

TD acceptance and rejection

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1 TD acceptance for $\pi^+\nu\bar{\nu}1$ analysis

The TD acceptance had been measured by using the π_{scat} monitor sample of 2002 data. More details of this calculation can be found in [1], [2] and [3]. Table 1(A) shows the obtained results represented in [2] and [3]. A few comments should be mentioned when regarding these results:

- Not complete π_{scat} monitor sample had been used.
- The comis function that produced the results had a bug. This bug influences on a ratio of two numbers in a row of the table. For instance, in the first row we have $3203/4966 = 0.645$.

2 Re-measurement of TD acceptance for $\pi^+\nu\bar{\nu}1$ analysis

The TD acceptance for $\pi^+\nu\bar{\nu}1$ analysis have been recalculated taking into account the above mentioned comments. As before the **loose setup cut** has been defined by the following set of cuts: BAD_RUN, RD_TRK, STLAY, BAD_STC, TRKTIM, UTC, RDUTM, PDC, LAY14, UTC1, RANGE1, B4DEDX, $|t_\pi - t_{rs}| < 5$ ns, ICBIT, TARGF, DTGTTP, RTDIF, TGQUALT, TGZFOOL, BHTRS, CKTRS, CKTAIL, RSPV, Online PV, PVCUT, TGCUT, TGPVCUT, COS3D, LAYV4, Final box, RNGMOM, ZFRF, ZUTOUT, LAYER14, UTCQUAL, EICKIN, The **tight setup cut** is defined as the loose setup cut with 3 additional cuts: RSPV, RSDEX and PRRF.

The table 1(B) shows the obtained results. Note that there's another ratio in the first row of the table ($6882/18163 = 0.379$). The biggest difference between the table 1(A) and table 1(B) manifests itself in the RSHEX2 cut. This difference is smoothed after including the RSHEX cut into the loose setup cut. The corresponding results are shown in the table 1(C).

3 Measurement of TD acceptance for $\pi^+\nu\bar{\nu}2$ analysis

The measurement of TD acceptance for $\pi^+\nu\bar{\nu}2$ analysis have been performed by the same comis function as in the $\pi^+\nu\bar{\nu}1$ analysis but with a few exceptions. There were two changes in the loose setup cut: a) BOX_PNN1 \rightarrow BOX_PNN2; b) LAYV4 \rightarrow ($6 \leq \text{LAY} \leq 18$). As before the **tight setup cut** has been defined as the new loose setup cut with 3 additional cuts: RSPV, RSDEX and PRRF. The obtained results are presented in the table 2. The results corresponds to the case when the RSHEX cut is not included in the loose setup cut. The table 3 should be considered when the RSHEX cut is included.

Cuts	Loose setup cuts		Tight setup cuts	
	Events	Acceptance	Events	Acceptance
Setup	4966	-	3203	-
FITPI (bad data)	4962	0.99919	3199	0.99875
FITPI (counting)	4117	0.82971	2701	0.84433
RSHEX2	4045	0.98251	2659	0.98445
L1.1	3090	0.76391	2035	0.76533
L1.2	2674	0.86537	1772	0.87076
TDCUT	2504	0.93642	1657	0.93510
EV5	2138	0.85383	1408	0.84973
ELVETO	2029	0.94902	1339	0.95099
TDFOOL	2028	0.99951	1339	1.00000
TDVARNN	1716	0.84615	1134	0.84690
Acceptance	0.3456 ± 0.0068		0.3590 ± 0.0086	
$A_{\pi \rightarrow \mu \rightarrow e}$	0.3523 ± 0.0077			
Setup	18163	-	6882	-
FITPI (bad data)	18137	0.99857	6877	0.99927
FITPI (counting)	14990	0.82649	5745	0.83539
RSHEX2	14052	0.93743	5475	0.95300
L1.1	10834	0.77099	4272	0.78027
L1.2	9213	0.85038	3606	0.84410
TDCUT	8697	0.94399	3414	0.94676
EV5	7292	0.83845	2868	0.84007
ELVETO	6895	0.94556	2720	0.94840
TDFOOL	6891	0.99942	2718	0.99927
TDVARNN	5811	0.84327	2279	0.83848
Acceptance	0.3199 ± 0.0035		0.3312 ± 0.0057	
$A_{\pi \rightarrow \mu \rightarrow e}$	0.3256 ± 0.0046			
Setup	17371	-	6690	-
FITPI (bad data)	17360	0.99937	6687	0.99955
FITPI (counting)	14364	0.82742	5604	0.83804
RSHEX2	14052	0.97828	5475	0.97698
L1.1	10834	0.77099	4272	0.78027
L1.2	9213	0.85038	3606	0.84410
TDCUT	8697	0.94399	3414	0.94676
EV5	7292	0.83845	2868	0.84007
ELVETO	6895	0.94556	2720	0.94840
TDFOOL	6891	0.99942	2718	0.99927
TDVARNN	5811	0.84327	2279	0.83848
Acceptance	0.3345 ± 0.0036		0.3407 ± 0.0058	
$A_{\pi \rightarrow \mu \rightarrow e}$	0.3376 ± 0.0047			

Table 1: A) π_{scat} -based TD acceptance for $\pi^+ \nu \bar{\nu} 1$ analysis of 2002 data (see [2] or [3]). B) Recalculated TD acceptance for $\pi^+ \nu \bar{\nu} 1$ analysis based on 2002 π_{scat} monitor trigger data. C) Recalculated TD acceptance for $\pi^+ \nu \bar{\nu} 1$ analysis based on 2002 π_{scat} monitor trigger data, where the RSHEX cut has been included in the loose setup cut.

Cuts	Loose setup cuts		Tight setup cuts	
	Events	Acceptance	Events	Acceptance
Setup	31540	-	7802	-
FITPI (bad data)	31506	0.99892	7793	0.99885
FITPI (counting)	26052	0.82689	6596	0.84640
RSHEX2	23940	0.91893	6182	0.93724
L1.1	19711	0.82335	5143	0.83193
L1.2	16043	0.81391	4324	0.84075
TDCUT	15111	0.94191	4080	0.94357
EV5	12547	0.83032	3419	0.83799
ELVETO	11977	0.95457	3244	0.94882
TDFOOL	11953	0.99800	3241	0.99908
TDVARNN	10157	0.84975	2752	0.84912
Acceptance	0.3220 ± 0.0026		0.3527 ± 0.0054	
$A_{\pi \rightarrow \mu \rightarrow e}$	0.3374 ± 0.0040			

Table 2: TD acceptance for $\pi^+ \nu \bar{\nu} 2$ analysis based on 2002 π_{scat} monitor trigger data.

Cuts	Loose setup cuts		Tight setup cuts	
	Events	Acceptance	Events	Acceptance
Setup	29586	-	7495	-
FITPI (bad data)	29571	0.99949	7490	0.99933
FITPI (counting)	24421	0.82584	6344	0.84700
RSHEX2	23940	0.98030	6182	0.97446
L1.1	19711	0.82335	5143	0.83193
L1.2	16043	0.81391	4324	0.84075
TDCUT	15111	0.94191	4080	0.94357
EV5	12547	0.83032	3419	0.83799
ELVETO	11977	0.95457	3244	0.94882
TDFOOL	11953	0.99800	3241	0.99908
TDVARNN	10157	0.84975	2752	0.84912
Acceptance	0.3433 ± 0.0028		0.3672 ± 0.0057	
$A_{\pi \rightarrow \mu \rightarrow e}$	0.3553 ± 0.0042			

Table 3: TD acceptance for $\pi^+ \nu \bar{\nu} 2$ analysis based on 2002 π_{scat} monitor trigger data, where the RSHEX cut has been included in the loose setup cut.

	Rejection				Acceptance
	range tail		band		
	all	ER box	all	ER box	
SETUP	65712(-)	20292(-)	40389(-)	17976(-)	192647(-)
EV5	31432(2.09)	9453(2.15)	19926(2.03)	9081(1.98)	160853(0.835)
ELVETO	18603(1.69)	5510(1.72)	11335(1.76)	5115(1.78)	150361(0.938)
TDFOOL	18508(1.01)	5478(1.01)	11283(1.00)	5096(1.00)	150098(0.998)
TDVAR	137(135 ± 11)	51(107 ± 15)	75(150 ± 17)	34(150 ± 26)	127016(0.846)
Rej.	480 ± 41	398 ± 56	539 ± 62	529 ± 91	0.659 ± 0.001

Table 4: Rejection and acceptance of the 2002 TD cuts using 2/3 sample (the table taken from [1]).

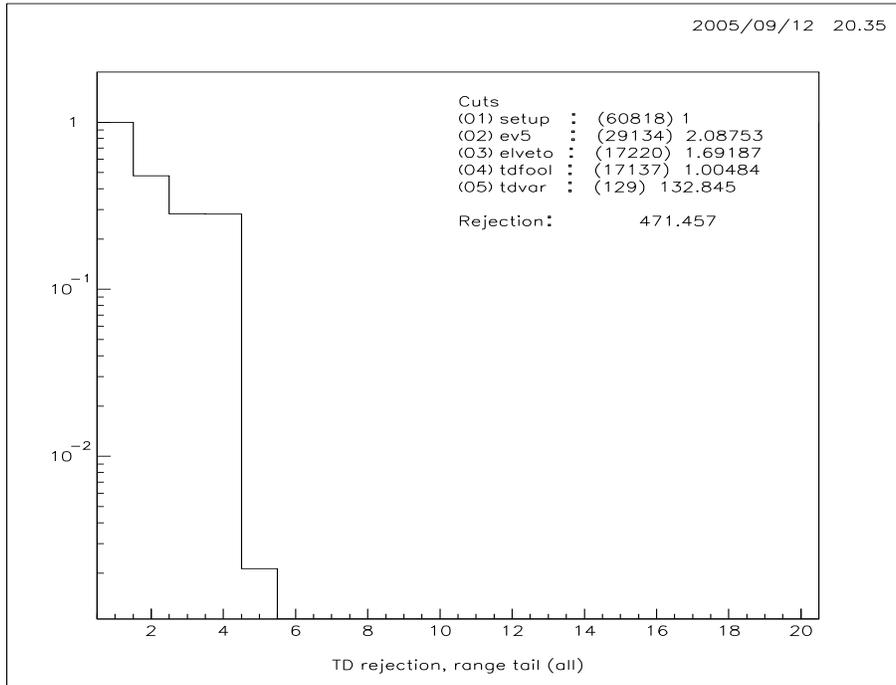


Figure 1: TD rejection (range tail, all) for $\pi^+\nu\bar{\nu}1$ analysis based on 2/3 sample of the 2002 data

4 Re-measurement of TD rejection for $\pi^+\nu\bar{\nu}1$ analysis (preliminary results)

There are only preliminary results devoted to the recalculation of TD rejection for $\pi^+\nu\bar{\nu}1$ analysis. The results are shown in Fig. 1 and 2. The previous results listed in [1] are represented in the table 4. In the mentioned reference one can find more detailed description.

References

- [1] S. Chen, J. Hu, A. Konaka, J. Mildenerger, K. Mizouchi, T. Sekiguchi, D. Vavilov, **2002 $\pi^+\nu\bar{\nu}1$ data analysis**, E949 K-034.
- [2] S. Chen, J. Hu, D. Jaffe, A. Konaka, J. Mildenerger, K. Mizouchi, T. Sekiguchi, D. Vavilov, **Further 2002 $\pi^+\nu\bar{\nu}1$ analysis**, E949 K-038.

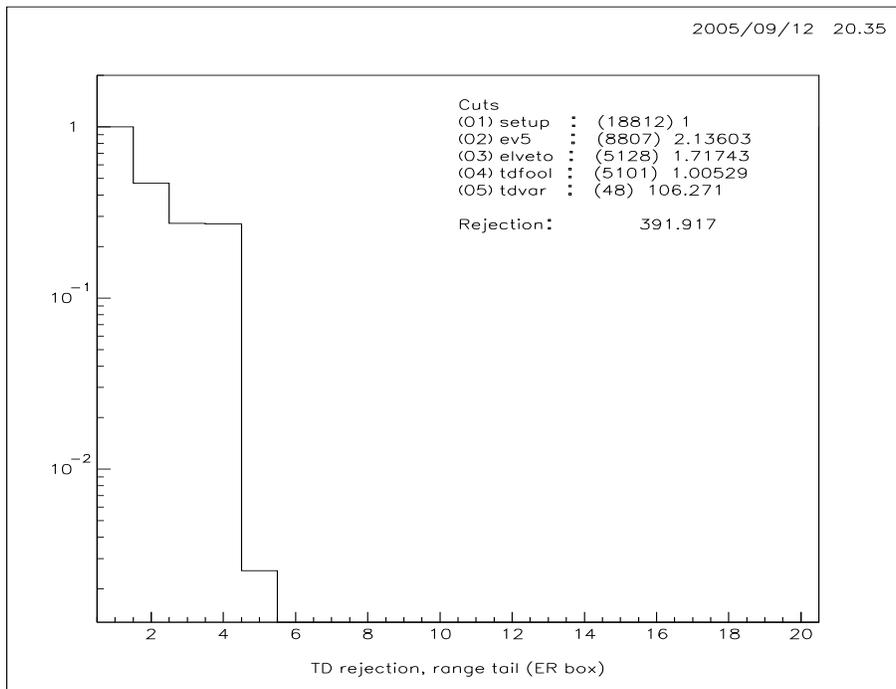


Figure 2: TD rejection (range tail, ER box) for $\pi^+\nu\bar{\nu}$ analysis based on 2/3 sample of the 2002 data

- [3] Tetsuro Sekiguchi, **Measurement of the $K^+ \rightarrow \pi^+\nu\bar{\nu}$ Branching Ratio**, thesis, KEK K-decay Report 2005-3.