CONSTRAINED FIT INFORMATION

An overall fit to the total width, 4 partial widths, a combination of partial widths obtained from integrated cross sections, and 6 branching ratios uses 37 measurements and one constraint to determine 8 parameters. The overall fit has a $\chi^2 = 67.9$ for 30 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta p_i \delta p_j \right\rangle / (\delta p_i \cdot \delta p_j)$, in percent, from the fit to parameters p_i, including 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	−92						
x_3	12	−38					
x_4	11	−36	1				
x_5	2	−9	0	0			
x_6	0	−6	0	0	0		
x_7	8	−3	−15	1	0	0	
Γ	−82	76	−12	−9	−3	0	−10
	x_1	x_2	x_3	x_4	x_5	x_6	x_7

	Mode	Rate (MeV)	Scale factor
Γ_1	$\pi\pi$	$156.8\ ^{+3.2}_{-1.3}$	
Γ_2	$\pi^+\pi^-2\pi^0$	$12.7\ ^{+2.9}_{-5.1}$	1.4
Γ_3	$K\overline{K}$	$8.6\ \pm 0.8$	2.9
Γ_4	$2\pi^+2\pi^-$	$5.2\ \pm 0.7$	1.2
Γ_5	$\eta\eta$	$0.83\ \pm 0.19$	2.4
Γ_6	$4\pi^0$	$0.55\ \pm 0.18$	
Γ_7	$\gamma\gamma$	$0.00244\ ^{+0.00032}_{-0.00029}$	

$f_2(1270)$ PARTIAL WIDTHS

$\Gamma(\pi\pi)$ — Γ_1

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$156.8^{+3.2}_{-1.3}$ OUR FIT			
$157.0^{+6.0}_{-1.0}$	[13] LONGACRE 86	MPS	$22\ \pi^- p \to n 2K^0_S$

$\Gamma(K\overline{K})$ — Γ_3

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
8.6 ±0.8 OUR FIT Error includes scale factor of 2.9.			
$9.0\ ^{+0.7}_{-0.3}$	[13] LONGACRE 86	MPS	$22\ \pi^- p \to n 2K^0_S$

$\Gamma(\eta\eta)$ — Γ_5

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
0.83±0.19 OUR FIT Error includes scale factor of 2.4.			
1.0 ±0.1	[13] LONGACRE 86	MPS	$22\ \pi^- p \to n 2K^0_S$

$\Gamma(\gamma\gamma)$ — Γ_7

The value of this width depends on the theoretical model used. Unitarised models with scalars give values clustering around $\simeq 2.6$; without an *S*-wave contribution, values are systematically higher (typically around 3). Since it is used to average results obtained with variety of models, we prefer to quote our own estimate.

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.8 ±0.4 OUR ESTIMATE				
$2.44^{+0.32}_{-0.29}$ OUR FIT				
$2.58\pm0.13^{+0.36}_{-0.27}$		[14] BEHREND 92	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$3.10\pm0.35\pm0.35$		[15] BLINOV 92	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.27\pm0.47\pm0.11$		ADACHI 90D	TOPZ	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.15\pm0.04\pm0.39$		BOYER 90	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.19\pm0.16^{+0.29}_{-0.28}$		MARSISKE 90	CBAL	$e^+e^- \to e^+e^-\pi^0\pi^0$
2.35 ± 0.65		[16] MORGAN 90	RVUE	$\gamma\gamma \to \pi^+\pi^-,\ \pi^0\pi^0$
$3.19\pm0.09^{+0.22}_{-0.38}$	2177	OEST 90	JADE	$e^+e^- \to e^+e^-\pi^0\pi^0$
$3.2\ \pm0.1\ \pm0.4$		[17] AIHARA 86B	TPC	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.5\ \pm0.1\ \pm0.5$		BEHREND 84B	CELL	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.85\pm0.25\pm0.5$		[18] BERGER 84	PLUT	$e^+e^- \to e^+e^-2\pi$
$2.70\pm0.05\pm0.20$		COURAU 84	DLCO	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.52\pm0.13\pm0.38$		[19] SMITH 84C	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.3\ \pm0.2\ \pm0.5$		FRAZER 83	JADE	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.7\ \pm0.2\ \pm0.6$		EDWARDS 82F	CBAL	$e^+e^- \to e^+e^-2\pi^0$
$2.9\ ^{+0.6}_{-0.4}\ \pm0.6$		[20] EDWARDS 82F	CBAL	$e^+e^- \to e^+e^-2\pi^0$
$3.2\ \pm0.2\ \pm0.6$		BRANDELIK 81B	TASS	$e^+e^- \to e^+e^-\pi^+\pi^-$
$3.6\ \pm0.3\ \pm0.5$		ROUSSARIE 81	MRK2	$e^+e^- \to e^+e^-\pi^+\pi^-$
$2.3\ \pm0.8$		[21] BERGER 80B	PLUT	e^+e^-

$\Gamma(e^+e^-)$ — Γ_{10}

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<1.7	90	VOROBYEV 88	ND	$e^+e^- \to \pi^0\pi^0$

[13] From a partial-wave analysis of data using a K-matrix formalism with 5 poles.
[14] Using a unitarized model with scalars.
[15] Using the unitarized model of LYTH 85.
[16] Error includes spread of different solutions. Data of MARK2 and CRYSTAL BALL used in the analysis. Authors report strong correlations with $\gamma\gamma$ width of $f_0(1300)$: $\Gamma(f_2) + 1/4\ \Gamma(f^0) = 3.6 \pm 0.3$ KeV.
[17] Radiative corrections modify the partial widths; for instance the COURAU 84 value becomes 2.66 ± 0.21 in the calculation of LANDRO 86.
[18] Using the MENNESSIER 83 model.
[19] Superseded by BOYER 90.
[20] If helicity = 2 assumption is not made.
[21] Using mass, width and B($f_2(1270) \to 2\pi$) from PDG 78.

$f_2(1270)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_3\Gamma_7/\Gamma$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
$0.114^{+0.016}_{-0.015}$ OUR FIT Error includes scale factor of 1.1.			
$0.091\pm0.007\pm0.027$	[22] ALBRECHT 90G	ARG	$e^+e^- \to e^+e^-K^+K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •			
$0.104\pm0.007\pm0.072$	[23] ALBRECHT 90G	ARG	$e^+e^- \to e^+e^-K^+K^-$

[22] Using an incoherent background.
[23] Using a coherent background.

$f_2(1270)$ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.849^{+0.025}_{-0.013}$ OUR FIT Error includes scale factor of 1.3.				
0.837±0.020 OUR AVERAGE				
0.849 ± 0.025		CHABAUD 83	ASPK	$17\ \pi^- p$ polarized
$0.85\ \pm0.05$	250	BEAUPRE 71	HBC	$8\ \pi^+ p \to \Delta^{++} f_2$
$0.8\ \ \pm0.04$	600	OH 70	HBC	$1.26\ \pi^- p \to \pi^+\pi^- n$

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(\pi\pi)$ — Γ_2/Γ_1

Should be twice $\Gamma(2\pi^+2\pi^-)/\Gamma(\pi\pi)$ if decay is $\rho\rho$. (See ASCOLI 68D.)

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
$0.081^{+0.019}_{-0.034}$ OUR FIT Error includes scale factor of 1.4.				
0.15 ±0.06	600	EISENBERG 74	HBC	$4.9\ \pi^+ p \to \Delta^{++} f_2$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.07		EMMS 75D	DBC	$4\ \pi^+ n \to p f_2$

$\Gamma(K\overline{K})/\Gamma(\pi\pi)$ — Γ_3/Γ_1

We average only experiments which either take into account $f_2(1270)$-$a_2(1320)$ interference explicitly or demonstrate that $a_2(1320)$ production is negligible.

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.055±0.006 OUR FIT Error includes scale factor of 2.8.				
$0.040^{+0.005}_{-0.006}$ OUR AVERAGE				
$0.037^{+0.008}_{-0.021}$		ETKIN 82B	MPS	$23\ \pi^- p \to n 2K^0_S$
0.045 ± 0.009		CHABAUD 81	ASPK	$17\ \pi^- p$ polarized
0.039 ± 0.008		LOVERRE 80	HBC	$4\ \pi^- p \to K\overline{K}N$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.036 ± 0.005		[24] COSTA... 80	OMEG	$1\text{–}2.2\ \pi^- p \to K^+K^- n$
0.030 ± 0.005		[25] MARTIN 79	RVUE	
0.027 ± 0.009		[26] POLYCHRO... 79	STRC	$7\ \pi^- p \to n 2K^0_S$
0.025 ± 0.015		EMMS 75D	DBC	$4\ \pi^+ n \to p f_2$
0.031 ± 0.012	20	ADERHOLZ 69	HBC	$8\ \pi^+ p \to K^+K^-\pi^+ p$

[24] Re-evaluated by CHABAUD 83.
[25] Includes PAWLICKI 77 data.
[26] Takes into account the $f_2(1270)$-$f'_2(1525)$ interference.