



$$I(J^P) = \frac{1}{2}(0^-)$$

K^0 MASS

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
497.672±0.031 OUR FIT				
497.672±0.031 OUR AVERAGE				
497.661±0.033	3713	BARKOV	87B CMD	$e^+e^- \rightarrow K_L^0 K_S^0$
497.742±0.085	780	BARKOV	85B CMD	$e^+e^- \rightarrow K_L^0 K_S^0$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
497.44 ±0.50		FITCH	67 OSPK	
498.9 ±0.5	4500	BALTAY	66 HBC	K^0 from $\bar{p}p$
497.44 ±0.33	2223	KIM	65B HBC	K^0 from $\bar{p}p$
498.1 ±0.4		CHRISTENS...	64 OSPK	

$m_{K^0} - m_{K^\pm}$

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
3.995±0.034 OUR FIT	Error includes scale factor of 1.1.				
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
3.95 ±0.21	417	HILL	68B DBC	+	$K^+ d \rightarrow K^0 p p$
3.90 ±0.25	9	BURNSTEIN	65 HBC	-	
3.71 ±0.35	7	KIM	65B HBC	-	$K^- p \rightarrow n \bar{K}^0$
5.4 ±1.1		CRAWFORD	59 HBC	+	
3.9 ±0.6		ROSENFELD	59 HBC	-	

$$|m_{K^0} - m_{\bar{K}^0}| / m_{\text{average}}$$

A test of *CPT* invariance.

<u>VALUE</u>	<u>DOCUMENT ID</u>
<10⁻¹⁸ OUR EVALUATION	

T-VIOLATION PARAMETER IN K^0 - \bar{K}^0 MIXING

The asymmetry $A_T = \frac{\Gamma(\bar{K}^0 \rightarrow K^0) - \Gamma(K^0 \rightarrow \bar{K}^0)}{\Gamma(\bar{K}^0 \rightarrow K^0) + \Gamma(K^0 \rightarrow \bar{K}^0)}$ must vanish if *T* invariance holds.

TIME-REVERSAL ASYMMETRY A_T

<u>VALUE (units 10⁻³)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>
6.6±1.3±1.0	640k	¹ ANGELOPO...	98E CPLR

¹ANGELOPOULOS 98E measures the asymmetry $A_T = [\Gamma(\bar{K}_{t=0}^0 \rightarrow e^+ \pi^- \nu_{t=\tau}) - \Gamma(K_{t=0}^0 \rightarrow e^- \pi^+ \bar{\nu}_{t=\tau})] / [\Gamma(\bar{K}_{t=0}^0 \rightarrow e^+ \pi^- \nu_{t=\tau}) + \Gamma(K_{t=0}^0 \rightarrow e^- \pi^+ \bar{\nu}_{t=\tau})]$ as a function of the neutral-kaon eigentime τ . The initial strangeness of the neutral kaon is tagged by the charge of the accompanying charged kaon in the reactions $p\bar{p} \rightarrow K^- \pi^+ K^0$ and $p\bar{p} \rightarrow K^+ \pi^- \bar{K}^0$. The strangeness at the time of the decay is tagged by the lepton charge. The reported result is the average value of A_T over the interval $1\tau_S < \tau < 20\tau_S$.

CPT-VIOLATION PARAMETERS IN K^0 - \bar{K}^0 MIXING

If CP -violating interactions include a T conserving part then

$$|K_S\rangle = [|K_1\rangle + (\epsilon + \Delta) |K_2\rangle] / \sqrt{1 + |\epsilon + \Delta|^2}$$

$$|K_L\rangle = [|K_2\rangle + (\epsilon - \Delta) |K_1\rangle] / \sqrt{1 + |\epsilon - \Delta|^2}$$

where

$$|K_1\rangle = [|K^0\rangle + |\bar{K}^0\rangle] / \sqrt{2}$$

$$|K_2\rangle = [|K^0\rangle - |\bar{K}^0\rangle] / \sqrt{2}$$

and

$$|\bar{K}^0\rangle = CP|K^0\rangle.$$

The parameter Δ specifies the CPT -violating part.

Estimates of Δ are given below assuming the validity of the $\Delta S = \Delta Q$ rule. See also THOMSON 95 for a test of CPT -symmetry conservation in K^0 decays using the Bell-Steinberger relation.

REAL PART OF Δ

A nonzero value violates CPT invariance.

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.9 ± 2.7 OUR AVERAGE				
2.9 ± 2.6 ± 0.6	1.3M	² ANGELOPO... 98F	CPLR	
180 ± 200	6481	³ DEMIDOV 95		$K_{\ell 3}$ reanalysis

² If $\Delta S = \Delta Q$ is not assumed, ANGELOPOULOS 98F finds $\text{Re}\Delta = (3.0 \pm 3.3 \pm 0.6) \times 10^{-4}$.

³ DEMIDOV 95 reanalyzes data from HART 73 and NIEBERGALL 74.

IMAGINARY PART OF Δ

A nonzero value violates CPT invariance.

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
- 0.8 ± 3.1 OUR AVERAGE				
- 0.9 ± 2.9 ± 1.0	1.3M	⁴ ANGELOPO... 98F	CPLR	
21 ± 37	6481	⁵ DEMIDOV 95		$K_{\ell 3}$ reanalysis

⁴ If $\Delta S = \Delta Q$ is not assumed, ANGELOPOULOS 98F finds $\text{Im}\Delta = (-15 \pm 23 \pm 3) \times 10^{-3}$.

⁵ DEMIDOV 95 reanalyzes data from HART 73 and NIEBERGALL 74.

K^0 REFERENCES

ANGELOPO... 98E	PL B444 43	A. Angelopoulos+	(CPLEAR Collab.)
ANGELOPO... 98F	PL B444 52	A. Angelopoulos+	(CPLEAR Collab.)
DEMIDOV 95	PAN 58 968	+Gusev, Shabalin	(ITEP)
	From YAF 58 1041.		
THOMSON 95	PR D51 1412	+Zou	(RUTG)
BARKOV 87B	SJNP 46 630	+Vasserman, Vorobev, Ivanov+	(NOVO)
	Translated from YAF 46 1088.		
BARKOV 85B	JETPL 42 138	+Blinov, Vasserman+	(NOVO)
	Translated from ZETFP 42 113.		
NIEBERGALL 74	PL 49B 103	+Regler, Stier+	(CERN, ORSAY, VIEN)
HART 73	NP B66 317	+Hutton, Field, Sharp, Blackmore+	(CAVE, RHEL)
HILL 68B	PR 168 1534	+Robinson, Sakitt, Canter	(BNL, CMU)
FITCH 67	PR 164 1711	+Roth, Russ, Vernon	(PRIN)
BALTAY 66	PR 142 932	+Sandweiss, Stonehill+	(YALE, BNL)
BURNSTEIN 65	PR 138B 895	+Rubin	(UMD)
KIM 65B	PR 140B 1334	+Kirsch, Miller	(COLU)
CHRISTENS... 64	PRL 13 138	Christenson, Cronin, Fitch, Turlay	(PRIN)
CRAWFORD 59	PRL 2 112	+Cresti, Good, Stevenson, Ticho	(LRL)
ROSENFELD 59	PRL 2 110	+Solmitz, Tripp	(LRL)