NODE=M002

$\eta'(958)$

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

$\eta'(958)$ MASS

NODE=M002M

NODE=M002M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
957.78 ±0.06 OUR AVERAGE					
957.793±0.054±0.036	3.9k	LIBBY	08	CLEO	$J/\psi \to \gamma\eta'$
957.9 ±0.2 ±0.6	4800	WURZINGER	96	SPEC	1.68 $pd \to {}^3\mathrm{He}\eta'$
957.46 ±0.33		DUANE	74	MMS	$\pi^- p \to n$MM
958.2 ±0.5	1414	DANBURG	73	HBC	2.2 $K^- p \to \Lambda\eta'$
958 ±1	400	JACOBS	73	HBC	2.9 $K^- p \to \Lambda\eta'$
956.1 ±1.1	3415	[1] BASILE	71	CNTR	1.6 $\pi^- p \to n\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
957.5 ±0.2		BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
959 ±1	630	[2] BELADIDZE	92C	VES	36 $\pi^-\mathrm{Be} \to \pi^-\eta'\eta\mathrm{Be}$
958 ±1	340	[2] ARMSTRONG	91B	OMEG	300 $pp \to pp\eta\pi^+\pi^-$
958.2 ±0.4	622	[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\eta\pi^+\pi^-$
957.8 ±0.2	2420	[2] AUGUSTIN	90	DM2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
956.3 ±1.0	143	[2] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
957.4 ±1.4	535	[3] BASILE	71	CNTR	1.6 $\pi^- p \to n\eta'$
957 ±1		RITTENBERG	69	HBC	1.7–2.7 $K^- p$

OCCUR=2

OCCUR=2

[1] Using all η' decays. NODE=M002M;LINKAGE=BS

[2] Systematic uncertainty not estimated. NODE=M002M;LINKAGE=NS

[3] Using η' decays into neutrals. Not independent of the other listed BASILE 71 η' mass measurement. NODE=M002M;LINKAGE=BA

$\eta'(958)$ WIDTH

NODE=M002W

NODE=M002W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
0.188±0.006 OUR FIT						
0.230±0.021 OUR AVERAGE						
0.226±0.017±0.014	2300	CZERWINSKI	10	MMS		$pp \to pp\eta'$
0.40 ±0.22	4800	WURZINGER	96	SPEC		1.68 $pd \to {}^3\mathrm{He}\eta'$
0.28 ±0.10	1000	BINNIE	79	MMS	0	$\pi^- p \to n$MM
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.20 ±0.04		BAI	04J	BES2		$J/\psi \to \gamma\gamma\pi^+\pi^-$

$\eta'(958)$ DECAY MODES

NODE=M002215;NODE=M002

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$\pi^+\pi^-\eta$	(42.5 ±0.5) %		DESIG=1
Γ_2	$\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)	(29.48 ±0.35) %		DESIG=9
Γ_3	$\rho^0\gamma$			DESIG=213
Γ_4	$\pi^0\pi^0\eta$	(22.4 ±0.5) %		DESIG=2
Γ_5	$\omega\gamma$	(2.52 ±0.07) %		DESIG=7
Γ_6	ωe^+e^-	(2.0 ±0.4) $\times 10^{-4}$		DESIG=205
Γ_7	$\gamma\gamma$	(2.307±0.033) %		DESIG=6
Γ_8	$3\pi^0$	(2.50 ±0.17) $\times 10^{-3}$		DESIG=8
Γ_9	$\mu^+\mu^-\gamma$	(1.13 ±0.28) $\times 10^{-4}$		DESIG=20
Γ_{10}	$\pi^+\pi^-\mu^+\mu^-$	(2.13 ±0.13) $\times 10^{-5}$		DESIG=201
Γ_{11}	$\pi^+\pi^-\pi^0$	(3.61 ±0.17) $\times 10^{-3}$		DESIG=121
Γ_{12}	$(\pi^+\pi^-\pi^0)$ S-wave	(3.8 ±0.5) $\times 10^{-3}$		DESIG=211
Γ_{13}	$\pi^\mp\rho^\pm$	(7.4 ±2.3) $\times 10^{-4}$		DESIG=210
Γ_{14}	$2(\pi^+\pi^-)$	(8.51 ±0.33) $\times 10^{-5}$		DESIG=131
Γ_{15}	$\pi^+\pi^-2\pi^0$	(2.11 ±0.15) $\times 10^{-4}$		DESIG=202
Γ_{16}	$2(\pi^+\pi^-)$ neutrals	< 1 %	95%	DESIG=132
Γ_{17}	$2(\pi^+\pi^-)\pi^0$	< 1.8 $\times 10^{-3}$	90%	DESIG=141

Γ_{18}	$2(\pi^+\pi^-)2\pi^0$		<1 %	95%	DESIG=15
Γ_{19}	$3(\pi^+\pi^-)$		$<3.1 \times 10^{-5}$	90%	DESIG=203
Γ_{20}	$K^\pm\pi^\mp$		$<4 \times 10^{-5}$	90%	DESIG=207
Γ_{21}	$\pi^+\pi^-e^+e^-$		$(2.43 \pm0.06) \times 10^{-3}$		DESIG=10
Γ_{22}	$\pi^+e^-\nu_e+$ c.c.		$<2.1 \times 10^{-4}$	90%	DESIG=204
Γ_{23}	γe^+e^-		$(4.80 \pm0.15) \times 10^{-4}$		DESIG=28
Γ_{24}	$\pi^0\gamma\gamma$		$(3.20 \pm0.24) \times 10^{-3}$		DESIG=24
Γ_{25}	$\pi^0\gamma\gamma$(non resonant)		$(6.2 \pm0.9) \times 10^{-4}$		DESIG=212
Γ_{26}	$\eta\gamma\gamma$		$<1.33 \times 10^{-4}$	90%	DESIG=214
Γ_{27}	$4\pi^0$		$<1.2 \times 10^{-5}$	90%	DESIG=26
Γ_{28}	e^+e^-		$<5.6 \times 10^{-9}$	90%	DESIG=150
Γ_{29}	$e^+e^-e^+e^-$		$(4.5 \pm1.1) \times 10^{-6}$		DESIG=215
Γ_{30}	$e^+e^-\mu^+\mu^-$		$<1.8 \times 10^{-6}$	90%	DESIG=219
Γ_{31}	$\mu^+\mu^-\mu^+\mu^-$		$<5 \times 10^{-7}$	90%	DESIG=220
Γ_{32}	invisible		$<2.1 \times 10^{-4}$	90%	DESIG=200
Γ_{33}	γ Dark Photon		5×10^{-7} to 3.5×10^{-6}	90%	DESIG=217

Charge conjugation (*C*), Parity (*P*), Lepton family number (*LF*) violating modes NODE=M002;CLUMP=B

Γ_{34}	$\pi^+\pi^-$	*P,CP*	$<1.8 \times 10^{-5}$	90%	DESIG=111
Γ_{35}	$\pi^0\pi^0$	*P,CP*	$<4 \times 10^{-4}$	90%	DESIG=25
Γ_{36}	$\pi^0e^+e^-$	*C* [a]	$<1.4 \times 10^{-3}$	90%	DESIG=16
Γ_{37}	$\pi^0\rho^0$	*C*	<4 %	90%	DESIG=18
Γ_{38}	ηe^+e^-	*C* [a]	$<2.4 \times 10^{-3}$	90%	DESIG=17
Γ_{39}	3γ	*C*	$<1.0 \times 10^{-4}$	90%	DESIG=23
Γ_{40}	$\mu^+\mu^-\pi^0$	*C* [a]	$<6.0 \times 10^{-5}$	90%	DESIG=22
Γ_{41}	$\mu^+\mu^-\eta$	*C* [a]	$<1.5 \times 10^{-5}$	90%	DESIG=21
Γ_{42}	$e\mu$	*LF*	$<4.7 \times 10^{-4}$	90%	DESIG=27
Γ_{43}	$\pi^+\pi^-$ ALP $\rightarrow \pi^+\pi^-e^+e^-$		$<1.9 \times 10^{-5}$	90%	DESIG=218

[a] *C* parity forbids this to occur as a single-photon process. LINKAGE=CS

CONSTRAINED FIT INFORMATION

An overall fit to the total width, a partial width, 2 combinations of partial widths obtained from integrated cross section, and 21 branching ratios uses 53 measurements and one constraint to determine 9 parameters. The overall fit has a $\chi^2 = 69.5$ for 45 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the x_i whose labels appear in this array to sum to one.

	x_1	x_2	x_4	x_5	x_7	x_8	x_{11}	x_{21}
x_2	−24							
x_4	−77	−42						
x_5	−7	−6	−2					
x_7	−11	−7	9	−1				
x_8	−17	−9	19	−1	2			
x_{11}	−1	−1	−1	0	0	0		
x_{21}	−5	19	−9	−1	−2	−2	0	
Γ	11	−9	−2	1	−40	0	0	−2

	Mode	Rate (MeV)	
Γ_1	$\pi^+\pi^-\eta$	0.0799 ± 0.0029	DESIG=1
Γ_2	$\rho^0\gamma$(including non-resonant $\pi^+\pi^-\gamma$)	0.0554 ± 0.0019	DESIG=9
Γ_4	$\pi^0\pi^0\eta$	0.0421 ± 0.0017	DESIG=2
Γ_5	$\omega\gamma$	0.00474 ± 0.00020	DESIG=7

Γ_7	$\gamma\gamma$	0.00434 ± 0.00013	DESIG=6
Γ_8	$3\pi^0$	$(4.7 \pm0.4) \times 10^{-4}$	DESIG=8
Γ_{11}	$\pi^+\pi^-\pi^0$	$(6.8 \pm0.4) \times 10^{-4}$	DESIG=121
Γ_{21}	$\pi^+\pi^- e^+ e^-$	$(4.57 \pm0.19) \times 10^{-4}$	DESIG=10

η'(958) PARTIAL WIDTHS

NODE=M002220

$\Gamma(\gamma\gamma)$ Γ_7

NODE=M002W4
NODE=M002W4

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.34±0.14 OUR FIT					
4.28±0.19 OUR AVERAGE					
$4.17\pm0.10\pm0.27$	2000	[1] ACCIARRI	98Q	L3	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
$4.53\pm0.29\pm0.51$	266	KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
$3.61\pm0.13\pm0.48$		[2] BEHREND	91	CELL	$e^+e^- \to e^+e^-\eta'(958)$
$4.6 \pm1.1 \pm0.6$	23	BARU	90	MD1	$e^+e^- \to e^+e^-\pi^+\pi^-\gamma$
$4.57\pm0.25\pm0.44$		BUTLER	90	MRK2	$e^+e^- \to e^+e^-\eta'(958)$
$5.08\pm0.24\pm0.71$	547	[3] ROE	90	ASP	$e^+e^- \to e^+e^-2\gamma$
$3.8 \pm0.7 \pm0.6$	34	AIHARA	88C	TPC	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
$4.9 \pm0.5 \pm0.5$	136	[4] WILLIAMS	88	CBAL	$e^+e^- \to e^+e^-2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$4.7 \pm0.6 \pm0.9$	143	[5] GIDAL	87	MRK2	$e^+e^- \to e^+e^-\eta\pi^+\pi^-$
4.0 ± 0.9		[6] BARTEL	85E	JADE	$e^+e^- \to e^+e^-2\gamma$

[1] No non-resonant $\pi^+\pi^-$ contribution found. NODE=M002W4;LINKAGE=AC
[2] Reevaluated by us using B($\eta' \to \rho(770)\gamma$) = (30.2 ± 1.3)%. NODE=M002W4;LINKAGE=K1
[3] Reevaluated by us using B($\eta' \to \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K2
[4] Reevaluated by us using B($\eta' \to \gamma\gamma$) = (2.11 ± 0.13)%. NODE=M002W4;LINKAGE=K3
[5] Superseded by BUTLER 90. NODE=M002W4;LINKAGE=C
[6] Systematic error not evaluated. NODE=M002W4;LINKAGE=A

$\Gamma(e^+e^-)$ Γ_{28}

NODE=M002W1
NODE=M002W1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
$<1.1 \times 10^{-3}$	90	[1,2] ACHASOV	15	SND	$0.958\ e^+e^- \to \pi\pi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.0 \times 10^{-3}$	90	[2] ACHASOV	15	SND	$0.958\ e^+e^- \to \pi\pi\eta$
$<2.4 \times 10^{-3}$	90	[2] AKHMETSHIN	15	CMD3	$0.958\ e^+e^- \to \pi^+\pi^-\eta$

OCCUR=2

[1] Combining data of ACHASOV 15 and AKHMETSHIN 15. NODE=M002W1;LINKAGE=A
[2] Using η and η' branching fractions from PDG 14. NODE=M002W1;LINKAGE=B

η'(958) $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

NODE=M002223

This combination of a partial width with the partial width into $\gamma\gamma$ and with the total width is obtained from the integrated cross section into channel(i) in the $\gamma\gamma$ annihilation.

NODE=M002223

$\Gamma(\gamma\gamma) \times \Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma_{\text{total}}$ $\Gamma_7\Gamma_2/\Gamma$

NODE=M002G1
NODE=M002G1

VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
1.28±0.04 OUR FIT					
1.26±0.07 OUR AVERAGE Error includes scale factor of 1.2.					
$1.09\pm0.04\pm0.13$		BEHREND	91	CELL	$e^+e^- \to e^+e^-\rho(770)^0\gamma$
$1.35\pm0.09\pm0.21$		AIHARA	87	TPC	$e^+e^- \to e^+e^-\rho\gamma$
$1.13\pm0.04\pm0.13$	867	ALBRECHT	87B	ARG	$e^+e^- \to e^+e^-\rho\gamma$
$1.53\pm0.09\pm0.21$		ALTHOFF	84E	TASS	$e^+e^- \to e^+e^-\rho\gamma$
$1.14\pm0.08\pm0.11$	243	BERGER	84B	PLUT	$e^+e^- \to e^+e^-\rho\gamma$
$1.73\pm0.34\pm0.35$	95	JENNI	83	MRK2	$e^+e^- \to e^+e^-\rho\gamma$
$1.49\pm0.13\pm0.027$	213	BARTEL	82B	JADE	$e^+e^- \to e^+e^-\rho\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.85\pm0.31\pm0.24$	43	BEHREND	82C	CELL	$e^+e^- \to e^+e^-\rho\gamma$

$\Gamma(\gamma\gamma) \times \Gamma(\pi^0\pi^0\eta)/\Gamma_{\text{total}}$ — $\Gamma_7\Gamma_4/\Gamma$

NODE=M002G2

VALUE (keV)	DOCUMENT ID		TECN	COMMENT
0.97±0.04 OUR FIT Error includes scale factor of 1.1.				
0.92±0.06±0.11	[1] KARCH	92	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.95±0.05±0.08	[2] KARCH	90	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$
1.00±0.08±0.10	[2,3] ANTREASYAN	87	CBAL	$e^+e^- \to e^+e^-\eta\pi^0\pi^0$

[1] Reevaluated by us using B($\eta \to \gamma\gamma$) = (39.21 ± 0.34)%. Supersedes ANTREASYAN 87 and KARCH 90. NODE=M002G2;LINKAGE=K4

[2] Superseded by KARCH 92. NODE=M002G2;LINKAGE=A

[3] Using BR($\eta \to 2\gamma$)=(38.9 ± 0.5)%. NODE=M002G2;LINKAGE=D

$\eta'(958)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

NODE=M002224

$\Gamma(\pi^+\pi^-\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ — $\Gamma_1\Gamma_{28}/\Gamma$

NODE=M002G01

VALUE (10^{-3} eV)	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	[1] AKHMETSHIN	15	CMD3	0.958 $e^+e^- \to \pi^+\pi^-\eta$

[1] AKHMETSHIN 15 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\eta) \times \Gamma(\eta'(958) \to e^+e^-)/\Gamma_{\text{total}}] \times [B(\eta \to 2\gamma)] < 4.1 \times 10^{-4}$ eV which we divide by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002G01;LINKAGE=A

$\eta'(958)$ BRANCHING RATIOS

NODE=M002230

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

NODE=M002R47

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
42.5 ±0.5 OUR FIT Error includes scale factor of 1.1.					
41.24±0.08±1.24	312k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
42.4 ±1.1 ±0.4	1.2k	[1] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R47;LINKAGE=PE

$\Gamma(\pi^+\pi^-\eta(\text{charged decay}))/\Gamma_{\text{total}}$ — $0.2805\Gamma_1/\Gamma$

NODE=M002R3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.1191±0.0015 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.123 ±0.014	107	RITTENBERG	69	HBC	1.7–2.7 K^-p
0.10 ±0.04	10	LONDON	66	HBC	2.24 $K^-p \to \Lambda 2\pi^+ 2\pi^- \pi^0$
0.07 ±0.04	7	BADIER	65B	HBC	3 K^-p

$\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))/\Gamma_{\text{total}}$ — $0.7195\Gamma_1/\Gamma$

NODE=M002R1

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.306±0.004 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.314±0.026	281	RITTENBERG	69	HBC	1.7–2.7 K^-p

$\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))/\Gamma_{\text{total}}$ — Γ_2/Γ

NODE=M002R6

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
29.5 ± 0.4 OUR FIT Error includes scale factor of 1.1.					
29.90± 0.03±0.55	913k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
28.7 ± 0.7 ±0.4	0.2k	[1] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$
32.9 ± 3.3	298	RITTENBERG	69	HBC	1.7–2.7 K^-p
20 ±10	20	LONDON	66	HBC	2.24 $K^-p \to \Lambda\pi^+\pi^-\gamma$
34 ± 9	35	BADIER	65B	HBC	3 K^-p

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R6;LINKAGE=PE

$\Gamma(\rho^0\gamma)/\Gamma_{\text{total}}$ — Γ_3/Γ

NODE=M002R66

VALUE (%)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
33.34±0.06±1.60	970k	[1] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$
34.43±0.52±1.97	970k	[2] ABLIKIM	18C	BES3	$\eta'(958) \to \gamma\pi^+\pi^-$ OCCUR=2

[1] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$, $\omega(782)$, and box anomaly components. NODE=M002R66;LINKAGE=A

[2] From a fit to $\pi^+\pi^-$ mass using $\rho(770)$, $\omega(782)$, and $\rho(1450)$ components. NODE=M002R66;LINKAGE=B

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi^+\pi^-\eta)$ — Γ_2/Γ_1

NODE=M002R43
NODE=M002R43

VALUE	DOCUMENT ID		TECN	COMMENT
0.694±0.014 OUR FIT Error includes scale factor of 1.1.				
0.683±0.020 OUR AVERAGE				
0.677±0.024±0.011	PEDLAR	09	CLE3	$J/\psi \to \eta' \gamma$
0.69 ±0.03	ABLIKIM	06E	BES2	$J/\psi \to \eta' \gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi^+\pi^-\eta(\text{neutral decay}))$ — $\Gamma_2/0.714\Gamma_1$

NODE=M002R27
NODE=M002R27

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.972±0.019 OUR FIT Error includes scale factor of 1.1.					
0.97 ±0.09 OUR AVERAGE					
0.70 ±0.22		AMSLER	04B	CBAR	$0\ \bar{p}p \to \pi^+\pi^-\eta$
1.07 ±0.17		BELADIDZE	92C	VES	$36\ \pi^-\text{Be} \to \pi^-\eta'\eta\text{Be}$
0.92 ±0.14	473	DANBURG	73	HBC	$2.2\ K^-p \to \Lambda X^0$
1.11 ±0.18	192	JACOBS	73	HBC	$2.9\ K^-p \to \Lambda X^0$

$\Gamma(\pi^0\pi^0\eta)/\Gamma_{\text{total}}$ — Γ_4/Γ

NODE=M002R48
NODE=M002R48

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
22.4 ±0.6 OUR FIT Error includes scale factor of 1.1.					
21.36±0.10±0.92	52k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
23.5 ±1.3 ±0.4	3.2k	[1] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R48;LINKAGE=PE

$\Gamma(\pi^0\pi^0\eta(3\pi^0\text{ decay}))/\Gamma_{\text{total}}$ — $0.321\Gamma_4/\Gamma$

NODE=M002R26
NODE=M002R26

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0718±0.0018 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.11 ±0.06	4	BENSINGER	70	DBC	$2.2\ \pi^+ d$

$\Gamma(\pi^0\pi^0\eta)/\Gamma(\pi^+\pi^-\eta)$ — Γ_4/Γ_1

NODE=M002R45
NODE=M002R45

VALUE	DOCUMENT ID		TECN	COMMENT
0.527±0.019 OUR FIT Error includes scale factor of 1.1.				
0.555±0.043±0.013	PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$

$\Gamma(\rho^0\gamma(\text{including non-resonant } \pi^+\pi^-\gamma))/\Gamma(\pi\pi\eta)$ — $\Gamma_2/(\Gamma_1+\Gamma_4)$

NODE=M002R7
NODE=M002R7

VALUE	DOCUMENT ID		TECN	COMMENT
0.455±0.008 OUR FIT Error includes scale factor of 1.1.				
0.43 ±0.02 ±0.02	BARBERIS	98C	OMEG	$450\ pp \to p_f\eta' p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.31 ±0.15	DAVIS	68	HBC	$5.5\ K^- p$

$\Gamma(\omega\gamma)/\Gamma_{\text{total}}$ — Γ_5/Γ

NODE=M002R49
NODE=M002R49

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.52 ±0.07 OUR FIT					
2.50 ±0.07 OUR AVERAGE					
2.489±0.018±0.074	23k	ABLIKIM	19T	BES	$J/\psi \to \gamma\eta'$
2.55 ±0.03 ±0.16	33.2k	[1] ABLIKIM	15AD	BES3	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2.34 ±0.30 ±0.04	70	[2] PEDLAR	09	CLEO	$J/\psi \to \gamma\eta'$

[1] Using $B(J/\psi \to \eta'\gamma) = (5.15\pm0.16)\times10^{-3}$ and $B(\omega \to \pi^+\pi^-\pi^0) = (89.2\pm0.7)\%$.

NODE=M002R49;LINKAGE=A

[2] Not independent of other η' branching fractions and ratios in PEDLAR 09.

NODE=M002R49;LINKAGE=PE

$\Gamma(\omega\gamma)/\Gamma(\pi^+\pi^-\eta)$ — Γ_5/Γ_1

NODE=M002R17
NODE=M002R17

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0593±0.0018 OUR FIT Error includes scale factor of 1.1.					
0.055 ±0.007 ±0.001		PEDLAR	09	CLE3	$J/\psi \to \eta'\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.068 ±0.013	68	ZANFINO	77	ASPK	$8.4\ \pi^- p$

$\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_5/Γ_4

NODE=M002R33
NODE=M002R33

VALUE	DOCUMENT ID		TECN	COMMENT
0.113±0.004 OUR FIT				
0.147±0.016	ALDE	87B	GAM2	$38\ \pi^- p \to n4\gamma$

$\Gamma(\omega e^+ e^-)/\Gamma(\omega\gamma)$ — Γ_6/Γ_5

NODE=M002R60

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$7.71 \pm 1.34 \pm 0.54$	[1] ABLIKIM	15AD	BES3	$J/\psi \to \eta' \gamma$

[1] Obtained from other ABLIKIM 15AD meausurements with common systematics taken into account. NODE=M002R60;LINKAGE=A

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

NODE=M002R59

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
$1.97 \pm 0.34 \pm 0.17$	66	[1] ABLIKIM	15AD	BES3	$J/\psi \to \eta' \gamma$

[1] Using B($J/\psi \to \eta' \gamma$) = $(5.15 \pm 0.16) \times 10^{-3}$ and B($\omega \to \pi^+ \pi^- \pi^0$) = (89.2 ± 0.7)%. NODE=M002R59;LINKAGE=A

$\Gamma(\rho^0 \gamma (\text{including non-resonant } \pi^+ \pi^- \gamma))/[\Gamma(\pi^+ \pi^- \eta) + \Gamma(\pi^0 \pi^0 \eta) + \Gamma(\omega\gamma)]$ — $\Gamma_2/(\Gamma_1+\Gamma_4+\Gamma_5)$

NODE=M002R18

VALUE	DOCUMENT ID		TECN	COMMENT
0.438 ± 0.008 OUR FIT Error includes scale factor of 1.1.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.25 ± 0.14	DAUBER	64	HBC	1.95 $K^- p$

$[\Gamma(\pi^0 \pi^0 \eta (\text{charged decay})) + \Gamma(\omega (\text{charged decay}) \gamma)]/\Gamma_{\text{total}}$ — $(0.286\Gamma_4+0.89\Gamma_5)/\Gamma$

NODE=M002R4

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.0864 ± 0.0017 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.045 ± 0.029	42	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(\pi^+ \pi^- \text{neutrals})/\Gamma_{\text{total}}$ — $(0.714\Gamma_1+0.286\Gamma_4+0.89\Gamma_5)/\Gamma$

NODE=M002R2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.3896 ± 0.0027 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.4 ± 0.1	39	LONDON	66	HBC	2.24 $K^- p \to \Lambda \pi^+ \pi^-$ neutrals
0.35 ± 0.06	33	BADIER	65B	HBC	3 $K^- p$

$\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — Γ_7/Γ

NODE=M002R19

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.307 ± 0.035 OUR FIT Error includes scale factor of 1.1.					
2.31 ± 0.06 OUR AVERAGE Error includes scale factor of 1.8.					
$2.331 \pm 0.012 \pm 0.035$	71k	ABLIKIM	19T	BES	$J/\psi \to \gamma \eta'$
$1.99 {}^{+0.31}_{-0.27} \pm 0.07$	114	[1] WICHT	08	BELL	$B^\pm \to K^\pm \gamma\gamma$
2.00 ± 0.18		[2] STANTON	80	SPEC	8.45 $\pi^- p \to n \pi^+ \pi^- 2\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$2.25 \pm 0.16 \pm 0.03$	0.3k	[3] PEDLAR	09	CLEO	$J/\psi \to \gamma \eta'$
1.8 ± 0.2	6000	[4] APEL	79	NICE	15–40 $\pi^- p \to n 2\gamma$
2.5 ± 0.7		DUANE	74	MMS	$\pi^- p \to n$MM
1.71 ± 0.33	68	DALPIAZ	72	CNTR	1.6 $\pi^- p \to n X^0$
$2.0 {}^{+0.8}_{-0.6}$	31	HARVEY	71	OSPK	3.65 $\pi^- p \to n X^0$

[1] WICHT 08 reports $[\Gamma(\eta'(958) \to \gamma\gamma)/\Gamma_{\text{total}}] \times [B(B^+ \to \eta' K^+)] = (1.40 {}^{+0.16}_{-0.15} {}^{+0.15}_{-0.12}) \times 10^{-6}$ which we divide by our best (shown rounded) value $B(B^+ \to \eta' K^+) = (7.04 \pm 0.25) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R19;LINKAGE=WI

[2] Includes APEL 79 result. NODE=M002R19;LINKAGE=S

[3] Not independent of other η' branching fractions and ratios in PEDLAR 09. NODE=M002R19;LINKAGE=PE

[4] Data is included in STANTON 80 evaluation. NODE=M002R19;LINKAGE=A

$\Gamma(\gamma\gamma)/\Gamma(\pi^+ \pi^- \eta)$ — Γ_7/Γ_1

NODE=M002R46

VALUE	DOCUMENT ID		TECN	COMMENT
0.0543 ± 0.0012 OUR FIT Error includes scale factor of 1.1.				
$0.053 \pm 0.004 \pm 0.001$	PEDLAR	09	CLE3	$J/\psi \to \eta' \gamma$

$\Gamma(\gamma\gamma)/\Gamma(\rho^0 \gamma (\text{including non-resonant } \pi^+ \pi^- \gamma))$ — Γ_7/Γ_2

NODE=M002R42

VALUE	DOCUMENT ID		TECN	COMMENT
0.0782 ± 0.0016 OUR FIT Error includes scale factor of 1.1.				
0.080 ± 0.008	ABLIKIM	06E	BES2	$J/\psi \to \eta' \gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_7/Γ_4

NODE=M002R38

VALUE	DOCUMENT ID		TECN	COMMENT
0.1031±0.0028 OUR FIT				
0.105 ±0.010 OUR AVERAGE Error includes scale factor of 1.9.				
0.091 ±0.009	AMSLER	93	CBAR	0.0 $\overline{p}p$
0.112 ±0.002 ±0.006	ALDE	87B	GAM2	38 $\pi^- p \to n 2\gamma$

$\Gamma(\gamma\gamma)/\Gamma(\pi^0\pi^0\eta$(neutral decay)) — $\Gamma_7/0.714\Gamma_4$

NODE=M002R28

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.144±0.004 OUR FIT					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.188±0.058	16	APEL	72	OSPK	3.8 $\pi^- p \to n X^0$

Γ(neutrals)$/\Gamma_{total}$ — $(0.714\Gamma_4+0.09\Gamma_5+\Gamma_7)/\Gamma$

NODE=M002R5

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.185±0.004 OUR FIT Error includes scale factor of 1.1.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.185±0.022	535	BASILE	71	CNTR	1.6 $\pi^- p \to n X^0$
0.189±0.026	123	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(3\pi^0)/\Gamma_{total}$ — Γ_8/Γ

NODE=M002R55

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
2.50 ±0.17 OUR FIT					
3.57 ±0.26 OUR AVERAGE					
3.522±0.082±0.254	2015	ABLIKIM	17	BES3	$J/\psi \to \gamma(3\pi^0)$
4.79 ±0.59 ±1.14	183	[1] ABLIKIM	15P	BES3	$J/\psi \to K^+ K^- 3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3.56 ±0.22 ±0.34	309	[2] ABLIKIM	12E	BES3	$J/\psi \to \gamma(3\pi^0)$

[1] We have added all systematic uncertainties in quadrature to a single value. NODE=M002R55;LINKAGE=A

[2] Superseded by ABLIKIM 17. NODE=M002R55;LINKAGE=B

$\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_8/Γ_4

NODE=M002R32

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
112± 8 OUR FIT					
78±10 OUR AVERAGE					
86±19	235	BLIK	08	GAMS	32 $\pi^- p \to \eta' n$
74±15		ALDE	87B	GAM2	38 $\pi^- p \to n 6\gamma$
75±18		BINON	84	GAM2	30–40 $\pi^- p \to n 6\gamma$

$\Gamma(\mu^+\mu^-\gamma)/\Gamma(\gamma\gamma)$ — Γ_9/Γ_7

NODE=M002R29

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.9±1.2	33	VIKTOROV	80	CNTR	25,33 $\pi^- p \to 2\mu\gamma$

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

NODE=M002R50

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.13±0.13 OUR AVERAGE						
2.15±0.13±0.02		434	[1] ABLIKIM	24AK	BES3	$J/\psi \to \gamma\eta'$
1.94±0.37±0.02		53	[2] ABLIKIM	21I	BES3	$J/\psi \to \gamma\eta'(958)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
< 2.9	90		[3] ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$
<24	90		[4] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 24AK reports $(2.16 \pm 0.12 \pm 0.06) \times 10^{-5}$ from a measurement of $[\Gamma(\eta'(958) \to \pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R50;LINKAGE=C

[2] ABLIKIM 21I reports $(1.97 \pm 0.33 \pm 0.19) \times 10^{-5}$ from a measurement of $[\Gamma(\eta'(958) \to \pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.21 \pm 0.17) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R50;LINKAGE=E

[3] Using $\Gamma_2/\Gamma = (29.3 \pm 0.6)\%$ from PDG 12. NODE=M002R50;LINKAGE=A

[4] Not independent of measured value of Γ_{10}/Γ_1 from NAIK 09. NODE=M002R50;LINKAGE=NA

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

NODE=M002R03
NODE=M002R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.5	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\mu^+\mu^-)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] < 1.3 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R03;LINKAGE=NA

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma(\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$)) — Γ_{10}/Γ_2

NODE=M002R57
NODE=M002R57

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<1.0	90	ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_{11}/Γ

NODE=M002R21
NODE=M002R21

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.61 ±0.18 OUR FIT					
3.61 ±0.18 OUR AVERAGE					
$3.591 \pm 0.054 \pm 0.174$	6067	ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$
$4.28 \pm 0.49 \pm 1.11$	78	[1] ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$
$3.7 ^{+1.1}_{-0.9} \pm 0.4$		[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3.83 \pm 0.15 \pm 0.39$	1014	[3] ABLIKIM	12E	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$

[1] We have added all systematic uncertainties in quadrature to a single value.
NODE=M002R21;LINKAGE=A

[2] Not independent of measured value of Γ_{11}/Γ_1 from NAIK 09.
NODE=M002R21;LINKAGE=NA

[3] Superseded by ABLIKIM 17.
NODE=M002R21;LINKAGE=B

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{11}/Γ_1

NODE=M002R01
NODE=M002R01

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.5 ±0.4 OUR FIT Error includes scale factor of 1.1.					
$\mathbf{8.27^{+2.49}_{-2.12} \pm 0.04}$	20	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)] = (21^{+6}_{-5} \pm 2) \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value.

NODE=M002R01;LINKAGE=NA

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

NODE=M002R63
NODE=M002R63

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
37.63±0.77±5.00	6580	[1] ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^+\pi^-\pi^0)$

[1] We have added all systematic uncertainties in quadrature.
NODE=M002R63;LINKAGE=A

$\Gamma(\pi^\mp\rho^\pm)/\Gamma_{total}$ — Γ_{13}/Γ

NODE=M002R62
NODE=M002R62

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.44±0.60±2.23	1231	[1] ABLIKIM	17	BES3	$J/\psi \to \gamma(\pi^\mp\rho^\pm)$

[1] We have added all systematic uncertainties in quadrature.
NODE=M002R62;LINKAGE=A

$\Gamma(2(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{14}/Γ

NODE=M002R24
NODE=M002R24

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
8.51±0.32±0.10		1650	[1] ABLIKIM	24F	BES3	$J/\psi \to \gamma\eta'(958)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$8.3 \pm 0.9 \pm 0.1$		199	[2,3] ABLIKIM	14M	BES3	$J/\psi \to \gamma\eta'$
< 24	90		[4] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<1000	90		RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[1] ABLIKIM 24F reports $(8.56 \pm 0.25 \pm 0.23) \times 10^{-5}$ from a measurement of $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value.
NODE=M002R24;LINKAGE=B

[2] ABLIKIM 14M reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-))/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] = (4.40 \pm 0.35 \pm 0.30) \times 10^{-7}$ which we divide by our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value.
NODE=M002R24;LINKAGE=A

[3] Superseded by ABLIKIM 24F.
NODE=M002R24;LINKAGE=C

[4] Not independent of measured value of Γ_{14}/Γ_1 from NAIK 09.
NODE=M002R24;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ — Γ_{14}/Γ_1

NODE=M002R04
NODE=M002R04

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<0.6	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-))/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 1.4 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R04;LINKAGE=NA

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma_{total}$ — Γ_{15}/Γ

NODE=M002R51
NODE=M002R51

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.11±0.15±0.02		865	[1] ABLIKIM	24F	BES3	$J/\psi \to \gamma\eta'(958)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.78±0.38±0.02		84	[2,3] ABLIKIM	14M	BES3	$J/\psi \to \gamma\eta'$
<27	90		[4] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 24F reports $(2.12 \pm 0.12 \pm 0.10) \times 10^{-4}$ from a measurement of $[\Gamma(\eta'(958) \to \pi^+\pi^-2\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R51;LINKAGE=B

[2] ABLIKIM 14M reports $[\Gamma(\eta'(958) \to \pi^+\pi^-2\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] = (9.38 \pm 1.79 \pm 0.89) \times 10^{-7}$ which we divide by our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R51;LINKAGE=A

[3] Superseded by ABLIKIM 24F. NODE=M002R51;LINKAGE=C

[4] Not independent of measured value of Γ_{15}/Γ_1 from NAIK 09. NODE=M002R51;LINKAGE=NA

$\Gamma(\pi^+\pi^-2\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{15}/Γ_1

NODE=M002R05
NODE=M002R05

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<6	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^-2\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 15 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R05;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\text{ neutrals})/\Gamma_{total}$ — Γ_{16}/Γ

NODE=M002R22
NODE=M002R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{total}$ — Γ_{17}/Γ

NODE=M002R23
NODE=M002R23

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.002	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<0.01	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

[1] Not independent of measured value of Γ_{17}/Γ_1 from NAIK 09. NODE=M002R23;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{17}/Γ_1

NODE=M002R06
NODE=M002R06

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<4	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 11 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R06;LINKAGE=NA

$\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ — Γ_{18}/Γ

NODE=M002R16
NODE=M002R16

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.01	95	KALBFLEISCH	64B	HBC	$K^- p \to \Lambda 2(\pi^+\pi^-)$+MM
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.01	90	LONDON	66	HBC	Compilation

$\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ — Γ_{19}/Γ

NODE=M002R07
NODE=M002R07

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
< 3.1	90	[1] ABLIKIM	13U	BES3	$J/\psi \to \gamma 3(\pi^+\pi^-)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 53	90	[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<500	95	KALBFLEISCH	64B	HBC	$K^- p \to \Lambda 2(\pi^+\pi^-)$

[1] Using B($J/\psi \to \gamma\eta'(958)$) = $(5.16 \pm 0.15) \times 10^{-3}$. NODE=M002R07;LINKAGE=A

[2] Not independent of measured value of Γ_{19}/Γ_1 from NAIK 09. NODE=M002R07;LINKAGE=NA

$\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ — Γ_{19}/Γ_1

NODE=M002R08
NODE=M002R08

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
<1.2	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to 3(\pi^+\pi^-))/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 3.0 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$. NODE=M002R08;LINKAGE=NA

$\Gamma(K^\pm\pi^\mp)/\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))$ — Γ_{20}/Γ_2

NODE=M002R61
NODE=M002R61

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.3 \times 10^{-4}$	90	ABLIKIM	16M	BES3	$e^+e^- \to J/\psi \to$ hadrons

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma_{total}$ — Γ_{21}/Γ

NODE=M002R12
NODE=M002R12

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
2.43±0.06 OUR FIT						
2.44±0.08±0.03		22725	[1] ABLIKIM	24AK	BES3	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2.11±0.12±0.14		429	[2] ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$
$2.5\ ^{+1.2}_{-0.9}\ \pm 0.5$			[3] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$
<6	90		RITTENBERG	65	HBC	2.7 $K^- p$

[1] ABLIKIM 24AK reports $(2.45 \pm 0.02 \pm 0.08) \times 10^{-3}$ from a measurement of $[\Gamma(\eta'(958) \to \pi^+\pi^- e^+ e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R12;LINKAGE=C

[2] Using $\Gamma_2/\Gamma = (29.3 \pm 0.6)\%$ from PDG 12. NODE=M002R12;LINKAGE=A

[3] Not independent of measured value of Γ_{21}/Γ_1 from NAIK 09. NODE=M002R12;LINKAGE=NA

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma(\pi^+\pi^-\eta)$ — Γ_{21}/Γ_1

NODE=M002R02
NODE=M002R02

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
5.72±0.17 OUR FIT					
$5.51^{+3.00}_{-2.30}\pm 0.03$	8	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \pi^+\pi^- e^+ e^-)/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $= (14^{+7}_{-5} \pm 3) \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = (39.36 \pm 0.18) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value. NODE=M002R02;LINKAGE=NA

$\Gamma(\pi^+\pi^- e^+ e^-)/\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))$ — Γ_{21}/Γ_2

NODE=M002R56
NODE=M002R56

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
8.24±0.21 OUR FIT					
8.20±0.16±0.27	2584	ABLIKIM	21J	BES3	$J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
7.2 ±0.4 ±0.5	429	[1] ABLIKIM	13O	BES3	$J/\psi \to \gamma\eta'$

[1] Superseded by ABLIKIM 21J. NODE=M002R56;LINKAGE=A

$\Gamma(\pi^+ e^-\nu_e + \text{c.c.})/\Gamma(\pi^+\pi^-\eta)$ — Γ_{22}/Γ_1

NODE=M002R54
NODE=M002R54

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<5.0	90	ABLIKIM	13G	BES3	$J/\psi \to \phi\eta'$

$\Gamma(\gamma e^+ e^-)/\Gamma_{total}$ — Γ_{23}/Γ

NODE=M002R40

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
4.80±0.14±0.05		7611	[1] ABLIKIM	24M	BES3	$e^+ e^- \to J/\psi \to \gamma\eta'$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<9	90		BRIERE	00	CLEO	10.6 $e^+ e^-$

OCCUR=2

[1] ABLIKIM 24M reports $(4.83 \pm 0.07 \pm 0.14) \times 10^{-4}$ from a measurement of $[\Gamma(\eta'(958) \to \gamma e^+ e^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value.

NODE=M002R40;LINKAGE=H

$\Gamma(\gamma e^+ e^-)/\Gamma(\gamma\gamma)$ — Γ_{23}/Γ_7

NODE=M002R00

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
2.13±0.09±0.07	864	ABLIKIM	15O	BES3	$J/\psi \to \gamma e^+ e^-$

$\Gamma(\pi^0\gamma\gamma)/\Gamma_{total}$ — Γ_{24}/Γ

NODE=M002R64

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.20±0.07±0.23	3.4k	ABLIKIM	17T	BES3	$J/\psi \to \gamma\eta'$

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{24}/Γ_4

NODE=M002R35

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<37	90	ALDE	87B	GAM2	38 $\pi^- p \to n 4\gamma$

$\Gamma(\pi^0\gamma\gamma(\text{non resonant}))/\Gamma_{total}$ — Γ_{25}/Γ

NODE=M002R65

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
6.16±0.64±0.67	655	ABLIKIM	17T	BES3	$J/\psi \to \gamma\eta'$

$\Gamma(\eta\gamma\gamma)/\Gamma_{total}$ — Γ_{26}/Γ

NODE=M002R67

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.33 × 10^{-4}	90	ABLIKIM	19AW	BES3	$J/\psi \to \gamma\eta' \to \gamma\gamma\gamma 2\gamma$

$\Gamma(4\pi^0)/\Gamma_{total}$ — Γ_{27}/Γ

NODE=M002R58

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.2 × 10^{-5}	90	[1] ABLIKIM	24F	BES3	$J/\psi \to \gamma\eta'(958)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.94 × 10^{-5}	90	[2] ABLIKIM	20E	BES3	$J/\psi \to \eta'\gamma$
<3.2 × 10^{-4}	90	DONSKOV	14	GAM4	32.5 $\pi^- p \to \eta' n$

[1] ABLIKIM 24F reports $< 1.24 \times 10^{-5}$ from a measurement of $[\Gamma(\eta'(958) \to 4\pi^0)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.28 \times 10^{-3}$.

NODE=M002R58;LINKAGE=A

[2] Superseded by ABLIKIM 24F.

NODE=M002R58;LINKAGE=B

$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{27}/Γ_4

NODE=M002R37

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<23	90	ALDE	87B	GAM2	38 $\pi^- p \to n 8\gamma$

$\Gamma(e^+ e^-)/\Gamma_{total}$ — Γ_{28}/Γ

NODE=M002R39

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 5.6 × 10^{-9}	90	[1] ACHASOV	15	SND	0.958 $e^+ e^- \to \pi\pi\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<12 × 10^{-9}	90	[2] AKHMETSHIN	15	CMD3	0.958 $e^+ e^- \to \pi^+\pi^-\eta$
< 2.1 × 10^{-7}	90	VOROBYEV	88	ND	$e^+ e^- \to \pi^+\pi^-\eta$

[1] Combining data of ACHASOV 15 and AKHMETSHIN 15 and using $\Gamma(\eta') = 0.198 \pm 0.009$ MeV.

NODE=M002R39;LINKAGE=B

[2] Using $\Gamma_{\eta'(958)} = 198 \pm 9$ keV, $B(\eta'(958) \to \pi^+\pi^-\eta) = (42.9 \pm 0.7)\%$, and $B(\eta \to \gamma\gamma) = (39.41 \pm 0.20)\%$.

NODE=M002R39;LINKAGE=A

$\Gamma(e^+e^-e^+e^-)/\Gamma_{\rm total}$ Γ_{29}/Γ

NODE=M002R68
NODE=M002R68

VALUE (units 10^{-6})	EVTS	DOCUMENT ID		TECN	COMMENT
4.5±1.1±0.1	30	[1] ABLIKIM	22E	BES3	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 22E reports $(4.5 \pm 1.0 \pm 0.5) \times 10^{-6}$ from a measurement of $[\Gamma(\eta'(958) \to e^+e^-e^+e^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$, which we rescale to our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best (shown rounded) value.

NODE=M002R68;LINKAGE=B

$\Gamma(e^+e^-\mu^+\mu^-)/\Gamma_{\rm total}$ Γ_{30}/Γ

NODE=M002R74
NODE=M002R74

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.8 × 10⁻⁶	90	[1] ABLIKIM	25N	BES3	$J/\psi \to \gamma\eta'$

OCCUR=2

[1] ABLIKIM 25N reports $< 1.75 \times 10^{-6}$ from a measurement of $[\Gamma(\eta'(958) \to e^+e^-\mu^+\mu^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$.

NODE=M002R74;LINKAGE=C

$\Gamma(\mu^+\mu^-\mu^+\mu^-)/\Gamma_{\rm total}$ Γ_{31}/Γ

NODE=M002R75
NODE=M002R75

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<5 × 10⁻⁷	90	[1] ABLIKIM	25N	BES3	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 25N reports $< 5.28 \times 10^{-7}$ from a measurement of $[\Gamma(\eta'(958) \to \mu^+\mu^-\mu^+\mu^-)/\Gamma_{\rm total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))]$ assuming $B(J/\psi(1S) \to \gamma\eta'(958)) = (5.28 \pm 0.06) \times 10^{-3}$.

NODE=M002R75;LINKAGE=B

$\Gamma(\pi^+\pi^-e^+e^-)/\Gamma(\pi^+\pi^-\mu^+\mu^-)$ Γ_{21}/Γ_{10}

NODE=M002R70
NODE=M002R70

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
113.4±0.9±3.7	434	[1] ABLIKIM	24AK	BES3	$J/\psi \to \gamma\eta'$

[1] ABLIKIM 24AK value is not independent from the individual branching fraction measurements.

NODE=M002R70;LINKAGE=A

$\Gamma(\text{invisible})/\Gamma_{\rm total}$ Γ_{32}/Γ

NODE=M002R52
NODE=M002R52

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.1 × 10⁻⁴	90	[1] ANDREEV	24D	NA64	CEX π^- Fe $\to \eta' X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<9.5 \times 10^{-4}$	90	[2] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] ANDREEV 24D result is based on 2.9×10^9 pions on active ^{26}Fe target.
[2] Not independent of measured value of Γ_{32}/Γ_1 from NAIK 09.

NODE=M002R52;LINKAGE=A
NODE=M002R52;LINKAGE=NA

$\Gamma(\text{invisible})/\Gamma(\pi^+\pi^-\eta)$ Γ_{32}/Γ_1

NODE=M002R09
NODE=M002R09

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1	90	[1] NAIK	09	CLEO	$J/\psi \to \gamma\eta'$

[1] NAIK 09 reports $[\Gamma(\eta'(958) \to \text{invisible})/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)]$ / $[B(\eta \to 2\gamma)]$ $< 5.4 \times 10^{-3}$ which we multiply by our best (shown rounded) value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$.

NODE=M002R09;LINKAGE=NA

$\Gamma(\text{invisible})/\Gamma(\gamma\gamma)$ Γ_{32}/Γ_7

NODE=M002R44
NODE=M002R44

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<2.4 \times 10^{-2}$	90	ABLIKIM	13	BES3	$J/\psi \to \phi\eta'$
$<6.69 \times 10^{-2}$	90	ABLIKIM	06Q	BES	$J/\psi \to \phi\eta'$

$\Gamma(\gamma\,\text{Dark Photon})/\Gamma_{\rm total}$ Γ_{33}/Γ

NODE=M002R72
NODE=M002R72

VALUE (units 10^{-6})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.5 to 3.5 (CL = 90%)	[0.50 to 3.50×10^{-6} (CL = 90%) OUR 2025 BEST LIMIT]					
0.5 to 3.5	90	7611	[1] ABLIKIM	24M	BES3	$e^+e^- \to J/\psi \to \gamma\eta'$

[1] For a dark photon decaying to e^+e^- in the mass range 0 to 0.7 GeV.

NODE=M002R72;LINKAGE=A

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$ — Γ_{34}/Γ

NODE=M002R20

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
< 0.18	90	[1] AAIJ	17D	LHCB	$D^+_{(s)} \to \pi^+\pi^-\pi^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
< 0.5	90	[2] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^+\pi^-$
< 29	90	[3] MORI	07A	BELL	$\gamma\gamma \to \pi^+\pi^-$
< 3.3	90	[4] MORI	07A	BELL	$\gamma\gamma \to \pi^+\pi^-$
<800	95	DANBURG	73	HBC	2.2 $K^- p \to \Lambda X^0$
<200	90	RITTENBERG	69	HBC	1.7–2.7 $K^- p$

OCCUR=2

[1] Using branching fractions of $D^+_{(s)}$ decays from PDG 15.

[2] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.28 \times 10^{-3}$.

[3] Taking into account interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.

[4] Without interference with the $\gamma\gamma \to \pi^+\pi^-$ continuum.

NODE=M002R20;LINKAGE=A
NODE=M002R20;LINKAGE=AL
NODE=M002R20;LINKAGE=MO
NODE=M002R20;LINKAGE=MR

$\Gamma(\pi^0\pi^0)/\Gamma_{total}$ — Γ_{35}/Γ

NODE=M002R53

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4 \times 10^{-4}$	90	[1] ABLIKIM	11G	BES3	$J/\psi \to \gamma\pi^0\pi^0$

[1] ABLIKIM 11G reports $[\Gamma(\eta'(958) \to \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(1S) \to \gamma\eta'(958))] < 2.84 \times 10^{-7}$ which we divide by our best (shown rounded) value $B(J/\psi(1S) \to \gamma\eta'(958)) = 5.28 \times 10^{-3}$.

NODE=M002R53;LINKAGE=AL

$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{35}/Γ_4

NODE=M002R36

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<45	90	ALDE	87B	GAM2	38 $\pi^- p \to n 4\gamma$

$\Gamma(\pi^0 e^+ e^-)/\Gamma_{total}$ — Γ_{36}/Γ

NODE=M002R8

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 1.4	90	BRIERE	00	CLEO	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<13	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(\pi^0\rho^0)/\Gamma_{total}$ — Γ_{37}/Γ

NODE=M002R10

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.04	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(\eta e^+ e^-)/\Gamma_{total}$ — Γ_{38}/Γ

NODE=M002R9

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
< 2.4	90	BRIERE	00	CLEO	10.6 e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<11	90	RITTENBERG	65	HBC	2.7 $K^- p$

$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$ — Γ_{39}/Γ_4

NODE=M002R34

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.6	90	ALDE	87B	GAM2	38 $\pi^- p \to n 3\gamma$

$\Gamma(\mu^+\mu^-\pi^0)/\Gamma_{total}$ — Γ_{40}/Γ

NODE=M002R31

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<6.0	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(\mu^+\mu^-\eta)/\Gamma_{total}$ — Γ_{41}/Γ

NODE=M002R30

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
<1.5	90	DZHELYADIN	81	CNTR	30 $\pi^- p \to \eta' n$

$\Gamma(e\mu)/\Gamma_{total}$ — Γ_{42}/Γ

NODE=M002R41

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
<4.7	90	BRIERE	00	CLEO	10.6 e^+e^-

$\Gamma(\pi^+\pi^- \text{ALP} \to \pi^+\pi^- e^+ e^-)/\Gamma(\pi^+\pi^- e^+ e^-)$ Γ_{43}/Γ_{21}

NODE=M002R73
NODE=M002R73

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<7.8 × 10^{-3}	90	[1] ABLIKIM	24AK	BES3	$J/\psi \to \gamma\eta'$

[1] For a pseudoscalar ALP, with a mass in the range 0–500 MeV. The measured limit at the 90% credibility level as a function of the mass of ALP ranges from 0.1×10^{-3} to 7.8×10^{-3}.

NODE=M002R73;LINKAGE=A

$\eta'(958) \to \eta\pi\pi$ DECAY PARAMETERS

NODE=M002225

$|\text{MATRIX ELEMENT}|^2 = |1 + \alpha Y|^2 + CX + DX^2$

X and Y are Dalitz variables; α is complex and C, and D are real-valued. Parameters C and D are not necessarily equal to c and d, respectively, in the generalized parameterization following this one. May be different for $\eta'(958) \to \eta\pi^+\pi^-$ and $\eta'(958) \to \eta\pi^0\pi^0$ decays. Because of different initial assumptions and strong correlations of the parameters we do not average the parameters in the section below.

NODE=M002225

$Re(\alpha)$ decay parameter

NODE=M002A0
NODE=M002A0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.034 \pm 0.002 \pm 0.002$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.054 \pm 0.004 \pm 0.001$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.033 \pm 0.005 \pm 0.003$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.072 \pm 0.012 \pm 0.006$	7k	[2] AMELIN	05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$-0.021 \pm 0.018 \pm 0.017$	6.7k	[3] BRIERE	00	CLEO	$10.6\ e^+e^- \to \eta\pi^+\pi^- X$
$-0.058 \pm 0.013 \pm 0.003$	5.4k	[4] ALDE	86	GAM2	$38\ \pi^- p \to n\eta\pi^0\pi^0$
$-0.08\ \pm 0.03$		[4,5] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

OCCUR=2

[1] See ABLIKIM 11 for the full correlation matrix.
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below.
[3] Assuming $\text{Im}(\alpha) = 0$, $C = 0$, and $D = 0$.
[4] Assuming $C = 0$.
[5] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73.

NODE=M002A0;LINKAGE=AB
NODE=M002A0;LINKAGE=AM
NODE=M002A0;LINKAGE=BR
NODE=M002A0;LINKAGE=A
NODE=M002A0;LINKAGE=KA

$Im(\alpha)$ decay parameter

NODE=M002IA0
NODE=M002IA0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.000 \pm 0.019 \pm 0.001$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$0.000 \pm 0.038 \pm 0.002$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$0.000 \pm 0.049 \pm 0.001$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.0\ \pm 0.1\ \pm 0.0$	7k	[2] AMELIN	05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$-0.00\ \pm 0.13\ \pm 0.00$	5.4k	[3] ALDE	86	GAM2	$38\ \pi^- p \to n\eta\pi^0\pi^0$
$0.0\ \pm 0.3$		[3,4] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

OCCUR=2

[1] See ABLIKIM 11 for the full correlation matrix.
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below.
[3] Assuming $C = 0$.
[4] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73.

NODE=M002IA0;LINKAGE=AB
NODE=M002IA0;LINKAGE=AM
NODE=M002IA0;LINKAGE=A
NODE=M002IA0;LINKAGE=KA

C decay parameter

NODE=M002C0
NODE=M002C0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0027 \pm 0.0024 \pm 0.0015$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$0.018\ \pm 0.009\ \pm 0.003$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.020\ \pm 0.018\ \pm 0.004$	7k	[2] AMELIN	05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$

[1] See ABLIKIM 11 for the full correlation matrix.
[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below.

NODE=M002C0;LINKAGE=AB
NODE=M002C0;LINKAGE=AM

D decay parameter

NODE=M002D0
NODE=M002D0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.053 \pm 0.004 \pm 0.004$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.061 \pm 0.009 \pm 0.005$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.059 \pm 0.012 \pm 0.004$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.066 \pm 0.030 \pm 0.015$	7k	[2] AMELIN	05A	VES	$28\ \pi^- A \to \eta\pi^+\pi^-\pi^- A^*$
$0.00 \pm 0.03 \pm 0.00$	5.4k	[3] ALDE	86	GAM2	$38\ \pi^- p \to n\eta\pi^0\pi^0$
0		[3,4] KALBFLEISCH	74	RVUE	$\eta' \to \eta\pi^+\pi^-$

OCCUR=2

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002D0;LINKAGE=AB

[2] Superseded by DOROFEEV 07, which found this parameterization unacceptable. See below. NODE=M002D0;LINKAGE=AM

[3] Assuming $C = 0$. NODE=M002D0;LINKAGE=AL

[4] From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JACOBS 73, and DANBURG 73. NODE=M002D0;LINKAGE=KA

$\eta'(958) \to \eta\pi\pi$ DECAY PARAMETERS

NODE=M002227

$|\text{MATRIX ELEMENT}|^2 \propto 1 + a\,Y + b\,Y^2 + c\,X + d\,X^2$

X and Y are Dalitz variables and a, b, c, and d are real-valued parameters. May be different for $\eta'(958) \to \eta\pi^+\pi^-$ and $\eta'(958) \to \eta\pi^0\pi^0$ decays. We do not average measurements in the section below because parameter values from each experiment are strongly correlated.

NODE=M002227

a decay parameter

NODE=M002DPA
NODE=M002DPA

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.077 \pm 0.003 \pm 0.001$		[1] ABLIKIM	23AH	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.056 \pm 0.004 \pm 0.002$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.087 \pm 0.009 \pm 0.006$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.074 \pm 0.008 \pm 0.006$	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
$-0.072 \pm 0.007 \pm 0.008$		[2] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
$-0.047 \pm 0.011 \pm 0.003$	44k	[3] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.066 \pm 0.016 \pm 0.003$	15k	[4] BLIK	09	GAM4	$32.5\ \pi^- p \to \eta' n$
$-0.127 \pm 0.016 \pm 0.008$	20k	[5] DOROFEEV	07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

OCCUR=2

[1] Fit IV, ignoring noncusp terms. Supersedes ABLIKIM 18. NODE=M002DPA;LINKAGE=B

[2] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPA;LINKAGE=A

[3] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPA;LINKAGE=AB

[4] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPA;LINKAGE=BL

[5] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPA;LINKAGE=DO

b decay parameter

NODE=M002DPB
NODE=M002DPB

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.066 \pm 0.006 \pm 0.001$		[1] ABLIKIM	23AH	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.049 \pm 0.006 \pm 0.006$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.073 \pm 0.014 \pm 0.005$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.063 \pm 0.014 \pm 0.005$	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
$-0.052 \pm 0.001 \pm 0.002$		[2] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
$-0.069 \pm 0.019 \pm 0.009$	44k	[3] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.063 \pm 0.028 \pm 0.004$	15k	[4] BLIK	09	GAM4	$32.5\ \pi^- p \to \eta' n$
$-0.106 \pm 0.028 \pm 0.014$	20k	[5] DOROFEEV	07	VES	$27\ \pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

OCCUR=2

[1] Fit IV, ignoring noncusp terms. Supersedes ABLIKIM 18. NODE=M002DPB;LINKAGE=B

[2] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPB;LINKAGE=A

[3] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPB;LINKAGE=AB

[4] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPB;LINKAGE=BL

[5] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPB;LINKAGE=DO

c decay parameter

NODE=M002DPC
NODE=M002DPC

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.0027 \pm 0.0024 \pm 0.0018$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$0.019 \pm 0.011 \pm 0.003$	44k	[1] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$-0.107 \pm 0.096 \pm 0.003$	15k	[2] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
$0.015 \pm 0.011 \pm 0.014$	20k	[3] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPC;LINKAGE=AB
[2] From $\eta' \to \eta\pi^0\pi^0$ decay. NODE=M002DPC;LINKAGE=BL
[3] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPC;LINKAGE=DO

d decay parameter

NODE=M002DPD
NODE=M002DPD

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$-0.068 \pm 0.004 \pm 0.001$		[1] ABLIKIM	23AH	BES3	$\eta' \to \eta\pi^0\pi^0$
$-0.063 \pm 0.004 \pm 0.003$	351k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^+\pi^-$
$-0.074 \pm 0.009 \pm 0.004$	56k	ABLIKIM	18	BES3	$\eta' \to \eta\pi^0\pi^0$ OCCUR=2
$-0.050 \pm 0.009 \pm 0.005$	124k	ADLARSON	18A	A2MM	$\eta' \to \eta\pi^0\pi^0$
$-0.051 \pm 0.008 \pm 0.006$		[2] GONZALEZ-S...	18A	RVUE	$\eta' \to \eta\pi^0\pi^0$
$-0.073 \pm 0.012 \pm 0.003$	44k	[3] ABLIKIM	11	BES3	$J/\psi \to \gamma\eta\pi^+\pi^-$
$0.018 \pm 0.078 \pm 0.006$	15k	[4] BLIK	09	GAM4	32.5 $\pi^- p \to \eta' n$
$-0.082 \pm 0.017 \pm 0.008$	20k	[5] DOROFEEV	07	VES	27 $\pi^- p \to \eta' n$, $\pi^- A \to \eta'\pi^- A^*$

[1] Fit IV, ignoring noncusp terms. Supersedes ABLIKIM 18. NODE=M002DPD;LINKAGE=B
[2] Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop. NODE=M002DPD;LINKAGE=A
[3] See ABLIKIM 11 for the full correlation matrix. NODE=M002DPD;LINKAGE=AB
[4] From $\eta' \to \eta\pi^0\pi^0$ decay. If $c \equiv 0$ from Bose-Einstein symmetry, $d = -0.067 \pm 0.020 \pm 0.003$. NODE=M002DPD;LINKAGE=BL
[5] From $\eta' \to \eta\pi^+\pi^-$ decay. NODE=M002DPD;LINKAGE=DO

$\eta'(958)$ β PARAMETER
$|\text{MATRIX ELEMENT}|^2 = (1 + 2\beta Z)$

NODE=M002226

See the "Note on η Decay Parameters" in our 1994 edition Physical Review **D50** 1173 (1994), p. 1454.

NODE=M002226

β decay parameter

NODE=M002B0
NODE=M002B0

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
-0.61 ± 0.08 OUR AVERAGE	Error includes scale factor of 1.2.				
$-0.640 \pm 0.046 \pm 0.047$	1.8k	ABLIKIM	15G	BES3	$J/\psi \to \gamma(\pi^0\pi^0\pi^0)$
-0.59 ± 0.18	235	BLIK	08	GAMS	32 $\pi^- p \to \eta' n$
-0.1 ± 0.3		ALDE	87B	GAM2	38 $\pi^- p \to n3\pi^0$

$\eta'(958)$ C-NONCONSERVING DECAY PARAMETER

NODE=M002235

See the note on η decay parameters in the Stable Particle Particle Listings for definition of this parameter.

NODE=M002235

DECAY ASYMMETRY PARAMETER FOR $\pi^+\pi^-\gamma$

NODE=M002A
NODE=M002A

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
-0.03 ± 0.04 OUR AVERAGE					
-0.019 ± 0.056		AIHARA	87	TPC	$2\gamma \to \pi^+\pi^-\gamma$
-0.069 ± 0.078	295	GRIGORIAN	75	STRC	2.1 $\pi^- p$
0.00 ± 0.10	103	KALBFLEISCH	75	HBC	2.18 $K^- p \to \Lambda\pi^+\pi^-\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.07 ± 0.08	152	RITTENBERG	65	HBC	2.1–2.7 $K^- p$

$\eta'(958) \to \gamma\ell^+\ell^-$ TRANSITION FORM FACTOR SLOPE

NODE=M002FFL

Related to the effective virtual meson mass Λ, via slope $\approx \Lambda^{-2}$. See e.g. LANDSBERG 85, eq. (3.8), for a detailed definition.

NODE=M002FFL

NODE=M002FFL

VALUE (GeV^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
1.53 ± 0.04 OUR AVERAGE					
1.524 ± 0.041	7611	[1] ABLIKIM	24M	BES3	$e^+e^- \to J/\psi \to \gamma\eta'$
1.7 ± 0.4	33	[1] VIKTOROV	80		25,33 $\pi^- p \to 2\mu\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					

1.30 ±0.19		[2] ABLIKIM	24AK	BES3	$\eta' \to \pi^+ \pi^- \mu^+ \mu^-$, $\pi^+ \pi^- e^+ e^-$
1.60 ±0.17 ±0.08	864	[1] ABLIKIM	15O	BES3	$\eta' \to \gamma e^+ e^-$

[1] In the single-pole Ansatz where slope $= 1/(\Lambda^2 + \gamma^2)$ with Λ, γ being a Breit-Wigner mass, width for the effective contributing vector meson. NODE=M002FFL;LINKAGE=A

[2] From a weighted average of the $\eta' \to \pi^+ \pi^- e^+ e^-$ and $\eta' \to \pi^+ \pi^- \mu^+ \mu^-$ values. The uncertainty is obtained by combining statistical and systematic uncertainties. TFF slope values go between 1.10 ± 0.21 GeV^{-2} and 1.61 ± 0.71 GeV^{-2} for $\eta' \to \pi^+ \pi^- e^+ e^-$, and between 2.37 ± 0.49 GeV^{-2} and 2.88 ± 0.25 GeV^{-2} for $\eta' \to \pi^+ \pi^- \mu^+ \mu^-$, according to the solution of the fitting function model. NODE=M002FFL;LINKAGE=B

η'(958) REFERENCES

NODE=M002

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ALTHOFF	84E	PL 147B 487	M. Althoff *et al.*	(TASSO Collab.)	REFID=20305
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BARTEL	82B	PL 113B 190	W. Bartel *et al.*	(JADE Collab.)	REFID=20300
BEHREND	82C	PL 114B 378	H.J. Behrend *et al.*	(CELLO Collab.)	REFID=20303
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STANTON	80	PL B92 353	N.R. Stanton *et al.*	(OSU, CARL, MCGI+)	REFID=40294
VIKTOROV	80	SJNP 32 520 Translated from YAF 32 1005.	V.A. Viktorov *et al.*	(SERP)	REFID=20298
APEL	79	PL 83B 131	W.D. Apel, K.H. Augenstein, E. Bertolucci	(KARLK+)	REFID=20295
BINNIE	79	PL 83B 141	D.M. Binnie *et al.*	(LOIC)	REFID=20296
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GRIGORIAN	75	NP B91 232	A. Grigorian *et al.*	(+)	REFID=20287
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand, J.W. Chapman	(BNL+)	REFID=20223
DUANE	74	PRL 32 425	A. Duane *et al.*	(LOIC, SHMP)	REFID=20284
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