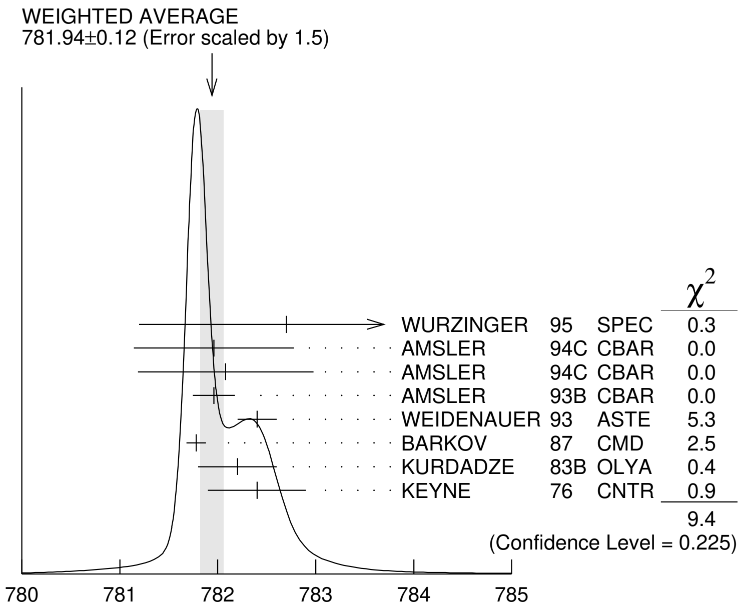
$\omega(782)$

$I^G(J^{PC}) = 0^-(1^{--})$

ω(782) MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
781.94±0.12 OUR AVERAGE		Error includes scale factor of 1.5. See the ideogram below.			
782.7 ±0.1 ±1.5	19500	WURZINGER	95	SPEC	1.33 $p d \to {}^3\mathrm{He}\omega$
781.96±0.17±0.80	11k	AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\pi^0\pi^0$
782.08±0.36±0.82	3463	AMSLER	94C	CBAR	0.0 $\overline{p}p \to \omega\eta\pi^0$
781.96±0.13±0.17	15k	AMSLER	93B	CBAR	0.0 $\overline{p}p \to \omega\pi^0\pi^0$
782.4 ±0.2	270k	WEIDENAUER	93	ASTE	$\overline{p}p \to 2\pi^+2\pi^-\pi^0$
781.78±0.10		BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
782.2 ±0.4	1488	KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
782.4 ±0.5	7000	[1] KEYNE	76	CNTR	$\pi^- p \to \omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
783.3 ±0.4		CORDIER	80	WIRE	$e^+e^- \to \pi^+\pi^-\pi^0$
782.5 ±0.8	33260	ROOS	80	RVUE	0.0–3.6 $\overline{p}p$
782.6 ±0.8	3000	BENKHEIRI	79	OMEG	9–12 $\pi^\pm p$
781.8 ±0.6	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \to 5\pi$
782.7 ±0.9	535	VANAPEL...	78	HBC	7.2 $\overline{p}p \to \overline{p}p\omega$
783.5 ±0.8	2100	GESSAROLI	77	HBC	11 $\pi^- p \to \omega n$
782.5 ±0.8	418	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
783.4 ±1.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K^+K^-\omega$
781.0 ±0.6	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \to K_1 K_1 \omega$
783.7 ±1.0	3583	[2] COYNE	71	HBC	3.7 $\pi^+ p \to p\pi^+\pi^+\pi^-\pi^0$
784.1 ±1.2	750	ABRAMOVI...	70	HBC	3.9 $\pi^- p$
783.2 ±1.6		[3] BIGGS	70B	CNTR	<4.1 $\gamma\mathrm{C} \to \pi^+\pi^-\mathrm{C}$
782.4 ±0.5	2400	BIZZARRI	69	HBC	0.0 $\overline{p}p$

[1] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.
[2] From best-resolution sample of COYNE 71.
[3] From ω-ρ interference in the $\pi^+\pi^-$ mass spectrum assuming ω width 12.6 MeV.



$\omega(782)$ mass (MeV)

$\omega(782)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
8.41±0.09 OUR AVERAGE					
8.2 ±0.3	19500	WURZINGER	95	SPEC	1.33 $pd \rightarrow {}^3\text{He}\omega$
8.4 ±0.1		[4] AULCHENKO	87	ND	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
8.30±0.40		BARKOV	87	CMD	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.8 ±0.9	1488	KURDADZE	83B	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.0 ±0.8		CORDIER	80	WIRE	$e^+e^- \rightarrow \pi^+\pi^-\pi^0$
9.1 ±0.8		BENAKSAS	72B	OSPK	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12 ±2	1430	COOPER	78B	HBC	0.7–0.8 $\overline{p}p \rightarrow 5\pi$
9.4 ±2.5	2100	GESSAROLI	77	HBC	11 $\pi^-p \rightarrow \omega n$
10.22±0.43	20000	[5] KEYNE	76	CNTR	$\pi^-p \rightarrow \omega n$
13.3 ±2	418	AGUILAR-...	72B	HBC	3.9,4.6 K^-p
10.5 ±1.5		BORENSTEIN	72	HBC	2.18 K^-p
7.70±0.9 ±1.15	940	BROWN	72	MMS	2.5 $\pi^-p \rightarrow n\text{MM}$
10.3 ±1.4	510	BIZZARRI	71	HBC	0.0 $p\overline{p} \rightarrow K_1K_1\omega$
12.8 ±3.0	248	BIZZARRI	71	HBC	0.0 $p\overline{p} \rightarrow K^+K^-\omega$
9.5 ±1.0	3583	COYNE	71	HBC	3.7 $\pi^+p \rightarrow p\pi^+\pi^+\pi^-\pi^0$

[4] Relativistic Breit-Wigner includes radiative corrections.
[5] Observed by threshold-crossing technique. Mass resolution = 4.8 MeV FWHM.

$\omega(782)$ DECAY MODES

	Mode		Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\pi^+\pi^-\pi^0$		(88.8 ± 0.7) %	
Γ_2	$\pi^0\gamma$		(8.5 ± 0.5) %	
Γ_3	$\pi^+\pi^-$		(2.21 ± 0.30) %	
Γ_4	neutrals (excluding $\pi^0\gamma$)		$(5.3 \ {}^{+8.7}_{-3.5}) \times 10^{-3}$	
Γ_5	$\eta\gamma$		$(8.3 \pm 2.1) \times 10^{-4}$	
Γ_6	$\pi^0 e^+ e^-$		$(5.9 \pm 1.9) \times 10^{-4}$	
Γ_7	$\pi^0 \mu^+ \mu^-$		$(9.6 \pm 2.3) \times 10^{-5}$	
Γ_8	$e^+ e^-$		$(7.24 \pm 0.20) \times 10^{-5}$	
Γ_9	$\pi^+\pi^-\pi^0\pi^0$		< 2 %	90%
Γ_{10}	$\pi^+\pi^-\gamma$		$< 3.6 \times 10^{-3}$	95%
Γ_{11}	$\pi^+\pi^-\pi^+\pi^-$		$< 1 \times 10^{-3}$	90%
Γ_{12}	$\pi^0\pi^0\gamma$		$(7.2 \pm 2.5) \times 10^{-5}$	
Γ_{13}	$\mu^+\mu^-$		$< 1.8 \times 10^{-4}$	90%
Γ_{14}	3γ		$< 2 \times 10^{-4}$	90%
	Charge conjugation (C)			
Γ_{15}	$\eta\pi^0$	C	$< 1 \times 10^{-3}$	90%
Γ_{16}	$3\pi^0$	C	$< 3 \times 10^{-4}$	90%

CONSTRAINED FIT INFORMATION

An overall fit to 6 branching ratios uses 20 measurements and one constraint to determine 4 parameters. The overall fit has a $\chi^2 =$ 10.3 for 17 degrees of freedom.

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

x_2	13		
x_3	−39	−5	
x_4	−74	−68	−1
	x_1	x_2	x_3

$\omega(782)$ PARTIAL WIDTHS

$\Gamma(e^+e^-)$ **Γ_8**

VALUE (keV)	*DOCUMENT ID*
0.60±0.02 OUR EVALUATION	

$\omega(782)$ BRANCHING RATIOS

$\Gamma(\text{neutrals})/\Gamma(\pi^+\pi^-\pi^0)$ — $(\Gamma_2+\Gamma_4)/\Gamma_1$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.102±0.008 OUR FIT					
$0.103^{+0.011}_{-0.010}$ OUR AVERAGE					
0.15 ±0.04	46	AGUILAR-...	72B	HBC	3.9,4.6 $K^- p$
0.10 ±0.03	19	BARASH	67B	HBC	0.0 $\overline{p}p$
0.134±0.026	850	DIGIUGNO	66B	CNTR	1.4 $\pi^- p$
0.097±0.016	348	FLATTE	66	HBC	1.4 – 1.7 $K^- p \to \Lambda MM$
$0.06\ ^{+0.05}_{-0.02}$		JAMES	66	HBC	2.1 $\pi^+ p$
0.08 ±0.03	35	KRAEMER	64	DBC	1.2 $\pi^+ d$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.11 ±0.02	20	BUSCHBECK	63	HBC	1.5 $K^- p$

$\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_3/Γ_1

See also $\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$.

VALUE	DOCUMENT ID		TECN	COMMENT
0.0249±0.0035 OUR FIT				
0.026 ±0.005 OUR AVERAGE				
$0.021\ ^{+0.028}_{-0.009}$	[6] RATCLIFF	72	ASPK	15 $\pi^- p \to n 2\pi$
0.028 ±0.006	BEHREND	71	ASPK	Photoproduction
$0.022\ ^{+0.009}_{-0.01}$	[7] ROOS	70	RVUE	

[6] Significant interference effect observed. NB of $\omega \to 3\pi$ comes from an extrapolation.
[7] ROOS 70 combines ABRAMOVICH 70 and BIZZARRI 70.

$\Gamma(\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
0.096±0.006 OUR FIT				
0.096±0.006 OUR AVERAGE				
0.099±0.007	DOLINSKY	89	ND	$e^+e^- \to \pi^0\gamma$
0.084±0.013	KEYNE	76	CNTR	$\pi^- p \to \omega n$
0.109±0.025	BENAKSAS	72C	OSPK	e^+e^-
0.081±0.020	BALDIN	71	HLBC	2.9 $\pi^+ p$
0.13 ±0.04	JACQUET	69B	HLBC	

$\Gamma(\pi^+\pi^-\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{10}/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.066	90	KALBFLEISCH	75	HBC	2.18 $K^- p \to \Lambda\pi^+\pi^-\gamma$
<0.05	90	FLATTE	66	HBC	1.2 – 1.7 $K^- p \to \Lambda\pi^+\pi^-\gamma$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.0036	95	WEIDENAUER	90	ASTE	$p\overline{p} \rightarrow \pi^+\pi^-\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.004	95	BITYUKOV	88B	SPEC	32 $\pi^- p \rightarrow \pi^+\pi^-\gamma X$

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

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1 \times 10^{-3}$	90	KURDADZE	88	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^+\pi^-$

$\Gamma(\pi^+\pi^-\pi^0\pi^0)/\Gamma_{total}$ — Γ_9/Γ

VALUE (units 10^{-2})	CL%	DOCUMENT ID		TECN	COMMENT
<2	90	KURDADZE	86	OLYA	$e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$

$\Gamma(\mu^+\mu^-)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{13}/Γ_1

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.2	90	WILSON	69	OSPK	12 π^- C $\rightarrow$ Fe
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.7	74	FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\mu^+\mu^-$
<1.2		BARBARO-...	65	HBC	2.7 $K^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^0\gamma)$ — Γ_{12}/Γ_2

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.00085±0.00029		40 ± 14	ALDE	94B	GAM2	$38\pi^- p \rightarrow \pi^0\pi^0\gamma n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 0.005	90		DOLINSKY	89	ND	$e^+e^- \rightarrow \pi^0\pi^0\gamma$
< 0.18	95		KEYNE	76	CNTR	$\pi^- p \rightarrow \omega n$
< 0.15	90		BENAKSAS	72C	OSPK	e^+e^-
< 0.14			BALDIN	71	HLBC	2.9 $\pi^+ p$
< 0.1	90		BARMIN	64	HLBC	1.3–2.8 $\pi^- p$

$\Gamma(\eta\pi^0)/\Gamma_{total}$ — Γ_{15}/Γ

Violates *C* conservation.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.001	90	ALDE	94B	GAM2	$38\pi^- p \rightarrow \eta\pi^0 n$

$[\Gamma(\eta\gamma)+\Gamma(\eta\pi^0)]/\Gamma(\pi^+\pi^-\pi^0)$ — $(\Gamma_5+\Gamma_{15})/\Gamma_1$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.016	90	[8] FLATTE	66	HBC	1.2 – 1.7 $K^- p \rightarrow \Lambda\pi^+\pi^-$ MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.045	95	JACQUET	69B	HLBC	

[8] Restated by us usingBR($\eta \rightarrow chargedmodes$)=(29.2)%.

$\Gamma(\text{neutrals})/\Gamma(\text{charged particles})$ — $(\Gamma_2+\Gamma_4)/(\Gamma_1+\Gamma_3)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.099±0.008 OUR FIT				
0.124±0.021	FELDMAN	67C	OSPK	1.2 $\pi^- p$

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\pi^+\pi^-\pi^0)$ — Γ_{12}/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.00045	90	DOLINSKY	89	ND	$e^+e^- \to \pi^0\pi^0\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.08	95	JACQUET	69B	HLBC	

$\Gamma(\eta\gamma)/\Gamma(\pi^0\gamma)$ — Γ_5/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
0.0098±0.0024	[9] ALDE	93	GAM2	$38\pi^- p \to \omega n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.0082±0.0033	[10] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$
0.039 ±0.007	[11] DOLINSKY	89	ND	e^+e^-
0.010 ±0.045	APEL	72B	OSPK	4–8 $\pi^- p \to n3\gamma$

[9] Model independent determination.
[10] Solution corresponding to constructive ω-ρ interference. The quark model predicts a relative decay phase of zero.
[11] Solution corresponding to destructive ρ-ω interference.

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma_{\text{total}}$ — Γ_7/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
0.96±0.23	DZHELYADIN	81B	CNTR	25–33 $\pi^- p \to \omega n$

$\Gamma(\pi^0 e^+e^-)/\Gamma_{\text{total}}$ — Γ_6/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
5.9±1.9	43	DOLINSKY	88	ND	$e^+e^- \to \pi^0 e^+e^-$

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
0.724±0.020 OUR AVERAGE					
0.714±0.036		DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$
0.72 ±0.03		BARKOV	87	CMD	$e^+e^- \to \pi^+\pi^-\pi^0$
0.675±0.069		CORDIER	80	WIRE	$e^+e^- \to 3\pi$
0.83 ±0.10		BENAKSAS	72B	OSPK	$e^+e^- \to 3\pi$
0.77 ±0.06		[12] AUGUSTIN	69D	OSPK	$e^+e^- \to 2\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.64 ±0.04	1488	[13] KURDADZE	83B	OLYA	$e^+e^- \to \pi^+\pi^-\pi^0$
0.65 ±0.13	33	[14] ASTVACAT...	68	OSPK	Assume SU(3)+mixing

[12] Rescaled by us to correspond to ω width 8.4 MeV.
[13] Superseded by KURDADZE 84.
[14] Not resolved from ρ decay. Error statistical only.

$\Gamma(\text{neutrals})/\Gamma_{\text{total}}$ — $(\Gamma_2+\Gamma_4)/\Gamma$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.090±0.006 OUR FIT					
0.081±0.011 OUR AVERAGE					
0.075±0.025		BIZZARRI	71	HBC	0.0 $p\overline{p}$
0.079±0.019		DEINET	69B	OSPK	1.5 $\pi^- p$
0.084±0.015		BOLLINI	68C	CNTR	2.1 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.073±0.018	42	BASILE	72B	CNTR	1.67 $\pi^- p$

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

See also $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$.

VALUE	DOCUMENT ID		TECN	COMMENT
0.0221±0.0030 OUR FIT				
0.021 ±0.004 OUR AVERAGE				
0.023 ±0.005	BARKOV	85	OLYA	e^+e^-
$0.016\ ^{+0.009}_{-0.007}$	QUENZER	78	CNTR	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.010 ±0.001	[15] WICKLUND	78	ASPK	3,4,6 $\pi^\pm N$
0.0122±0.0030	ALVENSLEB...	71C	CNTR	Photoproduction
$0.013\ ^{+0.012}_{-0.009}$	MOFFEIT	71	HBC	2.8,4.7 γp
$0.0080\ ^{+0.0028}_{-0.002}$	[16] BIGGS	70B	CNTR	4.2 $\gamma C \rightarrow \pi^+\pi^- C$

[15] From a model-dependent analysis assuming complete coherence.

[16] Re-evaluated under $\Gamma(\pi^+\pi^-)/\Gamma(\pi^+\pi^-\pi^0)$ by BEHREND 71 using more accurate $\omega \rightarrow \rho$ photoproduction cross-section ratio.

$\Gamma(\pi^0\pi^0\gamma)/\Gamma(\text{neutrals})$ — $\Gamma_{12}/(\Gamma_2+\Gamma_4)$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.22±0.07		[17] DAKIN	72	OSPK	1.4 $\pi^- p \rightarrow n$MM
<0.19	90	DEINET	69B	OSPK	

[17] See $\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$.

$\Gamma(\pi^0\gamma)/\Gamma(\text{neutrals})$ — $\Gamma_2/(\Gamma_2+\Gamma_4)$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.78±0.07		[18] DAKIN	72	OSPK	1.4 $\pi^- p \rightarrow n$MM
>0.81	90	DEINET	69B	OSPK	

[18] Error statistical only. Authors obtain good fit also assuming $\pi^0\gamma$ as the only neutral decay.

$\Gamma(\eta\gamma)/\Gamma_{total}$ Γ_5/Γ

VALUE (units 10^{-4})	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
8.3 ± 2.1	[19] ALDE	93	GAM2	$38\pi^- p \to \omega n$
7.3 ± 2.9	[20] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$
35 ± 5	[21] DOLINSKY	89	ND	$e^+e^- \to \eta\gamma$
$3.0^{+2.5}_{-1.8}$	[20] ANDREWS	77	CNTR	6.7–10 γCu
29.0 ± 7.0	[21] ANDREWS	77	CNTR	6.7–10 γCu

[19] Model independent determination.
[20] Solution corresponding to constructive ω-ρ interference. The quark model predicts a relative decay phase of zero.
[21] Solution corresponding to destructive ω-ρ interference.

$\Gamma(\pi^0\mu^+\mu^-)/\Gamma(\mu^+\mu^-)$ Γ_7/Γ_{13}

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.2 ± 0.6	30	[22] DZHELYADIN	79	CNTR	25–33 $\pi^- p$

[22] Superseded by DZHELYADIN 81B result above.

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

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
0.8942±0.0062	DOLINSKY	89	ND	$e^+e^- \to \pi^+\pi^-\pi^0$

$\Gamma(3\pi^0)/\Gamma_{total}$ Γ_{16}/Γ

Violates *C* conservation.

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.0003	90	PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\pi^0 n$

$\Gamma(3\gamma)/\Gamma_{total}$ Γ_{14}/Γ

VALUE	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.0002	90	PROKOSHKIN	95	GAM2	38 $\pi^- p \to 3\gamma n$

ω(782) REFERENCES

PROKOSHKIN 95 SPD 342 273 +Samoilenko (SERP)
Translated from DANS 342 610.
WURZINGER 95 PR C51 443 +Siebert+ (BONN, ORSAY, SACL, LOUC, CRAC)
ALDE 94B PL B340 122 +Binon, Boutemeur+ (SERP, BELG, LANL, LAPP, MONT)
AMSLER 94C PL B327 425 +Armstrong, Ravndal+ (Crystal Barrel Collab.)
ALDE 93 PAN 56 1229 +Binon+ (SERP, LAPP, LANL, BELG, BRUX, CERN)
Translated from YAF 56 137.
Also 94 ZPHY C61 35 Alde, Binon+ (SERP, LAPP, LANL, BELG, BRUX, CERN)
AMSLER 93B PL B311 362 +Armstrong, v.Dombrowski+ (Crystal Barrel Collab.)
WEIDENAUER 93 ZPHY C59 387 +Duch+ (ASTERIX Collab.)
WEIDENAUER 90 ZPHY C47 353 +Duch, Heel, Kalinowsky+ (ASTERIX Collab.)
DOLINSKY 89 ZPHY C42 511 +Druzhinin, Dubrovin, Golubev+ (NOVO)
BITYUKOV 88B SJNP 47 800 +Borisov, Viktorov, Golovkin+ (SERP)
Translated from YAF 47 1258.
DOLINSKY 88 SJNP 48 277 +Druzhinin, Dubrovin, Golubev+ (NOVO)
Translated from YAF 48 442.
KURDADZE 88 JETPL 47 512 +Leltchouk, Pakhtusova, Sidorov+ (NOVO)
Translated from ZETFP 47 432.
AULCHENKO 87 PL B186 432 +Dolinsky, Druzhinin, Dubrovin+ (NOVO)
BARKOV 87 JETPL 46 164 +Vasserman, Vorobev, Ivanov (NOVO)
Translated from ZETFP 46 132.

KURDADZE	86	JETPL 43 643	+Lelchuk, Pakhtusova, Sidorov, Skrinskii+	(NOVO)
		Translated from ZETFP 43 497.		
BARKOV	85	NP B256 365	+Chilingarov, Eidelman, Khazin, Lelchuk+	(NOVO)
KURDADZE	84	IYF 84-7 Preprint	+Leltchouk, Pakhtusova, Sidorov+	(NOVO)
KURDADZE	83B	JETPL 36 274	+Pakhtusova, Sidorov+	(NOVO)
		Translated from ZETFP 36 221.		
DZHELYADIN	81B	PL 102B 296	+Golovkin, Konstantinov+	(SERP)
CORDIER	80	NP B172 13	+Delcourt, Eschstruth, Fulda+	(LALO)
ROOS	80	LNC 27 321	+Pellinen	(HELS)
BENKHEIRI	79	NP B150 268	+Eisenstein+	(EPOL, CERN, CDEF, LALO)
DZHELYADIN	79	PL 84B 143	+Golovkin, Gritsuk+	(SERP)
COOPER	78B	NP B146 1	+Ganguli+	(TATA, CERN, CDEF, MADR)
QUENZER	78	PL 76B 512	+Ribes, Rumpf, Bertrand, Bizot, Chase+	(LALO)
VANAPEL...	78	NP B133 245	VanApeldoorn, Grundeman, Harting+	(ZEEM)
WICKLUND	78	PR D17 1197	+Ayres, Diebold, Greene, Kramer, Pawlicki	(ANL)
ANDREWS	77	PRL 38 198	+Fukushima, Harvey, Lobkowicz, May+	(ROCH)
GESSAROLI	77	NP B126 382	+	(BGNA, FIRZ, GENO, MILA, OXF, PAVI)
KEYNE	76	PR D14 28	+Binnie, Carr, Debenham, Garbutt+	(LOIC, SHMP)
Also	73B	PR D8 2789	Binnie, Carr, Debenham, Duane+	(LOIC, SHMP)
KALBFLEISCH	75	PR D11 987	+Strand, Chapman	(BNL, MICH)
AGUILAR-...	72B	PR D6 29	Aguilar-Benitez, Chung, Eisner, Samios	(BNL)
APEL	72B	PL 41B 234	+Auslander, Muller, Bertolucci+	(KARLK, KARLE, PISA)
BASILE	72B	Phil. Conf. 153	+Bollini, Broglin, Dalpiaz, Frabetti+	(CERN)
BENAKSAS	72B	PL 42B 507	+Cosme, Jean-Marie, Jullian	(ORSAY)
BENAKSAS	72C	PL 42B 511	+Cosme, Jean-Marie, Jullian, Laplanche+	(ORSAY)
BORENSTEIN	72	PR D5 1559	+Danburg, Kalbfleisch+	(BNL, MICH)
BROWN	72	PL 42B 117	+Downing, Holloway, Huld, Bernstein+	(ILL, ILLC)
DAKIN	72	PR D6 2321	+Hauser, Kreisler, Mischke	(PRIN)
RATCLIFF	72	PL 38B 345	+Bulos, Carnegie, Kluge, Leith, Lynch+	(SLAC)
ALVENSLEB...	71C	PRL 27 888	Alvensleben, Becker, Busza, Chen, Cohen+	(DESY)
BALDIN	71	SJNP 13 758	+Yergakov, Trebukhovsky, Shishov	(ITEP)
		Translated from YAF 13 1318.		
BEHREND	71	PRL 27 61	+Lee, Nordberg, Wehmann+	(ROCH, CORN, FNAL)
BIZZARRI	71	NP B27 140	+Montanet, Nilsson, D'Andlau+	(CERN, CDEF)
COYNE	71	NP B32 333	+Butler, Fang-Landau, MacNaughton	(LRL)
MOFFEIT	71	NP B29 349	+Bingham, Fretter+	(LRL, UCB, SLAC, TUFTS)
ABRAMOVI...	70	NP B20 209	Abramovich, Blumenfeld, Bruyant+	(CERN)
BIGGS	70B	PRL 24 1201	+Clifft, Gabathuler, Kitching, Rand	(DARE)
BIZZARRI	70	PRL 25 1385	+Ciapetti, Dore, Gaspero, Guidoni+	(ROMA, SYRA)
ROOS	70	DNPL/R7 173		(CERN)
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AUGUSTIN	69D	PL 28B 513	+Benaksas, Buon, Gracco, Haissinski+	(ORSAY)
BIZZARRI	69	NP B14 169	+Foster, Gavillet, Montanet+	(CERN, CDEF)
DEINET	69B	PL 30B 426	+Menzione, Muller, Buniatov+	(KARL, CERN)
JACQUET	69B	NC 63A 743	+Nguyen-Khac, Haatuft, Halsteinslid	(EPOL, BERG)
WILSON	69	Private Comm.		(HARV)
Also	69	PR 178 2095	Wehmann+	(HARV, CASE, SLAC, CORN, MCGI)
ASTVACAT...	68	PL 27B 45	Astvacaturov, Azimov, Baldin+	(JINR, MOSU)
BOLLINI	68C	NC 56A 531	+Buhler, Dalpiaz, Massam+	(CERN, BGNA, STRB)
BARASH	67B	PR 156 1399	+Kirsch, Miller, Tan	(COLU)
FELDMAN	67C	PR 159 1219	+Frati, Gleeson, Halpern, Nussbaum+	(PENN)
DIGIUGNO	66B	NC 44A 1272	+Peruzzi, Troise+	(NAPL, FRAS, TRST)
FLATTE	66	PR 145 1050	+Huwe, Murray, Button-Shafer, Solmitz+	(LRL)
JAMES	66	PR 142 896	+Kraybill	(YALE, BNL)
BARBARO-...	65	PRL 14 279	Barbaro-Galtieri, Tripp	(LRL)
BARMIN	64	JETP 18 1289	+Dolgolenko, Krestnikov+	(ITEP)
		Translated from ZETF 45 1879.		
KRAEMER	64	PR 136B 496	+Madansky, Fields+	(JHU, NWES, WOOD)
BUSCHBECK	63	Siena Conf. 1 166	+Czapp+	(VIEN, CERN, ANIK)

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DOLINSKY	86	PL B174 453	+Druzhinin, Dubrovin, Eidelman+	(NOVO)
KURDADZE	83	JETPL 37 733	+Lelchuk, Pakhtusova+	(NOVO)
		Translated from ZETFP 37 613.		
ALFF-...	62B	PRL 9 325	Alff-Steinberger, Berley, Colley+	(COLU, RUTG)
ARMENTEROS	62	CERN Conf. 90	+Budde+	(CERN, CDEF, EPOL)
STEVENSON	62	PR 125 687	+Alvarez, Maglich, Rosenfeld	(LRL)
MAGLICH	61	PRL 7 178	+Alvarez, Rosenfeld, Stevenson	(LRL)
PEVSNER	61	PRL 7 421	+Kraemer, Nussbaum, Richardson+	(JHU)
XUONG	61	PRL 7 327	+Lynch	(LRL)