.022 ± 0.004	0.027 ± 0.004	0.024 ± 0.004	0.024 ± 0.004
Muon Back	0.011 ± 0.011	0.007 ± 0.007	0.019 ± 0.019	0.0082 ± 0.0082
1-beam	0.0009 ± 0.0009	0.0003 ± 0.0003	0.0007 ± 0.0007	0.0007 ± 0.0007
2-beam	0.050 ± 0.050 (KK)	0.031 ± 0.031 (KK)	0.091 ± 0.091 (KK)	0.091 ± 0.091 (KK)
	0.006 ± 0.006 (KP)	0.002 ± 0.002 (KP)	0.013 ± 0.013 (KP)	0.013 ± 0.013 (KP)
KE4	0.022 ± 0.022 (M1)	0.026 ± 0.032 (DM)	0.027 ± 0.027 (M1)	0.027 ± 0.027 (M1)
	0.071 ± 0.071 (M3)		0.048 ± 0.048 (M3)	0.048 ± 0.048 (M3)
	0.051 ± 0.062 (DM)		0.051 ± 0.062 (DM)	0.051 ± 0.062 (DM)
CEX	0.011 ± 0.011	0.011 ± 0.011	0.011 ± 0.011	0.011 ± 0.011
Total	0.506 ± 0.131	0.731 ± 0.177	0.820 ± 0.18	0.8093 ± 0.18

Table 0.3: Final Background Table from the 1/3 data

CUT	1996	%	1997	%
SETUP_RD	143331		308024	
RRS	143331	1.0000	308024	1.0000
TRKTIM	143303	0.9998	307981	0.9998
A_{RD}		0.9998 ± 0.00004		0.9998 ± 0.00002
SETUP_RECO	47845		101643	
UTC	47845	1.0000	101643	1.0000
UTCQUAL	46774	0.9776	97972	0.9639
TARGET RECO.	46654	0.9974	97669	0.9969
A_{RECO}		0.9751 ± 0.0007		0.9609 ± 0.0006
SETUP_PV	40412		87044	
LHEX	38225	0.9459	81991	0.9420
0N_BV	37605	0.9838	80681	0.9840
0N_EC	37278	0.9913	79992	0.9915
STLAY	36649	0.9831	78612	0.9828
RSHEX	34796	0.9494	74725	0.9506
P1_INTIME	34730	0.9981	74576	0.9980
PVCUT	34040	0.9801	72920	0.9778
TGPVCUT	33953	0.9974	72687	0.9968
RSHEX2	33953	1.0000	72687	1.0000
TGPVTR	33953	1.0000	72687	1.0000
TG	31111	0.9163	63535	0.8741
IC	30856	0.9918	62886	0.9898
VC	30741	0.9963	62625	0.9959
CO	30203	0.9825	61551	0.9829
CM	30198	0.9998	61536	0.9998
EC_IU	25478	0.8437	53254	0.8654
EC_ID	25032	0.9825	52129	0.9789
SG	24995	0.9985	52037	0.9982
RD	22817	0.9129	47637	0.9154
BV	21388	0.9374	44856	0.9416
EC	16521	0.7724	35144	0.7835
PBNRS	14666	0.8877	34071	0.9695
A_{PV}		0.3629 ± 0.0024		0.3914 ± 0.0017

Table 0.4: KM21 based Acceptance of RECO CUTS and PV cuts

CUT	1996	%	1997	%
SETUP_PSCT	67450		144114	
ICBIT	67258	0.9972	144014	0.9993
DCBIT	59631	0.8866	128697	0.8936
PSCUT	58396	0.9793	126515	0.9831
B4DEDX	57820	0.9901	125817	0.9945
BWTRS	57428	0.9932	124985	0.9934
B4TRS	57420	0.9999	124967	0.9999
B4TD	56849	0.9942	123929	0.9952
CPITRS	56835	0.9998	123886	0.9996
CKTRS	56800	0.9994	123852	0.9997
BHTRS	56800	1.0000	123852	1.0000
TIMCON-TK	56761	0.9993	123788	0.9995
TIMCON-TP	56570	0.9966	123351	0.9965
DELCO-PNN1	47735	0.8438	113582	0.9208
A_{PSCT}		0.7077 ± 0.0017		0.7881 ± 0.0011

Table 0.5: KM21 Based acceptance of Piscat cuts.

CUT	1996	%	1997	%	1997 (DC 10 ns)	%
SETUP_TG	47735		101289		101289	
B4TIM	44284	0.9277	98027	0.9678	98027	0.9678
B4EKZ	34790	0.7856	75618	0.7714	75618	0.7714
B4EKZ_IC	34692	0.9972	75399	0.9971	75399	0.9971
TGZFOOL	34580	0.9968	75166	0.9969	75166	0.9969
EPITG	33609	0.9719	72444	0.9638	72444	0.9638
EPIMAXK	33609	1.0000	72444	1.0000	72444	1.0000
TGER	33609	1.0000	72444	1.0000	72444	1.0000
TARGF	32926	0.9797	70893	0.9786	70893	0.9786
DTGTTP	32922	0.9999	70887	0.9999	70887	0.9999
RTDIF	32846	0.9977	70716	0.9976	70716	0.9976
DRP	32843	0.9999	70703	0.9998	70703	0.9998
TGKTIM	32085	0.9769	69506	0.9831	69506	0.9831
EIC	31986	0.9969	69299	0.9970	69299	0.9970
TIC	31947	0.9988	69209	0.9987	69209	0.9987
TGEDGE	31916	0.9990	69154	0.9992	69154	0.9992
TGENR	31000	0.9713	67204	0.9718	67204	0.9718
PIGAP	30787	0.9931	66812	0.9942	66812	0.9942
TGLIKE	30787	1.0000	66812	1.0000	66812	1.0000
TGB4	29391	0.9547	64192	0.9608	64192	0.9608
PHIVTX	28733	0.9776	61822	0.9631	61822	0.9631
CCDPUL	11516	0.4008	37744	0.6105	37744	0.6105
TIMKF	10534	0.9147	34920	0.9252	34920	0.9252
DELCO	8318	0.7896	26924	0.7710	17979	0.5149
NPITG	8318	1.0000	26924	1.0000	17979	1.0000
VERRNG	7732	0.9296	25013	0.9290	16703	0.9290
ANGLI	7731	0.9999	25012	0.9999	16702	0.9999
ALLKFIT	7716	0.9981	24881	0.9948	16616	0.9949
TPICS	7712	0.9995	24855	0.9989	16596	0.9988
KIC	7711	0.9999	24841	0.9994	16583	0.9992
EPIONK	7652	0.9923	24427	0.9833	16172	0.9752
A_{TG}		0.1603 ± 0.0017		0.2412 ± 0.0013		0.1597 ± 0.0012

Table 0.6: KM21 Based Acceptance of Target cuts

CUT	1996	%	1997	%
SETUP_TD	15178		36133	
FITPI	10844	0.714	25488	0.7054
RSHEX	10619	0.979	24960	0.9793
L1.N	9217	0.868	19191	0.7689
ELVETO	8764	0.951	18726	0.9758
PROBTD	8201	0.936	17472	0.9330
TDFOOL	8157	0.995	17436	0.9979
TAIL_F	–	–	17217	0.9874
A_{TD}		0.5374 ± 0.0040		0.4765 ± 0.0026

Table 0.7: Piscat based TD cuts Acceptance

CUT	1996	%	1997	%
SETUP_KIN				
BOX_PNN2	11353		25426	
RNGMOM	10115	0.891	23516	0.9249
CHIMAX_RSDEDX	10070	0.996	23402	0.9952
CL_RSDEDX	9863	0.979	22854	0.9766
CHIRF(XY)	9832	0.997	22781	0.9968
CHIRF(Z)	9431	0.959	21824	0.9580
A_{KIN}		0.8307 ± 0.0035		0.8583 ± 0.0022

Table 0.8: Piscat Based Kinematic Cuts Acceptance

CUT	1996	%	1997	%
SETUP_TGKIN	10846		39295	
TGDEDX	10720	0.988	38736	0.9858
CHI567	9110	0.850	32547	0.8402
CHI5MAX	8919	0.979	31886	0.9797
A_{TGKIN}		0.8223 ± 0.0037		0.8115 ± 0.0020

Table 0.9: KP22 based Acceptance of some Target cuts

	1996 PNN2	1997 PNN2	1997 PNN2 (DC 10 ns)
A_{UMC}	0.0808 ± 0.001	0.0808 ± 0.001	0.0808 ± 0.001
A_{KM21}	0.0401 ± 0.0005	0.0715 ± 0.0005	0.0473 ± 0.0004
A_{TD}	0.5448 ± 0.0040	0.4866 ± 0.0026	0.4866 ± 0.0026
A_{KIN}	0.8348 ± 0.0038	0.8583 ± 0.0022	0.8583 ± 0.0022
A_{TGKIN}	0.8223 ± 0.0037	0.8115 ± 0.0020	0.8115 ± 0.0020
A_{SWATH}	0.9820 ± 0.001	0.9820 ± 0.001	0.9820 ± 0.001
A_{TOT}	$(1.190 \pm 0.018) \times 10^{-3}$	$(1.923 \pm 0.030) \times 10^{-3}$	$(1.27 \pm 0.021) \times 10^{-3}$

Table 0.10: Final Acceptance Table