K^0_S

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

K^0_S MEAN LIFE

For earlier measurements, beginning with BOLDT 58B, see our our 1986 edition, Physics Letters **170B** 130 (1986).

OUR FIT is described in the note on "Fits for K^0_L *CP*-Violation Parameters" in the K^0_L Particle Listings.

VALUE (10^{-10} s)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
0.8935±0.0008 OUR FIT					
0.8940±0.0009 OUR AVERAGE					
0.8971±0.0021		BERTANZA	97	NA31	
0.8941±0.0014±0.0009		SCHWINGEN...95		E773	Δm free, $\phi_{+-}=\phi_{SW}$
0.8929±0.0016		GIBBONS	93	E731	
0.8920±0.0044	214k	GROSSMAN	87	SPEC	
0.881 ±0.009	26k	ARONSON	76	SPEC	
0.8924±0.0032		[1] CARITHERS	75	SPEC	
0.8937±0.0048	6M	GEWENIGER	74B	ASPK	
0.8958±0.0045	50k	[2] SKJEGGEST...	72	HBC	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.905 ±0.007		[3] ARONSON	82B	SPEC	
0.856 ±0.008	19994	[4] DONALD	68B	HBC	
0.872 ±0.009	20000	[4,5] HILL	68	DBC	

[1] CARITHERS 75 value is for $m_{K^0_L} - m_{K^0_S}$ $\Delta m = 0.5301 \pm 0.0013$. The Δm dependence of the total decay rate (inverse mean life) is $\Gamma(K^0_S) = [(1.122 \pm 0.004) + 0.16(\Delta m - 0.5348)/\Delta m]10^{10}$/s, or, in terms of meanlife $\tau_s = 0.8913 \pm 0.0032 - 0.238(\Delta m - 0.5348)$ where Δm and τ_s are in units of $10^{10}\hbar s^{-1}$ and 10^{-10}s respectively.

[2] HILL 68 has been changed by the authors from the published value (0.865 ± 0.009) because of a correction in the shift due to η_{+-}. SKJEGGESTAD 72 and HILL 68 give detailed discussions of systematics encountered in this type of experiment.

[3] ARONSON 82 find that K^0_S mean life may depend on the kaon energy.

[4] Pre-1971 experiments are excluded from the average because of disagreement with later more precise experiments.

[5] HILL 68 has been changed by the authors from the published value (0.865 ± 0.009) because of a correction in the shift due to η_{+-}. SKJEGGESTAD 72 and HILL 68 give detailed discussions of systematics encountered in this type of experiment.

K^0_S DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level

Hadronic modes

Γ_1	$\pi^0\pi^0$		(31.40±0.27) %	S=1.2
Γ_2	$\pi^+\pi^-$		(68.60±0.27) %	S=1.2
Γ_3	$\pi^+\pi^-\pi^0$		$(3.2\ {}^{+1.2}_{-1.0}) \times 10^{-7}$	

Modes with photons or $\ell\bar{\ell}$ pairs

Γ_4	$\pi^+\pi^-\gamma$	[a,b]	$(1.78\pm0.05) \times 10^{-3}$	
Γ_5	$\pi^+\pi^- e^+ e^-$		$(4.5\ \pm0.8\ ) \times 10^{-5}$	
Γ_6	$\gamma\gamma$		$(2.5\ \pm0.4\ ) \times 10^{-6}$	

Semileptonic modes

Γ_7	$\pi^\pm e^\mp \nu_e$	[c]	$(7.2\ \pm1.4\ ) \times 10^{-4}$	
Γ_8	$\pi^\pm \mu^\mp \nu_\mu$	[c]		

CP violating (*CP*) and $\Delta S = 1$ weak neutral current (*S1*) modes

Γ_9	$3\pi^0$	*CP*	< 1.4	$\times 10^{-5}$	CL=90%
Γ_{10}	$\mu^+\mu^-$	*S1*	< 3.2	$\times 10^{-7}$	CL=90%
Γ_{11}	$e^+ e^-$	*S1*	< 1.4	$\times 10^{-7}$	CL=90%
Γ_{12}	$\pi^0 e^+ e^-$	*S1*	< 1.1	$\times 10^{-6}$	CL=90%

[a] Most of this radiative mode, the low-momentum γ part, is also included in the parent mode listed without γ's.

[b] See the Particle Listings below for the energy limits used in this measurement.

[c] The value is for the sum of the charge states or particle/antiparticle states indicated.

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 13 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 = 15.5$ for 12 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−100
	x_1

K^0_S DECAY RATES

$\Gamma(\pi^\pm e^\mp \nu_e)$ Γ_7

VALUE (10^6 s^{-1})	EVTS	DOCUMENT ID		TECN	COMMENT
8.1 ±1.6	75	[6] AKHMETSHIN	99	CMD2	Tagged K^0_S using $\phi \to K^0_L K^0_S$

• • • We do not use the following data for averages, fits, limits, etc. • • •

7.50±0.08	[7] PDG	98		
seen	BURGUN	72	HBC	$K^+ p \to K^0 p \pi^+$
9.3 ±2.5	AUBERT	65	HLBC	ΔS=ΔQ, *CP* cons. not assumed

[6] AKHMETSHIN 99 is from a measured branching ratio $B(K^0_S \to \pi e \nu_e) = (7.2 \pm 1.4) \times 10^{-4}$ and $\tau_{K^0_S} = (0.8934 \pm 0.0008) \times 10^{-10}$ s.

[7] PDG 98 from K^0_L measurements, assuming that $\Delta S = \Delta Q$ in K^0 decay so that $\Gamma(K^0_S \to \pi^\pm e^\mp \nu_e) = \Gamma(K^0_L \to \pi^\pm e^\mp \nu_e)$.

$\Gamma(\pi^\pm \mu^\mp \nu_\mu)$ Γ_8

VALUE (10^6 s^{-1})	DOCUMENT ID		

• • • We do not use the following data for averages, fits, limits, etc. • • •

5.25±0.07	[8] PDG	98	

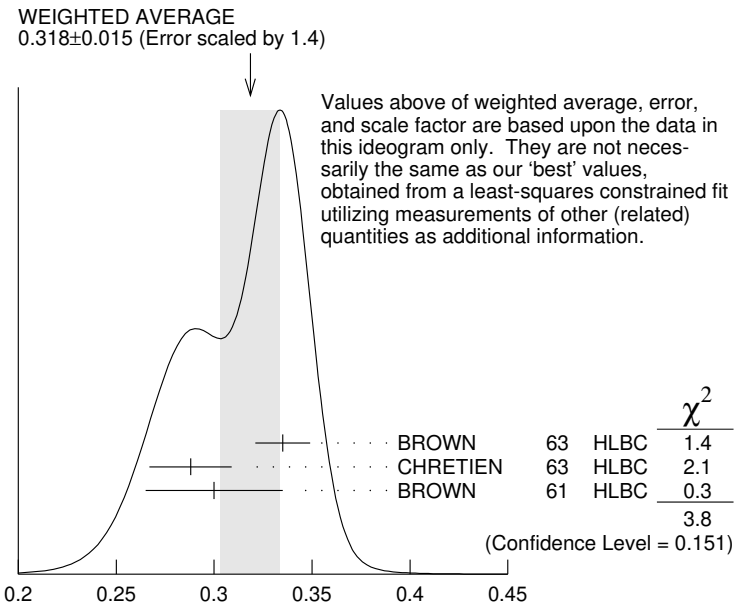
[8] PDG 98 from K^0_L measurements, assuming that $\Delta S = \Delta Q$ in K^0 decay so that $\Gamma(K^0_S \to \pi^\pm \mu^\mp \nu_\mu) = \Gamma(K^0_L \to \pi^\pm \mu^\mp \nu_\mu)$.

K^0_S BRANCHING RATIOS

Hadronic modes

$\Gamma(\pi^0 \pi^0)/\Gamma_{total}$ Γ_1/Γ

VALUE	EVTS	DOCUMENT ID		TECN
0.3140±0.0027 OUR FIT Error includes scale factor of 1.2.				
0.318 ±0.015 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
0.335 ±0.014	1066	BROWN	63	HLBC
0.288 ±0.021	198	CHRETIEN	63	HLBC
0.30 ±0.035		BROWN	61	HLBC



$\Gamma\left(\pi^0\,\pi^0\right)/\Gamma_{\text{total}}$

$\Gamma\left(\pi^+\pi^-\right)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.6860±0.0027 OUR FIT Error includes scale factor of 1.2.					
0.670 ±0.010	3447	DOYLE	69	HBC	$\pi^- p \rightarrow \Lambda K^0$

$\Gamma\left(\pi^+\pi^-\right)/\Gamma\left(\pi^0\pi^0\right)$ Γ_2/Γ_1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
2.185±0.027 OUR FIT Error includes scale factor of 1.2.					
2.197±0.026 OUR AVERAGE					
2.11 ±0.09	1315	EVERHART	76	WIRE	$\pi^- p \rightarrow \Lambda K^0$
2.169±0.094	16k	COWELL	74	OSPK	$\pi^- p \rightarrow \Lambda K^0$
2.16 ±0.08	4799	HILL	73	DBC	$K^+ d \rightarrow K^0 p p$
2.22 ±0.10	3068	[9] ALITTI	72	HBC	$K^+ p \rightarrow \pi^+ p K^0$
2.22 ±0.08	6380	MORSE	72B	DBC	$K^+ n \rightarrow K^0 p$
2.10 ±0.11	701	[10] NAGY	72	HLBC	$K^+ n \rightarrow K^0 p$
2.22 ±0.095	6150	[11] BALTAY	71	HBC	$K p \rightarrow K^0$ neutrals
2.282±0.043	7944	[12] MOFFETT	70	OSPK	$K^+ n \rightarrow K^0 p$
2.10 ±0.06	3700	MORFIN	69	HLBC	$K^+ n \rightarrow K^0 p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.12 ±0.17	267	[10] BOZOKI	69	HLBC	
2.285±0.055	3016	[12] GOBBI	69	OSPK	$K^+ n \rightarrow K^0 p$

[9] The directly measured quantity is $K^0_S \rightarrow \pi^+\pi^-/\text{all}$ $K^0 = 0.345 \pm 0.005$.
[10] NAGY 72 is a final result which includes BOZOKI 69.
[11] The directly measured quantity is $K^0_S \rightarrow \pi^+\pi^-/\text{all}$ $\overline{K}^0 = 0.345 \pm 0.005$.
[12] MOFFETT 70 is a final result which includes GOBBI 69.

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_3/Γ

VALUE (units 10^{-7})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.2^{+1.2}_{-1.0}$ OUR AVERAGE					
$2.5^{+1.3}_{-1.0}{}^{+0.5}_{-0.6}$	500k	[13] ADLER	97B	CPLR	
$4.8^{+2.2}_{-1.6}\pm1.1$		[14] ZOU	96	E621	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.1^{+2.5}_{-1.9}{}^{+0.5}_{-0.6}$		[15] ADLER	96E	CPLR	Sup. by ADLER 97B
$3.9^{+5.4}_{-1.8}{}^{+0.9}_{-0.7}$		[16] THOMSON	94	E621	Sup. by ZOU 96

[13] ADLER 97B find the *CP*-conserving parameters $\mathrm{Re}(\lambda) = (28 \pm 7 \pm 3) \times 10^{-3}$, $\mathrm{Im}(\lambda) = (-10 \pm 8 \pm 2) \times 10^{-3}$. They estimate $B(K^0_S \to \pi^+\pi^-\pi^0)$ from $\mathrm{Re}(\lambda)$ and the K^0_L decay parameters. See also ANGELOPOULOS 98C.

[14] ZOU 96 is from the the measured quantities $|\rho_{+-0}| = 0.039^{+0.009}_{-0.006} \pm 0.005$ and $\phi_\rho = (-9 \pm 18)^\circ$.

[15] ADLER 96E is from the measured quantities $\mathrm{Re}(\lambda) = 0.036 \pm 0.010^{+0.002}_{-0.003}$ and $\mathrm{Im}(\lambda)$ consistent with zero. Note that the quantity λ is the same as ρ_{+-0} used in other footnotes.

[16] THOMSON 94 calculates this branching ratio from their measurements $|\rho_{+-0}| = 0.035^{+0.019}_{-0.011} \pm 0.004$ and $\phi_\rho = (-59 \pm 48)^\circ$ where $|\rho_{+-0}|e^{i\phi_\rho} = A(K^0_S \to \pi^+\pi^-\pi^0, I=2)/A(K^0_L \to \pi^+\pi^-\pi^0)$.

Modes with photons or $\ell\bar{\ell}$ pairs

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-)$ Γ_4/Γ_2

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.60±0.08 OUR AVERAGE					
2.56±0.09	1286	RAMBERG	93	E731	p_γ >50 MeV/c
2.68±0.15		[17] TAUREG	76	SPEC	p_γ >50 MeV/c
2.8 ±0.6		[18] BURGUN	73	HBC	p_γ >50 MeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.10±0.22	3723	RAMBERG	93	E731	p_γ >20 MeV/c
3.0 ±0.6	29	[19] BOBISUT	74	HLBC	p_γ >40 MeV/c

[17] TAUREG 76 find direct emission contribution <0.06, CL = 90%.

[18] BURGUN 73 estimates that direct emission contribution is 0.3 ± 0.6.

[19] BOBISUT 74 not included in average because p_γ cut differs. Estimates direct emission contribution to be 0.5 or less, CL = 95%.

$\Gamma(\pi^+\pi^-e^+e^-)/\Gamma_{total}$ Γ_5/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID		TECN
4.5±0.7±0.4	56	LAI	00B	NA48

$\Gamma(\gamma\gamma)/\Gamma_{total}$ Γ_6/Γ

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN
2.5 ±0.4 OUR AVERAGE					
2.58±0.36±0.22		149	LAI	00	NA48
2.4 ±0.9		35	[20] BARR	95B	NA31
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.2 ±1.1		16	[21] BARR	95B	NA31
< 13	90		BALATS	89	SPEC
2.4 ±1.2		19	BURKHARDT	87	NA31
<133	90		BARMIN	86B	XEBC

[20] BARR 95B quotes this as the combined BARR 95B + BURKHARDT 87 result after rescaling BURKHARDT 87 to use same branching ratios and lifetimes as BARR 95B.
[21] BARR 95B result is calculated using $B(K_L \to \gamma\gamma) = (5.86 \pm 0.17) \times 10^{-4}$.

Semileptonic modes

$\Gamma(\pi^\pm e^\mp \nu_e)/\Gamma_{total}$ Γ_7/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.2±1.4	75	AKHMETSHIN	99	CMD2	Tagged K^0_S using $\phi \to K^0_L K^0_S$

CP violating (*CP*) and $\Delta S = 1$ weak neutral current (*S1*) modes

$\Gamma(3\pi^0)/\Gamma_{total}$ Γ_9/Γ

Violates *CP* conservation.

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN
<1.4	90	7M	ACHASOV	99D	SND
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.9	90	17300	[22] ANGELOPO...	98B	CPLR
<3.7	90		BARMIN	83	HLBC

[22] ANGELOPOULOS 98B is from $\mathrm{Im}(\eta_{000}) = -0.05 \pm 0.12 \pm 0.05$, assuming $\mathrm{Re}(\eta_{000}) = \mathrm{Re}(\epsilon) = 1.635 \times 10^{-3}$ and using the value $B(K^0_L \to \pi^0\pi^0\pi^0) = 0.2112 \pm 0.0027$.

$\Gamma(\mu^+\mu^-)/\Gamma_{total}$ Γ_{10}/Γ

Test for $\Delta S = 1$ weak neutral current. Allowed by first-order weak interaction combined with electromagnetic interaction.

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN
<0.032	90	GJESDAL	73	ASPK
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.7	90	HYAMS	69B	OSPK

$\Gamma(e^+e^-)/\Gamma_{total}$ Γ_{11}/Γ

Test for $\Delta S = 1$ weak neutral current. Allowed by first-order weak interaction combined with electromagnetic interaction.

VALUE (units 10^{-7})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
< 1.4	90		ANGELOPO...	97	CPLR	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 28	90	0	BLICK	94	CNTR	Hyperon facility
<100	90		BARMIN	86	XEBC	

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{total}$ Γ_{12}/Γ

Test for $\Delta S = 1$ weak neutral current. Allowed by first-order weak interaction combined with electromagnetic interaction.

VALUE (units 10^{-6})	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*
< 1.1	90	0	BARR	93B	NA31
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<45	90		GIBBONS	88	E731

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CP-VIOLATION PARAMETERS IN K^0_S DECAY

$\mathrm{Im}(\eta_{+-0})^2 = \Gamma(K^0_S \to \pi^+\pi^-\pi^0,$ *CP*-violating) / $\Gamma(K^0_L \to \pi^+\pi^-\pi^0)$

CPT assumed valid (i.e. $\mathrm{Re}(\eta_{+-0}) \simeq 0$).

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.23	90	601	[23] BARMIN	85	HLBC
<0.12	90	384	METCALF	72	ASPK

[23] BARMIN 85 find $\mathrm{Re}(\eta_{+-0}) = (0.05 \pm 0.17)$ and $\mathrm{Im}(\eta_{+-0}) = (0.15 \pm 0.33)$. Includes events of BALDO-CEOLIN 75.

$\mathrm{Im}(\eta_{+-0}) = \mathrm{Im}(A(K^0_S \to \pi^+\pi^-\pi^0,$ *CP*-violating) / $A(K^0_L \to \pi^+\pi^-\pi^0))$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$\mathbf{-0.002 \pm 0.009^{+0.002}_{-0.001}}$	500k	[24] ADLER	97B	CPLR	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.002 \pm 0.018 \pm 0.003$	137k	[25] ADLER	96D	CPLR	Sup. by ADLER 97B
$-0.015 \pm 0.017 \pm 0.025$	272k	[26] ZOU	94	SPEC	

[24] ADLER 97B also find $\mathrm{Re}(\eta_{+-0}) = -0.002 \pm 0.007^{+0.004}_{-0.001}$. See also ANGELOPOULOS 98C.

[25] The ADLER 96D fit also yields $\mathrm{Re}(\eta_{+-0}) = 0.006 \pm 0.013 \pm 0.001$ with a correlation $+0.66$ between real and imaginary parts. Their results correspond to $|\eta_{+-0}| < 0.037$ with 90% CL.

[26] ZOU 94 use theoretical constraint $\mathrm{Re}(\eta_{+-0}) = \mathrm{Re}(\epsilon) = 0.0016$. Without this constraint they find $\mathrm{Im}(\eta_{+-0}) = 0.019 \pm 0.061$ and $\mathrm{Re}(\eta_{+-0}) = 0.019 \pm 0.027$.

$\mathrm{Im}(\eta_{000})^2 = \Gamma(K^0_S \to 3\pi^0) / \Gamma(K^0_L \to 3\pi^0)$

CPT assumed valid (i.e. $\mathrm{Re}(\eta_{000}) \simeq 0$). This limit determines branching ratio $\Gamma(3\pi^0)/\Gamma_{total}$ above.

VALUE	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.1	90	632	[27] BARMIN	83	HLBC	
<0.28	90		[28] GJESDAL	74B	SPEC	Indirect meas.

[27] BARMIN 83 find $\mathrm{Re}(\eta_{000}) = (-0.08 \pm 0.18)$ and $\mathrm{Im}(\eta_{000}) = (-0.05 \pm 0.27)$. Assuming *CPT* invariance they obtain the limit quoted above.

[28] GJESDAL 74B uses $K2\pi$, $K_{\mu 3}$, and K_{e3} decay results, unitarity, and *CPT*. Calculates $|(\eta_{000})| = 0.26 \pm 0.20$. We convert to upper limit.

$\mathrm{Im}(\eta_{000}) = \mathrm{Im}(A(K_S^0 \to \pi^0\pi^0\pi^0)/A(K_L^0 \to \pi^0\pi^0\pi^0))$

$K_S^0 \to \pi^0\pi^0\pi^0$ violates CP conservation, in contrast to $K_S^0 \to \pi^+\pi^-\pi^0$ which has a CP-conserving part.

VALUE	EVTS	DOCUMENT ID	TECN
$=$ **0.05 ± 0.12 ± 0.05**	17300	[29] ANGELOPO... 98B	CPLR

[29] ANGELOPOULOS 98B assumes $\mathrm{Re}(\eta_{000}) = \mathrm{Re}(\epsilon) = 1.635 \times 10^{-3}$. Without assuming CPT invariance, they obtain $\mathrm{Re}(\eta_{000}) = 0.18 \pm 0.14 \pm 0.06$ and $\mathrm{Im}(\eta_{000}) = 0.15 \pm 0.20 \pm 0.03$.

K_S^0 REFERENCES

LAI	00	PL B493 29	A. Lai *et al.*	(CERN NA48 Collab.)
LAI	00B	PL B496 137	A. Lai *et al.*	(CERN NA48 Collab.)
ACHASOV	99D	PL B459 674	M.N. Achasov *et al.*	
AKHMETSHIN	99	PL B456 90	R.R. Akhmetshin *et al.*	(CMD-2 Collab.)
ANGELOPO...	98B	PL B425 391	A. Angelopoulos *et al.*	(CPLEAR Collab.)
ANGELOPO...	98C	EPJ C5 389	A. Angelopoulos *et al.*	(CPLEAR Collab.)
PDG	98	EPJ C3 1	C. Caso *et al.*	
ADLER	97B	PL B407 193	R. Adler *et al.*	(CPLEAR Collab.)
ANGELOPO...	97	PL B413 232	A. Angelopoulos *et al.*	(CPLEAR Collab.)
BERTANZA	97	ZPHY C73 629	L. Bertanza	(PISA, CERN, EDIN, MANZ, ORSAY+)
ADLER	96D	PL B370 167	R. Adler *et al.*	(CPLEAR Collab.)
ADLER	96E	PL B374 313	R. Adler *et al.*	(CPLEAR Collab.)
ZOU	96	PL B369 362	Y. Zou *et al.*	(RUTG, MINN, MICH)
BARR	95B	PL B351 579	G.D. Barr *et al.*	(CERN, EDIN, MANZ, LALO+)
SCHWINGEN...	95	PRL 74 4376	B. Schwingenheuer *et al.*	(EFI, CHIC+)
BLICK	94	PL B334 234	A.M. Blick *et al.*	(SERP, JINR)
THOMSON	94	PL B337 411	G.B. Thomson *et al.*	(RUTG, MINN, MICH)
ZOU	94	PL B329 519	Y. Zou *et al.*	(RUTG, MINN, MICH)
BARR	93B	PL B304 381	G.D. Barr *et al.*	(CERN, EDIN, MANZ, LALO+)
GIBBONS	93	PRL 70 1199	L.K. Gibbons *et al.*	(FNAL E731 Collab.)
Also	97	PR D55 6625	L.K. Gibbons *et al.*	(FNAL E731 Collab.)
RAMBERG	93	PRL 70 2525	E. Ramberg *et al.*	(FNAL E731 Collab.)
BALATS	89	SJNP 49 828	M.Y. Balats *et al.*	(ITEP)
		Translated from YAF 49 1332.		
GIBBONS	88	PRL 61 2661	L.K. Gibbons *et al.*	(FNAL E731 Collab.)
BURKHARDT	87	PL B199 139	H. Burkhardt *et al.*	(CERN, EDIN, MANZ+)
GROSSMAN	87	PRL 59 18	N. Grossman *et al.*	(MINN, MICH, RUTG)
BARMIN	86	SJNP 44 622	V.V. Barmin *et al.*	(ITEP)
		Translated from YAF 44 965.		
BARMIN	86B	NC 96A 159	V.V. Barmin *et al.*	(ITEP, PADO)
PDG	86B	PL 170B 130	M. Aguilar-Benitez *et al.*	(CERN, CIT+)
BARMIN	85	NC 85A 67	V.V. Barmin *et al.*	(ITEP, PADO)
Also	85B	SJNP 41 759	V.V. Barmin *et al.*	(ITEP)
		Translated from YAF 41 1187.		
BARMIN	83	PL 128B 129	V.V. Barmin *et al.*	(ITEP, PADO)
Also	84	SJNP 39 269	V.V. Barmin *et al.*	(ITEP, PADO)
		Translated from YAF 39 428.		
ARONSON	82	PRL 48 1078	S.H. Aronson *et al.*	(BNL, CHIC, STAN+)
ARONSON	82B	PRL 48 1306	S.H. Aronson *et al.*	(BNL, CHIC, PURD)
Also	82B	PL 116B 73	E. Fischbach *et al.*	(PURD, BNL, CHIC)
Also	83	PR D28 476	S.H. Aronson *et al.*	(BNL, CHIC, PURD)
Also	83B	PR D28 495	S.H. Aronson *et al.*	(BNL, CHIC, PURD)
ARONSON	76	NC 32A 236	S.H. Aronson *et al.*	(WISC, EFI, UCSD+)
EVERHART	76	PR D14 661	G.C. Everhart *et al.*	(PENN)
TAUREG	76	PL 65B 92	H. Taureg *et al.*	(HEIDH, CERN, DORT)
BALDO-...	75	NC 25A 688	M. Baldo-Ceolin *et al.*	(PADO, WISC)
CARITHERS	75	PRL 34 1244	W.C.J. Carithers *et al.*	(COLU, NYU)
BOBISUT	74	LNC 11 646	F. Bobisut *et al.*	(PADO)
COWELL	74	PR D10 2083	P.L. Cowell *et al.*	(STON, COLU)
GEWENIGER	74B	PL 48B 487	C. Geweniger *et al.*	(CERN, HEIDH)

GJESDAL	74B	PL 52B 119	S. Gjesdal *et al.*	(CERN, HEIDH)
BURGUN	73	PL 46B 481	G. Burgun *et al.*	(SACL, CERN)
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BURGUN	72	NP B50 194	G. Burgun *et al.*	(SACL, CERN, OSLO)
METCALF	72	PL 40B 703	M. Metcalf *et al.*	(CERN, IPN, WIEN)
MORSE	72B	PRL 28 388	R. Morse *et al.*	(COLO, PRIN, UMD)
NAGY	72	NP B47 94	E. Nagy, F. Telbisz, G. Vesztergombi	(BUDA)
Also	69	PL 30B 498	G. Bozoki *et al.*	(BUDA)
SKJEGGEST...	72	NP B48 343	O. Skjeggestad *et al.*	(OSLO, CERN, SACL)
BALTAY	71	PRL 27 1678	C. Baltay *et al.*	(COLU)
Also	71	Thesis Nevis 187	W.A. Cooper	(COLU)
MOFFETT	70	BAPS 15 512	R. Moffett *et al.*	(ROCH)
BOZOKI	69	PL 30B 498	G. Bozoki *et al.*	(BUDA)
DOYLE	69	Thesis UCRL 18139	J.C. Doyle	(LRL)
GOBBI	69	PRL 22 682	B. Gobbi *et al.*	(ROCH)
HYAMS	69B	PL 29B 521	B.D. Hyams *et al.*	(CERN, MPIM)
MORFIN	69	PRL 23 660	J.G. Morfin, D. Sinclair	(MICH)
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HILL	68	PR 171 1418	D.G. Hill *et al.*	(BNL, CMU)
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CHRETIEN	63	PR 131 2208	M. Chretien *et al.*	(BRAN, BROW, HARV+)
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