



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

K⁰ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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	

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

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
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.

VALUE	DOCUMENT ID
<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.

ASYMMETRY A_T IN $K^0-\bar{K}^0$ MIXING

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

¹ ANGELOPOULOS 98E measures the asymmetry $A_T = [\Gamma(\bar{K}^0_{t=0} \rightarrow e^+ \pi^- \nu_{t=\tau}) - \Gamma(K^0_{t=0} \rightarrow e^- \pi^+ \bar{\nu}_{t=\tau})] / [\Gamma(\bar{K}^0_{t=0} \rightarrow e^+ \pi^- \nu_{t=\tau}) + \Gamma(K^0_{t=0} \rightarrow e^- \pi^+ \bar{\nu}_{t=\tau})]$ 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 $1\tau_S < \tau < 20\tau_S$.

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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 <i>et al.</i>	(CPLEAR Collab.)
ANGELOPO... 98F	PL B444 52	A. Angelopoulos <i>et al.</i>	(CPLEAR Collab.)
DEMIDOV 95	PAN 58 968	V. Demidov, K. Gusev, E. Shabalín	(ITEP)
From YAF 58	1041.		
THOMSON 95	PR D51 1412	G.B. Thomson, Y. Zou	(RUTG)
BARKOV 87B	SJNP 46 630	L.M. Barkov <i>et al.</i>	(NOVO)
	Translated from YAF 46	1088.	
BARKOV 85B	JETPL 42 138	L.M. Barkov <i>et al.</i>	(NOVO)
	Translated from ZETFP 42	113.	

NIEBERGALL	74	PL 49B 103	F. Niebergall <i>et al.</i>	(CERN, ORSAY, VIEN)
HART	73	NP B66 317	J.C. Hart <i>et al.</i>	(CAVE, RHEL)
HILL	68B	PR 168 1534	D.G. Hill <i>et al.</i>	(BNL, CMU)
FITCH	67	PR 164 1711	V.L. Fitch <i>et al.</i>	(PRIN)
BALTAY	66	PR 142 932	C. Baltay <i>et al.</i>	(YALE, BNL)
BURNSTEIN	65	PR 138B 895	R.A. Burnstein, H.A. Rubin	(UMD)
KIM	65B	PR 140B 1334	J.K. Kim, L. Kirsch, D. Miller	(COLU)
CHRISTENS...	64	PRL 13 138	J.H. Christenson <i>et al.</i>	(PRIN)
CRAWFORD	59	PRL 2 112	F.S. Crawford <i>et al.</i>	(LRL)
ROSENFELD	59	PRL 2 110	A.H. Rosenfeld, F.T. Solmitz, R.D. Tripp	(LRL)
