$\eta'(958)$
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$$I^{G}(J^{PC}) = 0^{+}(0^{-+})$$

# $\eta'(958)$ MASS

VALUE (	MeV)		EVTS	DOCUMENT ID		TECN	COMMENT
957.78	$\pm 0.06$	our av	<b>ERAGE</b>				
957.793	$3 \pm 0.054$	$\pm 0.036$	3.9k	LIBBY	80	CLEO	$J/\psi  ightarrow \gamma \eta'$
957.9	$\pm 0.2$	$\pm 0.6$	4800	WURZINGER	96	SPEC	1.68 pd $ ightarrow$ $^3$ He $\eta^{\prime}$
957.46	$\pm 0.33$			DUANE	74	MMS	$\pi^- p \rightarrow n MM$
958.2	$\pm 0.5$		1414	DANBURG	73	HBC	2.2 $K^- p \rightarrow \Lambda \eta'$
958	$\pm 1$		400	JACOBS	73	HBC	2.9 $K^- p \rightarrow \Lambda \eta'$
956.1	$\pm 1.1$		3415	<sup>1</sup> BASILE	71	CNTR	1.6 $\pi^- p \rightarrow n \eta'$
• • • \	Ve do n	ot use the	e following	g data for average	s, fits	, limits,	etc. ● ● ●
957.5	$\pm 0.2$			BAI	04J	BES2	$J/\psi \rightarrow \gamma \gamma \pi^+ \pi^-$
959	$\pm 1$		630	<sup>2</sup> BELADIDZE	92C	VES	36 $\pi^- \operatorname{Be} \rightarrow \pi^- \eta' \eta \operatorname{Be}$
958	$\pm 1$		340	<sup>2</sup> ARMSTRONG	<b>91</b> B	OMEG	$300 pp \rightarrow pp\eta \pi^+\pi^-$
958.2	$\pm 0.4$		622	<sup>2</sup> AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
957.8	$\pm 0.2$		2420	<sup>2</sup> AUGUSTIN	90	DM2	$J/\psi \rightarrow \gamma \gamma \pi^+ \pi^-$
956.3	$\pm 1.0$		143	<sup>2</sup> GIDAL	87	MRK2	$e^+e^{\perp} \rightarrow$
				3 5 4 5 4 5			$e^+e^-\eta\pi^+\pi^-$
957.4	$\pm 1.4$		535	<sup>3</sup> BASILE	71	CNTR	1.6 $\pi^- p \rightarrow n \eta'$
957	$\pm 1$			RITTENBERG	69	HBC	1.7–2.7 K <sup>-</sup> p
1		, <sub>1</sub>					

<sup>1</sup>Using all  $\eta'$  decays.

<sup>2</sup>Systematic uncertainty not estimated. <sup>3</sup>Using  $\eta'$  decays into neutrals. Not independent of the other listed BASILE 71  $\eta'$  mass measurement.

# $\eta^{\prime}$ (958) WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT					
0.188±0.006 OUR FI	т										
$0.230\pm0.021$ OUR A	0.230±0.021 OUR AVERAGE										
$0.226\!\pm\!0.017\!\pm\!0.014$	2300	CZERWINSKI	10	MMS		$p p  ightarrow \ p p \eta'$					
$0.40 \pm 0.22$	4800	WURZINGER	96	SPEC		1.68 $pd \rightarrow {}^{3}\text{He}\eta'$					
$0.28 \pm 0.10$	1000	BINNIE	79	MMS	0	$\pi^- p \rightarrow n MM$					
$\bullet$ $\bullet$ $\bullet$ We do not use	the following	data for averag	es, fit	s, limits,	etc.	• • •					
$0.20 \pm 0.04$		BAI	04J	BES2		$J/\psi \rightarrow \gamma \gamma \pi^+ \pi^-$					

# $\eta'(958)$ DECAY MODES

	Mode		Fraction $(\Gamma_i/\Gamma)$	Confidence level
Г1	$\pi^+\pi^-\eta$		$(42.5 \pm 0.5)$	%
Γ <sub>2</sub>	$ ho^{0}\gamma$ (including non-re	sonant	$(29.5 \pm 0.4)$	%
_	$\pi^+ \pi^- \gamma)$			
I 3	$ ho$ o $\gamma$			
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Г <sub>4</sub>	$\pi^0 \pi^0 \eta$	$(22.4 \pm 0.5)$	) %	
Γ <sub>5</sub>	$\omega\gamma$	$(2.52 \pm 0.07)$	) %	
Г <sub>6</sub>	$\omega e^+ e^-$	$(2.0 \pm 0.4)$	$) \times 10^{-4}$	
Γ <sub>7</sub>	$\gamma \gamma_{\perp}$	$(2.307\pm0.033)$	) %	
Г <sub>8</sub>	$3\pi^0$	( $2.50 \pm 0.17$	$) \times 10^{-3}$	
Г9	$\mu^+\mu^-\gamma$	( 1.13 $\pm 0.28$	$) \times 10^{-4}$	
Γ <sub>10</sub>	$\pi^+\pi^-\mu^+\mu^-$	$(2.0 \pm 0.4)$	$) \times 10^{-5}$	
$\Gamma_{11}$	$\pi^+\pi^-\pi^0$	( $3.61 \pm 0.17$	$) \times 10^{-3}$	
$\Gamma_{12}$	$(\pi^{+}\pi^{-}\pi^{0})$ S-wave	( $3.8 \pm 0.5$	$) \times 10^{-3}$	
Г <sub>13</sub>	$\pi^{\mp}  ho^{\pm}$	$(7.4 \pm 2.3)$	$) \times 10^{-4}$	
$\Gamma_{14}$	$2(\pi^{+}\pi^{-})$	( $8.4 \pm 0.9$	$)  imes 10^{-5}$	
Γ <sub>15</sub>	$\pi^{+}\pi^{-}2\pi^{0}$	$(1.8 \pm 0.4)$	$) \times 10^{-4}$	
Γ <sub>16</sub>	$2(\pi^+\pi^-)$ neutrals	< 1	%	95%
Γ <sub>17</sub>	$2(\pi^+\pi^-)\pi^0$	< 1.8	imes 10 <sup>-3</sup>	90%
Γ <sub>18</sub>	$2(\pi^+\pi^-)2\pi^0$	< 1	%	95%
Γ <sub>19</sub>	$3(\pi^{+}\pi^{-})$	< 3.1	imes 10 <sup>-5</sup>	90%
Γ <sub>20</sub>	$K^{\pm}\pi^{\mp}$	< 4	imes 10 <sup>-5</sup>	90%
Γ <sub>21</sub>	$\pi^+\pi^-e^+e^-$	( 2.42 $\pm 0.10$	$) \times 10^{-3}$	
Γ <sub>22</sub>	$\pi^+ e^- \nu_e$ + c.c.	< 2.1	imes 10 <sup>-4</sup>	90%
Γ <sub>23</sub>	$\gamma e^+ e^-$	( 4.91 $\pm 0.27$	$) \times 10^{-4}$	
Γ <sub>24</sub>	$\pi^0 \gamma \gamma$	( $3.20 \pm 0.24$	$) \times 10^{-3}$	
Γ <sub>25</sub>	$\pi^{0}\gamma\gamma$ (non resonant)	( $6.2 \pm 0.9$	$) \times 10^{-4}$	
Г <sub>26</sub>	$\eta \gamma \gamma$	< 1.33	imes 10 <sup>-4</sup>	90%
Γ <sub>27</sub>	$4\pi^0$	< 4.94	imes 10 <sup>-5</sup>	90%
Γ <sub>28</sub>	$e^+e^-$	< 5.6	imes 10 <sup>-9</sup>	90%
Г <sub>29</sub>	$e^+e^-e^+e^-$	( 4.5 $\pm 1.1$	$)  imes 10^{-6}$	
Г <sub>30</sub>	invisible	< 6	imes 10 <sup>-4</sup>	90%

## Charge conjugation (C), Parity (P), Lepton family number (LF) violating modes

					-		
Γ <sub>31</sub>	$\pi^+\pi^-$	P,CP		<	1.8	imes 10 <sup>-5</sup>	90%
Γ <sub>32</sub>	$\pi^0 \pi^0$	P,CP		<	4	imes 10 <sup>-4</sup>	90%
Г <sub>33</sub>	$\pi^0 e^+ e^-$	С	[a] ·	<	1.4	imes 10 <sup>-3</sup>	90%
Г <sub>34</sub>	$\pi^0 \rho^0$	С		<	4	%	90%
Г <sub>35</sub>	$\eta e^+ e^-$	С	[a] ·	<	2.4	imes 10 <sup>-3</sup>	90%
Г <sub>36</sub>	$3\gamma$	С		<	1.0	imes 10 <sup>-4</sup>	90%
Г <sub>37</sub>	$\mu^+  \mu^-  \pi^0$	С	[a]	<	6.0	imes 10 <sup>-5</sup>	90%
Г <sub>38</sub>	$\mu^+ \mu^- \eta$	С	[a] ·	<	1.5	imes 10 <sup>-5</sup>	90%
Г <sub>39</sub>	e $\mu$	LF		<	4.7	imes 10 <sup>-4</sup>	90%

[a] C parity forbids this to occur as a single-photon process.

### **CONSTRAINED FIT INFORMATION**

An overall fit to the total width, a partial width, 2 combinations of partial widths obtained from integrated cross section, and 20 branching ratios uses 52 measurements and one constraint to determine 9 parameters. The overall fit has a  $\chi^2 = 69.5$  for 44 degrees of freedom.

The following off-diagonal array elements are the correlation coefficients  $\langle \delta p_i \delta p_j \rangle / (\delta p_i \cdot \delta p_j)$ , 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.

<i>x</i> 2	-25								
<i>x</i> <sub>4</sub>	-75	-43							
×5	-7	-6	-2						
<i>x</i> 7	-11	-7	9	-1					
<i>x</i> 8	-17	-10	19	0	2				
<i>x</i> <sub>11</sub>	-1	-1	-1	0	0	0			
x <sub>21</sub>	-8	30	-14	-2	-2	-3	0		
Г	11	-10	-1	1	-40	0	0	-3	
	$x_1$	<i>x</i> <sub>2</sub>	<i>x</i> 4	×5	x <sub>7</sub>	x <sub>8</sub>	<i>x</i> <sub>11</sub>	×21	

	Mode	Rate (MeV)
Г1	$\pi^+\pi^-\eta$	$0.0799 \pm 0.0029$
Г <sub>2</sub>	$ ho^{f 0}\gamma({\sf including non-resonant})$	$0.0554 \pm 0.0019$
	$\pi^+ \pi^- \gamma$ )	
Г4	$\pi^0 \pi^0 \eta$	$0.0421\ \pm 0.0017$
Γ <sub>5</sub>	$\omega\gamma$	$0.00474 \pm 0.00020$
Γ <sub>7</sub>	$\gamma \gamma_{\perp}$	$0.00434 \!\pm\! 0.00013$
Г <sub>8</sub>	$3\pi^{0}$	(4.7 $\pm 0.4$ ) $ imes 10^{-4}$
$\Gamma_{11}$	$\pi^+\pi^-\pi^0$	(6.8 $\pm$ 0.4 ) $\times$ 10 <sup>-4</sup>
Γ <sub>21</sub>	$\pi^+\pi^-e^+e^-$	(4.54 $\pm$ 0.23 ) $ imes$ 10 $^{-4}$

## $\eta'(958)$ PARTIAL WIDTHS

$\Gamma(\gamma \gamma)$					Γ <sub>7</sub>
VALUE (keV)	EVTS	DOCUMENT ID		TECN	COMMENT
4.34±0.14 OUR FI	т				
4.28±0.19 OUR A	/ERAGE				
$4.17\!\pm\!0.10\!\pm\!0.27$	2000	<sup>1</sup> ACCIARRI	98Q	L3	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\gamma$
$4.53\!\pm\!0.29\!\pm\!0.51$	266	KARCH	92	CBAL	$e^+e^- ightarrow e^+e^-\eta\pi^0\pi^0$
$3.61\!\pm\!0.13\!\pm\!0.48$		<sup>2</sup> BEHREND	91	CELL	$e^+e^- ightarrow e^+e^-\eta^\prime$ (958)
$4.6 \ \pm 1.1 \ \pm 0.6$	23	BARU	90	MD1	$e^+e^- \rightarrow e^+e^-\pi^+\pi^-\gamma$

$4.57 \!\pm\! 0.25 \!\pm\! 0.44$		BUTLER	90	MRK2	$e^+e^- \rightarrow e^-$	e <sup>+</sup> e <sup>-</sup>	$\eta'$ (958)	
$5.08 \pm 0.24 \pm 0.71$	547	<sup>3</sup> ROE	90	ASP	$e^+e^- \rightarrow e^-$	e+ e-	$2\gamma$	
$3.8 \pm 0.7 \pm 0.6$	34	AIHARA	<b>88</b> C	TPC	$e^+e^- \rightarrow e^-$	e+ e-	$\eta \pi^+ \pi^-$	
$4.9 \ \pm 0.5 \ \pm 0.5$	136	<sup>4</sup> WILLIAMS	88	CBAL	$e^+e^- \rightarrow e^-$	e <sup>+</sup> e <sup>-</sup>	$2\gamma$	
• • • We do not us	e the follo	owing data for ave	rages,	fits, limi	ts, etc. • • •	•		
$4.7 \pm 0.6 \pm 0.9$	143	<sup>5</sup> GIDAL	87	MRK2	$e^+e^- \rightarrow e^-$	$e^+e^-$	$\eta \pi^+ \pi^-$	
4.0 ±0.9		<sup>6</sup> BARTEL	85E	JADE	$e^+e^- \rightarrow e^-$	$e^+e^-$	$2\gamma$	
<sup>1</sup> No non-resonant $\pi^+ \pi^-$ contribution found. <sup>2</sup> Reevaluated by us using $B(\eta' \rightarrow \rho(770)\gamma) = (30.2 \pm 1.3)\%$ . <sup>3</sup> Reevaluated by us using $B(\eta' \rightarrow \gamma\gamma) = (2.11 \pm 0.13)\%$ . <sup>4</sup> Reevaluated by us using $B(\eta' \rightarrow \gamma\gamma) = (2.11 \pm 0.13)\%$ . <sup>5</sup> Superseded by BUTLER 90. <sup>6</sup> Systematic error not evaluated.								
Г(e <sup>+</sup> e <sup>-</sup> )							Г <sub>28</sub>	
VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT			
<1.1 × 10 <sup>-3</sup>	90	$^{1,2}$ ACHASOV	15	SND	0.958 e <sup>+</sup> e⁻	$\rightarrow$	$\pi\pi\eta$	
• • • We do not us	e the follo	owing data for ave	rages,	fits, limit	ts, etc. • • •	)		
$< 2.0 \times 10^{-3}$	90	<sup>2</sup> ACHASOV	15	SND	$0.958 \ e^+ \ e^-$	$^{-} \rightarrow$	$\pi\pi\eta$	
$<$ 2.4 $ imes$ 10 $^{-3}$	90	<sup>2</sup> AKHMETSH	IN 15	CMD3	$0.958 \ e^+ e^-$	$\rightarrow$	$\pi^+\pi^-\eta$	
$^1$ Combining data $^2$ Using $\eta$ and $\eta'$ .	of ACHA branching	SOV 15 and AKH fractions from PD	METS OG 14.	HIN 15.				

 $\eta'(958) \Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$ 

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.

1712/1
$e^+ e^- \rho(770)^0 \gamma$
$e^+e^- ho\gamma$
• •
$e^+e^- ho\gamma$
Γ <sub>7</sub> Γ <sub>4</sub> /Γ
1
+ - 0 0
$\rightarrow e e \eta \pi^0 \pi^0$

 $\bullet$   $\bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet$   $\bullet$ 

$0.95\!\pm\!0.05\!\pm\!0.08$	<sup>2</sup> KARCH	90	CBAL	$e^+e^- \rightarrow$	$e^+e^-\eta$	$\pi^{0}\pi^{0}$
$1.00 \pm 0.08 \pm 0.10$	<sup>2,3</sup> ANTREASYAN	87	CBAL	$e^+ e^-  ightarrow$	$e^+e^-\eta$	$\pi^0\pi^0$
$^{1}$ Reevaluated by us using B and KARCH 90. $^{2}$ Superseded by KARCH 92 $^{3}$ Using BR $(\eta \rightarrow 2\gamma)$ =(38.	$(\eta  o \ \gamma \gamma) = (39.21)$ 2. 9 $\pm$ 0.5)%.	± 0.3	34)%. Sı	upersedes A	NTREAS	YAN 87

# $\eta'(958) \ \Gamma(i) \Gamma(e^+e^-) / \Gamma(total)$

$\Gamma(\pi^+\pi^-\eta)$ × $\Gamma$	(e+ e^)/	ΊΓ <sub>total</sub>			Г <sub>1</sub> Г <sub>28</sub> /Г
$VALUE (10^{-3} \text{ eV})$	CL%	DOCUMENT ID	TECN	COMMENT	
<1.0	90	$^1$ AKHMETSHIN 15	CMD3	$0.958 \ e^+ e^-$	$\to \pi^+\pi^-\eta$
$^{1}$ AKHMETSHIN $ imes$ [B( $\eta  ightarrow 2\gamma$ )] 39.36 $ imes$ 10 <sup>-2</sup> .	15  reports $  < 4.1  imes$	$[\Gamma(\eta'(958) \rightarrow \pi^+ \pi^- \eta)]$ 10 <sup>-4</sup> eV which we divid	$) \times \Gamma(n)$	$\eta'(958) \rightarrow e^{-1}$ r best value B	$(\eta \rightarrow 2\gamma) =$

# $\eta'(958)$ BRANCHING RATIOS

$\Gamma(\pi^+\pi^-\eta)/\Gamma_{total}$						$\Gamma_1/\Gamma$
VALUE (units $10^{-2}$ )	EVTS	DOCUMENT I	ID	TECN	COMMENT	
42.5 ±0.5 OUR FIT	Error incl	udes scale facto	or of 1.1.			
41.24±0.08±1.24	312k	ABLIKIM	19⊤	BES	$J/\psi \rightarrow \gamma$	$\eta'$
• • • We do not use	the following	g data for avera	ges, fits,	limits, e	etc. • • •	
42.4 $\pm 1.1 \pm 0.4$	1.2k	<sup>1</sup> PEDLAR	09	CLEO	$J/\psi \rightarrow \gamma$	$\eta'$
$^1$ Not independent	of other $\eta'$ b	ranching fractic	ons and ra	atios in	PEDLAR 09	9.
$\Gamma(\pi^+\pi^-\eta)$ (charge	d decay))/	total				0.2804Г <sub>1</sub> /Г
<u>VALUE</u>	<u>TS DO</u>	CUMENT ID	TECN	COMN	<i>IENT</i>	
0.1191±0.0015 OUR	FIT Error	includes scale fa	actor of 1	.1.		
• • • We do not use	the following	g data for avera	ges, fits,	limits, e	etc. • • •	
0.123 ±0.014 1	07 RI <sup>-</sup>	TENBERG 69	HBC	1.7–2	2.7 K <sup>-</sup> p	
$0.10 \pm 0.04$	10 LO	NDON 66	HBC	2.24	$K^- p \rightarrow \Lambda$	$2\pi^{+}2\pi^{-}\pi^{0}$
0.07 ±0.04	7 BA	DIER 65	в НВС	3 K-	p	
$\Gamma(\pi^+\pi^-n)$	decav))/Г	total				0.7196Г1/Г
VALUE	EVTS	DOCUMENT I	D	TECN	COMMENT	···· -·· ·· 1/ ·
0.306±0.004 OUR F	T Error ind	cludes scale fact	or of 1.1			
• • • We do not use	the following	g data for avera	ges, fits,	limits, e	etc. • • •	
$0.314 \pm 0.026$	281	RITTENBE	RG 69	HBC	1.7–2.7 K	<sup>_</sup> p
$\Gamma(\rho^0\gamma)$ (including n	on-resonan	t $\pi^+  \pi^-  \gamma))/$	Γ <sub>total</sub>			$\Gamma_2/\Gamma$
VALUE (units $10^{-2}$ )	EVTS	DOCUMENT ID	TE	ECN C	OMMENT	-,
29.5 ± 0.4 OUR F	<b>T</b> Error ind	cludes scale fact	or of 1.1			
$29.90 \pm 0.03 \pm 0.55$	913k	ABLIKIM	19⊤ BI	ES J	$/\psi \rightarrow \gamma \eta'$	
					, , , ,	

 $\bullet$   $\bullet$   $\bullet$  We do not use the following data for averages, fits, limits, etc.  $\bullet$   $\bullet$ 

28.7	$\pm$ 0.7 $\pm 0.4$	0.2k	<sup>l</sup> PEDLAR	09	CLEO	$J/\psi  ightarrow \gamma \eta'$
32.9	$\pm$ 3.3	298	RITTENBERG	69	HBC	1.7–2.7 K <sup>-</sup> p
20	$\pm 10$	20	LONDON	66	HBC	2.24 $K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$
34	± 9	35	BADIER	<b>65</b> B	HBC	3 K <sup>-</sup> p

 $^1\,\mathrm{Not}$  independent of other  $\eta'$  branching fractions and ratios in PEDLAR 09.

Γ(ρ <sup>0</sup>	$(\gamma)/\Gamma_{ m total}$						Г <sub>3</sub> /Г
VALUE	E (%)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • •	We do not use the	e following	data for average	s, fits	, limits,	etc. ● ● ●	
33.34	$\pm 0.06 \pm 1.60$	970k	<sup>1</sup> ABLIKIM	18C	BES3	$\eta^{\prime}$ (958) $ ightarrow$	$\gamma \pi^+ \pi^-$
34.43	$\pm 0.52 \pm 1.97$	970k	<sup>2</sup> ABLIKIM	<b>18</b> C	BES3	$\eta^{\prime}(958)  ightarrow \gamma$	$\gamma \pi^+ \pi^-$
$^{1}$ F	rom a fit to $\pi^+\pi^-$	mass using	g $\rho(770), \omega(782)$	), and	box and	omaly compon	ents.
<sup>2</sup> F	rom a fit to $\pi^+\pi^-$	mass using	g $\rho(770), \omega(782)$	), and	$\rho$ (1450)	) components.	
Г(_0	$\alpha$ (including non	-resonant	$\pi^{+} \pi^{-} \gamma))/\Gamma($	$(\pi^+)$	$(\overline{n}^{-}n)$		$\Gamma_2/\Gamma_1$
VALUE	- / (		DOCUMENT ID	(	TECN	COMMENT	• 2/ • 1
0.694	±0.014 OUR FIT	Error inclu	udes scale factor	of 1.	1.	comment	
0.683	$\pm$ 0.020 OUR AVE	RAGE					
0.677	$\pm 0.024 \pm 0.011$		PEDLAR	09	CLE3	$J/\psi \rightarrow \eta' \gamma$	
0.69	$\pm 0.03$		ABLIKIM	06e	BES2	$J/\psi \rightarrow \eta' \gamma$	
Г(_0	$\alpha$ (including non	-resonant	$\pi^{+}\pi^{-}$ ( $\pi^{-}$ ( $\pi^{-}$	$(\pi^+)$	$\tau^{-}n(n\epsilon)$	eutral decay)	)
• ()				(		Γ	/ 5/0.714Γ1
VALUE	Ξ	<u>EVTS</u>	DOCUMENT ID		TECN	COMMENT	2, • 1
0.972	±0.020 OUR FIT	Error inclu	udes scale factor	of 1.	1.		
0. <b>97</b>	±0.09 OUR AVE	RAGE					
0.70	$\pm 0.22$		AMSLER	<b>04</b> B	CBAR	$0 \overline{p} p \rightarrow \pi^+$	$\pi^{-}\eta$
1.07	$\pm 0.17$		BELADIDZE	92C	VES	$36 \pi^{-} \text{Be} \rightarrow$	$\pi^{-}\eta^{\prime}\eta$ Be
0.92	$\pm 0.14$	473	DANBURG	73	HBC	$2.2 \text{ K}^- p \rightarrow$	$\Lambda X^0$
1.11	$\pm 0.18$	192	JACOBS	73	HRC	$2.9 \text{ K} p \rightarrow$	ΛX°
<b>Γ(</b> π <sup>0</sup>	$(\pi^0 \eta) / \Gamma_{\text{total}}$						Γ₄/Γ
VALUE	E (units 10 <sup>-2</sup> )	EVTS	DOCUMENT ID		TECN	COMMENT	
22.4	±0.6 OUR FIT	Error includ	des scale factor o	of 1.1			
21.36	$\pm 0.10 \pm 0.92$	52k	ABLIKIM	<b>19</b> T	BES	$J/\psi  ightarrow \gamma \eta'$	
• • •	We do not use the	e following	data for average	s, fits	, limits,	etc. • • •	
23.5	$\pm 1.3$ $\pm 0.4$	3.2k	<sup>1</sup> PEDLAR	09	CLEO	$J/\psi  ightarrow \gamma \eta'$	
$^{1}$ N	lot independent of	other $\eta'$ bra	nching fractions	and	ratios in	PEDLAR 09.	
г(π <sup>0</sup>	$0_{\pi}0_{\pi}(3_{\pi}0_{\text{decay}})$	))/Г				(	N 321 <b>Γ₄ /</b> Γ
• <b>(^</b>		FVTS	DOCUMENT ID		TECN	COMMENT	
0.071	8±0.0018 OUR FI	<b>T</b> Error in	cludes scale fact	or of	1.1.		
• • •	We do not use the	e following	data for average	s, fits	, limits,	etc. • • •	
0.11	$\pm 0.06$	4	BENSINGER	70	DBC	2.2 $\pi^+ d$	

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 $0.11 \phantom{0} \pm 0.06 \phantom{0}$ 

BENSINGER

 $\Gamma(\pi^0\pi^0\eta)/\Gamma(\pi^+\pi^-\eta)$  $\Gamma_4/\Gamma_1$ VALUE DOCUMENT ID TECN COMMENT **0.527 \pm 0.019 OUR FIT** Error includes scale factor of 1.1.  $0.555 \pm 0.043 \pm 0.013$ PEDLAR 09 CLE3  $J/\psi \rightarrow \eta' \gamma$  $\Gamma(\rho^0 \gamma (\text{including non-resonant } \pi^+ \pi^- \gamma)) / \Gamma(\pi \pi \eta)$  $\Gamma_2/(\Gamma_1+\Gamma_4)$ VALUF DOCUMENT ID TECN COMMENT **0.454±0.009 OUR FIT** Error includes scale factor of 1.1.  $0.43 \pm 0.02 \pm 0.02$ BARBERIS 98C OMEG 450  $pp \rightarrow p_f \eta' p_s$  We do not use the following data for averages, fits, limits, etc.  $0.31 \pm 0.15$ DAVIS 68 HBC 5.5  $K^{-}p$  $\Gamma(\omega\gamma)/\Gamma_{\rm total}$  $\Gamma_5/\Gamma$ <u>VALUE</u> (units  $10^{-2}$ ) DOCUMENT ID EVTS TECN COMMENT 2.52  $\pm$ 0.07 OUR FIT 2.50  $\pm$  0.07 OUR AVERAGE  $2.489 \pm 0.018 \pm 0.074$ 23k ABLIKIM 19⊤ BES  $J/\psi \rightarrow \gamma \eta'$ <sup>1</sup> ABLIKIM 15AD BES3  $J/\psi \rightarrow \eta' \gamma$  $2.55 \pm 0.03 \pm 0.16$ 33.2k • • • We do not use the following data for averages, fits, limits, etc. • • • 70 <sup>2</sup> PEDLAR 09 CLEO  $J/\psi \rightarrow \gamma \eta'$  $2.34 \pm 0.30 \pm 0.04$ <sup>1</sup> Using B( $J/\psi \rightarrow \eta' \gamma$ ) = (5.15 ± 0.16)×10<sup>-3</sup> and B( $\omega \rightarrow \pi^+ \pi^- \pi^0$ ) = (89.2 ± 0.7)%. <sup>2</sup>Not independent of other  $\eta'$  branching fractions and ratios in PEDLAR 09.  $\Gamma(\omega\gamma)/\Gamma(\pi^+\pi^-\eta)$  $\Gamma_5/\Gamma_1$ VALUE DOCUMENT ID TECN COMMENT EVTS **0.0593±0.0018 OUR FIT** Error includes scale factor of 1.1.  $0.055 \pm 0.007 \pm 0.001$ PEDLAR 09 CLE3  $J/\psi \rightarrow \eta' \gamma$ • • • We do not use the following data for averages, fits, limits, etc. • • •  $0.068 \pm 0.013$ 68 ZANFINO 77 ASPK 8.4  $\pi^- p$  $\Gamma(\omega\gamma)/\Gamma(\pi^0\pi^0\eta)$  $\Gamma_5/\Gamma_4$ VALUE DOCUMENT ID TECN COMMENT 0.113±0.004 OUR FIT  $0.147 \pm 0.016$ ALDE 87B GAM2 38  $\pi^- p \rightarrow n 4\gamma$  $\Gamma(\omega e^+ e^-)/\Gamma(\omega \gamma)$  $\Gamma_6/\Gamma_5$ VALUE (units  $10^{-3}$ ) DOCUMENT ID TECN COMMENT • • • We do not use the following data for averages, fits, limits, etc. • • • <sup>1</sup> ABLIKIM 15AD BES3  $J/\psi \rightarrow \eta' \gamma$  $7.71 \!\pm\! 1.34 \!\pm\! 0.54$ <sup>1</sup>Obtained from other ABLIKIM 15AD meausurements with common systematics taken into account.  $\Gamma(\omega e^+ e^-)/\Gamma_{total}$ Γ<sub>6</sub>/Γ *VALUE* (units  $10^{-4}$ ) DOCUMENT ID TECN <sup>1</sup> ABLIKIM 15AD BES3  $J/\psi \rightarrow \eta' \gamma$  $1.97 \pm 0.34 \pm 0.17$ 66 <sup>1</sup> Using B( $J/\psi \rightarrow \eta' \gamma$ ) = (5.15 ± 0.16)×10<sup>-3</sup> and B( $\omega \rightarrow \pi^+ \pi^- \pi^0$ ) = (89.2 ± 0.7)%.

$\Gamma(\rho^0\gamma)$ (including non-resor	$\max \pi^+ \pi^- \gamma))/ $	$\Gamma(\pi^+\pi^-\eta)$	$+\Gamma(\pi^{0}\pi^{0}\eta)+$
$\Gamma(\omega\gamma)$ ]	,	_ 、 ,	$\Gamma_2/(\Gamma_1+\Gamma_4+\Gamma_5)$
VALUE	DOCUMENT IE	D TECN	COMMENT
0.437±0.008 OUR FIT Error	r includes scale facto	or of 1.1.	
• • • We do not use the follow	wing data for averag	es, fits, limits	, etc. ● ● ●
$0.25 \pm 0.14$	DAUBER	64 HBC	1.95 K <sup>-</sup> p
$[\Gamma(\pi^0\pi^0\eta (\text{charged decay})$	$) + \Gamma(\omega \text{(charged)})$	$(decay)\gamma)]/$	/F <sub>total</sub>
			(0.286Г <sub>4</sub> +0.89Г <sub>5</sub> )/Г
VALUE EVTS	DOCUMENT IE	<u> </u>	COMMENT
0.0864±0.0017 OUR FIT Er	ror includes scale ta	ctor of 1.1.	
• • • We do not use the follow	wing data for averag	es, fits, limits	, etc. ● ● ●
0.045 ±0.029 42	RITTENBER	G 69 HBC	1.7–2.7 К <sup>—</sup> р
$\Gamma(\pi^+\pi^-$ neutrals)/ $\Gamma_{ m total}$		(0.714[	<sup>-</sup> 1+0.286Γ <sub>4</sub> +0.89Γ <sub>5</sub> )/Γ
VALUE EVTS	DOCUMENT ID	TECN	COMMENT
0.3897±0.0028 OUR FIT Er	ror includes scale fa	ctor of 1.1.	
• • • We do not use the follow	wing data for averag	es, fits, limits;	, etc. ● ● ●
$0.4 \pm 0.1$ 39 L	ONDON 66	HBC 2.24	$K^- p \rightarrow \Lambda \pi^+ \pi^-$ neutrals
0.35 ±0.06 33 E	BADIER 65B	HBC	3 K <sup>-</sup> p
$\Gamma(\gamma\gamma)/\Gamma_{total}$			Г <sub>7</sub> /Г
VALUE (units $10^{-2}$ ) EVTS	DOCUMENT ID	TECN	COMMENT
2.307±0.035 OUR FIT Error	r includes scale facto	or of 1.1.	
2.31 $\pm 0.06$ OUR AVERAGE	Error includes sca	le factor of 1.	8.
$2.331 \pm 0.012 \pm 0.035$ 71k	ABLIKIM	19T BES	$J/\psi \rightarrow \gamma \eta'$
$1.99 \begin{array}{c} +0.31 \\ -0.27 \end{array} \pm 0.07 \qquad 114$	<sup>1</sup> WICHT	08 BELL	$B^{\pm} \rightarrow K^{\pm} \gamma \gamma$
$2.00 \pm 0.18$	<sup>2</sup> STANTON	80 SPEC	$8.45 \ \pi^- p \rightarrow n \pi^+ \pi^- 2\gamma$
• • • We do not use the follow	wing data for averag	es, fits, limits	, etc. ● ● ●
$2.25 \pm 0.16 \pm 0.03  0.3k$	<sup>3</sup> PEDLAR	09 CLEO	$J/\psi \rightarrow \gamma \eta'$
1.8 ±0.2 6000	<sup>4</sup> APEL	79 NICE	15-40 $\pi^- p \rightarrow n 2\gamma$
$2.5 \pm 0.7$	DUANE	74 MMS	$\pi^- p \rightarrow n MM$
1.71 ±0.33 68	DALPIAZ	72 CNTR	$1.6 \pi^- p \rightarrow n X^0$
2.0 + 0.8 31	HARVEY	71 OSPK	3.65 $\pi^- p \rightarrow n X^0$
-0.6			
<sup>1</sup> WICHT 08 reports $[\Gamma(a)]$	$\eta'(958) \rightarrow \gamma \gamma)$	/Γ <sub>total</sub> ] ×	$[B(B^+ \to \eta'  K^+)] =$
$(1.40^{+0.16}_{-0.15}^{+0.16}_{-0.12}) \times 10^{-10}$	<sup>-6</sup> which we divide	by our best v	value B( $B^+  ightarrow \eta' K^+$ ) =
$(7.04 \pm 0.25) \times 10^{-5}$ . Ou	ır first error is their e	experiment's e	error and our second error is
the systematic error from u	using our best value.		
<sup>2</sup> Includes APEL 79 result.			
<sup>3</sup> Not independent of other <i>i</i>	$\eta^\prime$ branching fraction	ns and ratios i	n PEDLAR 09.
<sup>+</sup> Data is included in STANT	FON 80 evaluation.		
$\Gamma(\gamma\gamma)/\Gamma(\pi^+\pi^-n)$			┎╻/┎╻
· ( / / / / / / //)	DOCUMENT I		
0 0543+0 0012 OUR FIT Fr	ror includes scale fa	<u>, 12010</u> ctor of 11	

**0.0543 \pm 0.0012 OUR FIT** Error includes scale factor of 1.1. **0.053 \pm 0.004 \pm 0.001 PEDLAR 09 CLE3 J/\psi \rightarrow \eta' \gamma** 

 $\Gamma(\gamma\gamma)/\Gamma(\rho^0\gamma)$  (including non-resonant  $\pi^+\pi^-\gamma$ )  $\Gamma_7/\Gamma_2$ VALUE DOCUMENT ID TECN COMMENT 0.0783±0.0016 OUR FIT Error includes scale factor of 1.1. 0.080 ±0.008 ABLIKIM 06E BES2  $J/\psi \rightarrow \eta' \gamma$  $\Gamma(\gamma \gamma) / \Gamma(\pi^0 \pi^0 \eta)$  $\Gamma_7/\Gamma_4$ VALUE DOCUMENT ID TECN COMMENT 0.1031 ± 0.0028 OUR FIT 0.105  $\pm$  0.010 OUR AVERAGE Error includes scale factor of 1.9.  $0.091 \pm 0.009$ 93 CBAR 0.0 pp AMSLER  $0.112\ \pm 0.002\ \pm 0.006$ ALDE 87B GAM2 38  $\pi^- p \rightarrow n 2\gamma$  $\Gamma(\gamma \gamma) / \Gamma(\pi^0 \pi^0 \eta (\text{neutral decay}))$  $\Gamma_7/0.714\Gamma_4$ VALUE DOCUMENT ID TECN COMMENT 0.144 ± 0.004 OUR FIT • • • We do not use the following data for averages, fits, limits, etc. • • • 72 OSPK 3.8  $\pi^- p \rightarrow n X^0$  $0.188 \!\pm\! 0.058$ APEL 16  $\Gamma(\text{neutrals})/\Gamma_{\text{total}}$  $(0.714\Gamma_4 + 0.09\Gamma_5 + \Gamma_7)/\Gamma$ DOCUMENT ID TECN COMMENT VALUE EVTS 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. • • • CNTR 1.6  $\pi^- p \rightarrow n X^0$  $0.185 \pm 0.022$ 535 BASILE 71 HBC  $1.7-2.7 K^{-} p$  $0.189 \pm 0.026$ 123 **RITTENBERG 69**  $\Gamma(3\pi^0)/\Gamma_{total}$  $\Gamma_8/\Gamma$ VALUE (units  $10^{-3}$ ) EVTS DOCUMENT ID TECN COMMENT 2.50  $\pm 0.17$  OUR FIT 3.57  $\pm 0.26$  OUR AVERAGE 17 BES3  $J/\psi \rightarrow \gamma(3\pi^0)$  $3.522 \pm 0.082 \pm 0.254$ 2015 ABLIKIM  $4.79 \ \pm 0.59 \ \pm 1.14$ 183 <sup>1</sup> ABLIKIM 15P BES3  $J/\psi \rightarrow K^+ K^- 3\pi$ • • • We do not use the following data for averages, fits, limits, etc. • • • 309 <sup>2</sup> ABLIKIM 12E BES3  $J/\psi \rightarrow \gamma(3\pi^0)$  $3.56\ \pm 0.22\ \pm 0.34$  $^1$ We have added all systematic uncertainties in quadrature to a single value. <sup>2</sup>Superseded by ABLIKIM 17.  $\Gamma(3\pi^0)/\Gamma(\pi^0\pi^0\eta)$  $\Gamma_8/\Gamma_4$ VALUE (units  $10^{-4}$ ) EVTS DOCUMENT ID TECN COMMENT 112± 8 OUR FIT 78±10 OUR AVERAGE  $86\pm19$ 235 BLIK 08 GAMS 32  $\pi^- p \rightarrow \eta' n$  $74\pm15$ 87B GAM2 38  $\pi^- p \rightarrow n6\gamma$ ALDE GAM2 30-40  $\pi^- p \rightarrow n6\gamma$  $75\pm18$ BINON 84  $\Gamma(\mu^+\mu^-\gamma)/\Gamma(\gamma\gamma)$ Γο/Γ7 VALUE (units  $10^{-3}$ ) EVTS DOCUMENT ID COMMENT TECN  $4.9 \pm 1.2$ CNTR 25.33  $\pi^- p \rightarrow 2\mu\gamma$ 33 VIKTOROV 80

$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma$	total					Г <sub>10</sub> /Г
VALUE (units $10^{-5}$ )	CL% EVTS	DOCUMENT	ID	TEC	N <u>COMMENT</u>	
$1.95 {\pm} 0.37 {\pm} 0.03$	53	<sup>1</sup> ABLIKIM	2	1 BES	53 $J/\psi \rightarrow \gamma$	η <sup>'</sup> (958)
• • • We do not use t	he following	data for averages	s, fits,	limits, e	tc. • • •	
< 2.9	90	<sup>2</sup> ABLIKIM	1	30 BES	53 $J/\psi \rightarrow \gamma$	$\eta'$
<24	90	<sup>3</sup> NAIK	0	9 CLE	$J/\psi \rightarrow \gamma$	$\eta'$
<sup>1</sup> ABLIKIM 211 repor $\pi^+\pi^-\mu^+\mu^-)/\Gamma_t$ $\gamma \eta'(958)) = (5.21$ $\gamma \eta'(958)) = (5.25)$ second error is the <sup>2</sup> Using $\Gamma_2/\Gamma = (29)$ . <sup>3</sup> Not independent of	ts $(1.97 \pm 0)$ $(0.011) \times [E]$ $\pm 0.17) \times 3$ $(0.07) \times 3$ $(0.017) \times 3$ (	$.33 \pm 0.19) \times 10^{-3}$ $B(J/\psi(1S) \rightarrow 10^{-3}$ , which we r $10^{-3}$ . Our first e error from using o from PDG 12. value of $\Gamma_{10}/\Gamma_{10}$	<sup>3</sup> from $\gamma \eta'(9)$ escale rror is ur bes	a meas 58))] a: to our l their ex t value. AIK 09	urement of [Г( ssuming B(J/ pest value B(J speriment's err	$\eta'(958)  ightarrow f'\psi(1S)  ightarrow /\psi(1S)  ightarrow$ for and our
$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma$	$(\pi^+\pi^-\eta)$	10/11				Γ <sub>10</sub> /Γ <sub>1</sub>
VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID		TECN	COMMENT	
<0.5	90	<sup>1</sup> NAIK	09	CLEO	$J/\psi \rightarrow \gamma \eta'$	
<sup>1</sup> NAIK 09 reports [ $2\gamma$ ] < $1.3 \times 10^{-5}$	$\Gamma(\eta'(958) - 3$ which we	$\rightarrow \pi^+\pi^-\mu^+\mu^-$ multiply by our be	$)/{\sf \Gamma}ig(\eta')$ est val	'(958) - ue Β(η -	$\begin{array}{l} \rightarrow  \pi^+ \pi^- \eta) \\ \rightarrow  2\gamma) = 39.3 \\ \end{array}$	/ $[B(\eta \rightarrow B6 \times 10^{-2}]$ .
$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma$	$(\rho^{o}\gamma)$ (inclu	uding non-reson	ant $\pi$	$\pi^+\pi^-\gamma$	())	$\Gamma_{10}/\Gamma_2$
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID		TECN	COMMENT	
<1.0	90	ABLIKIM	130	BES3	$J/\psi \rightarrow \gamma \eta'$	
$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{ m total}$	1					Γ <sub>11</sub> /Γ
VALUE (units $10^{-3}$ )	EVTS	DOCUMENT ID		TECN	COMMENT	
$3.01 \pm 0.18$ OUR FI						
$3.591 \pm 0.054 \pm 0.174$	6067	ABLIKIM	17	BES3	$J/\psi \rightarrow \gamma (\pi^2)$	$+\pi - \pi^{0}$
4.28 $\pm 0.49 \pm 1.11$	78	<sup>1</sup> ABLIKIM	15P	BES3	$J/\psi \rightarrow K^+$	$K^{-}3\pi$
$3.7 + 1.1 \pm 0.4$		<sup>2</sup> NAIK	09	CLEO	$J/\psi \rightarrow \gamma \eta'$	
−0.9 • • We do not use t	he following	data for average	s fits	limits e	tc • • •	
$883 \pm 0.15 \pm 0.30$	1014	3 ABLIKIM	10⊑	RES3	$1/\psi > \alpha(\pi^{-1})$	$+ \pi - \pi 0$
<sup>1</sup> We have added all <sup>2</sup> Not independent o <sup>3</sup> Superseded by ABI	systematic i f measured v LIKIM 17.	uncertainties in qualue of $\Gamma_{11}/\Gamma_1$ f	iadrati rom N	ure to a AIK 09.	single value.	,
$\Gamma(\pi^+\pi^-\pi^0)/\Gamma(\pi^+)$	$(\pi^-\eta)$			TECH		$\Gamma_{11}/\Gamma_1$
VALUE (units 10 <sup>3</sup> ) 8.5 +0.4 OLIR FIT	<u>EVIS</u> Error inclue	<u>DUCUMENT ID</u> les scale factor of	11	IECN	COMMENT	
$8.27^{+2.49}_{-2.12} \pm 0.04$	20	<sup>1</sup> NAIK	09	CLEO	$J/\psi  ightarrow \gamma \eta'$	
<sup>1</sup> NAIK 09 reports [ $(21+6) \pm 2) \times 10^{-3}$ $(21-5) \pm 2) \times 10^{-3}$ $10^{-2}$ . Our first er error from using ou	$(\eta'(958)  ightarrow (3 which we referred to the second structure of the seco$	$\pi^+\pi^-\pi^0)/\Gamma(\eta^\prime)$ multiply by our best experiment's error e.	'(958) st valu and o	$\rightarrow \pi^+$ e B $(\eta \rightarrow$ our secor	$\pi^{-}\eta)] / [B(\eta + 2\gamma) = (39.36)$ and error is the	$ ightarrow 2\gamma)] = 5 \pm 0.18)  imes$ systematic

$\Gamma((\pi^+\pi^-\pi^0)$ S-wa	ve)/Г <sub>tota</sub>	ıl			Г <sub>12</sub> /Г
VALUE (units $10^{-4}$ )	EVTS	DOCUMENT ID		TECN	COMMENT
37.63±0.77±5.00	6580	<sup>1</sup> ABLIKIM	17	BES3	$J/\psi \rightarrow \gamma (\pi^+ \pi^- \pi^0)$
$^1$ We have added all	systematio	c uncertainties in qu	uadra	ture .	
$\Gamma(\pi^{\mp} ho^{\pm})/\Gamma_{ ext{total}}$					Г <sub>13</sub> /Г
VALUE (units $10^{-4}$ )	EVTS	DOCUMENT ID		TECN	COMMENT
7.44±0.60±2.23	1231	<sup>1</sup> ABLIKIM	17	BES3	$J/\psi \rightarrow \gamma(\pi^{\mp}\rho^{\pm})$

 $^1\mathrm{We}$  have added all systematic uncertainties in quadrature .

$\Gamma(2(\pi^+\pi^-))/\Gamma_{tot}$	al				Г <sub>14</sub>	/Г
VALUE (units $10^{-5}$ )	CL% EVTS	DOCUMENT ID		TECN	COMMENT	
$8.4 {\pm} 0.9 {\pm} 0.1$	199	<sup>1</sup> ABLIKIM	14M	BES3	$J/\psi  ightarrow \gamma \eta'$	
$\bullet \bullet \bullet$ We do not use	the following	data for averages,	fits, lin	nits, etc.	• • •	
< 24	90	<sup>2</sup> NAIK	09	CLEO	$J/\psi \rightarrow \gamma \eta'$	
<1000	90	RITTENBER	G 69	HBC	1.7–2.7 K <sup>-</sup> p	
<sup>1</sup> ABLIKIM 14M re	ports [ $\Gamma(\eta')$ (958	$(3) \rightarrow 2(\pi^+ \pi^-))/(3)$	Γ <sub>total</sub> ]	× [B(J	$/\psi(1S) \rightarrow \gamma \eta'(958)$	3))]

ABLINIVI 14M reports [I ( $\eta'(958) \rightarrow 2(\pi + \pi - ))/I_{total}$ ] × [B( $J/\psi(15) \rightarrow \gamma \eta'(958)$ )] = (4.40 ± 0.35 ± 0.30) × 10<sup>-7</sup> which we divide by our best value B( $J/\psi(15) \rightarrow \gamma \eta'(958)$ )  $\gamma \eta'(958)) = (5.25 \pm 0.07) \times 10^{-3}$ . Our first error is their experiment's error and our second error is the systematic error from using our best value. <sup>2</sup> Not independent of measured value of  $\Gamma_{14}/\Gamma_1$  from NAIK 09.

$$\begin{array}{c|c} \Gamma(2(\pi^{+}\pi^{-}))/\Gamma(\pi^{+}\pi^{-}\eta) & \Gamma_{14}/\Gamma_{1} \\ \hline \begin{array}{c} \frac{VALUE \ (\text{units }10^{-3})}{< \textbf{0.6}} & \frac{CL\%}{90} & \frac{1}{N\text{AIK}} & 09 & \frac{TECN}{\text{CLEO}} & \frac{COMMENT}{J/\psi \rightarrow \gamma\eta'} \\ \hline \begin{array}{c} 1 \text{ NAIK } 09 \ \text{reports } [\Gamma(\eta'(958) \rightarrow 2(\pi^{+}\pi^{-}))/\Gamma(\eta'(958) \rightarrow \pi^{+}\pi^{-}\eta)] \ / \ [B(\eta \rightarrow 2\gamma)] \\ < 1.4 \times 10^{-3} \ \text{which we multiply by our best value } B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \begin{array}{c} \Gamma(\pi^{+}\pi^{-}2\pi^{0})/\Gamma_{\text{total}} & \Gamma_{15}/\Gamma \\ \hline \begin{array}{c} \frac{VALUE \ (\text{units }10^{-4})}{1.79 \pm 0.38 \pm 0.02} & \frac{CL\%}{84} & \frac{DOCUMENT \ ID}{1 \ ABLIKIM} & \frac{TECN}{14M} & \frac{COMMENT}{J/\psi \rightarrow \gamma\eta'} \\ \bullet \bullet \bullet \text{ We do not use the following data for averages, fits, limits, etc. } \bullet \bullet \bullet \\ < 27 & 90 & 2 \ NAIK & 09 \ CLEO \ J/\psi \rightarrow \gamma\eta' \\ \hline \begin{array}{c} 1 \text{ABLIKIM } 14M \ \text{reports } [\Gamma(\eta'(958) \rightarrow \pi^{+}\pi^{-}2\pi^{0})/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \gamma\eta'(958))] \\ = (9.38 \pm 1.79 \pm 0.89) \times 10^{-7} \ \text{which we divide by our best value } B(J/\psi(1S) \rightarrow \gamma\eta'(958))] \\ = (5.25 \pm 0.07) \times 10^{-3}. \ Our \ first \ error \ is their experiment's \ error \ and our \ second \ error \ is the systematic \ error \ from \ using \ our \ best \ value. \\ \hline \begin{array}{c} 2 \ Not \ independent \ of \ measured \ value \ of \ \Gamma_{15}/\Gamma_{1} \ from \ NAIK \ 09. \\ \hline \begin{array}{c} \Gamma(\pi^{+}\pi^{-}2\pi^{0})/\Gamma(\pi^{+}\pi^{-}\eta) & \Gamma_{15}/\Gamma_{1} \ from \ NAIK \ 09. \\ \hline \begin{array}{c} \Gamma(\pi^{+}\pi^{-}2\pi^{0})/\Gamma(\pi^{+}\pi^{-}\eta) & \Gamma_{15}/\Gamma_{1} \ NAIK \ 09. \\ \hline \end{array}$$

<sup>1</sup> NAIK 09 reports  $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^- 2\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)] < 15 \times 10^{-3}$  which we multiply by our best value  $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ .

$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\Gamma(2(\pi^+\pi^-))$ neut	rals)/Γ <sub>tota</sub>	1			Г <sub>16</sub> /Г
<b>CO.01</b> 95 DANBURG 73 HBC $2.2 K^{-} p \rightarrow \Lambda X^{0}$ <b>CO.01</b> 90 RITENBERG 69 HBC $1.7-2.7 K^{-} p$ <b>F(2(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma_{total}</math> F C12(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma_{total}</math> <b>F C12(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma_{total}</math> <b>F C12(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma_{total}</math> <b>F C12(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma(\pi^{+}\pi^{-})\pi^{0}</math> C120</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C101</b> 90 RITENBERG 69 HBC <math>1.7-2.7 K^{-}p</math> <b>1</b> Not independent of measured value of <math>\Gamma_{17}/\Gamma_{1}</math> from NAIK 09. <b>F(2(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma(\pi^{+}\pi^{-}\eta)</math> C120</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>1</b> Not independent of measured value of <math>\Gamma_{17}/\Gamma_{1}</math> from NAIK 09. <b>F(2(<math>\pi^{+}\pi^{-})\pi^{0}</math>)/<math>\Gamma(\pi^{+}\pi^{-}\eta)</math> C120 COMMENT C120</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>1</b> NAIK 09 reports [<math>\Gamma(\eta'(958) \rightarrow 2(\pi^{+}\pi^{-})\pi^{0})/\Gamma(\eta'(958) \rightarrow \pi^{+}\pi^{-}\eta)</math>]/ [<math>B(\eta \rightarrow 2\gamma)</math>] <b>C11</b> × 10<sup>-3</sup> which we multiply by our best value <math>B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}</math>. <b>F(2(<math>\pi^{+}\pi^{-})2\pi^{0}</math>)/<math>\Gamma_{total}</math> C120 COMMENT C120 COMMENT C12(<math>\pi^{+}\pi^{-})2\pi^{0}</math>)/<math>\Gamma_{total}</math> <b>F18/F ValUE</b> (units 10<sup>-5</sup>) <b>C126 DOCUMENT</b> ID <b>TECN COMMENT C131</b> Y <b>D C153 DOCUMENT</b> ID <b>TECN COMMENT C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C17(<math>\pi^{+}\pi^{-})</math>)/<math>\Gamma_{total}</math> <b>F19/F C2(<math>\pi^{+}\pi^{-})</math> C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C31 DOCUMENT</b> ID <b>TECN COMMENT C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C31 DOCUMENT</b> ID <b>TECN COMMENT C17(<math>\pi^{+}\pi^{-})</math>) <b>C13 DOCUMENT</b> ID <b>TECN COMMENT C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C31 DOCUMENT</b> ID <b>TECN COMMENT C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C160</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C100 DOCUMENT</b> ID <b>TECN COMMENT C100</b> J/<math>\psi \rightarrow \gamma \eta'</math> <b>C100</b> J/</b></b></b></b></b></b>	VALUE	<u>CL%</u>	DOCUMENT ID	TECN	<u>COMMENT</u>	
••• We do not use the following data for averages, fits, limits, etc. ••• <0.01 90 RITTENBERG 69 HBC 1.7-2.7 K <sup>-</sup> p $\Gamma(2(\pi^{+}\pi^{-})\pi^{0})/\Gamma_{total} \Gamma_{total} \Gamma_{tota} \Gamma_{tota} \Gamma_{tot$	<0.01	95	DANBURG	73 HBC	$2.2 \ K^{-} p \rightarrow$	· ΛΧ <sup>0</sup>
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$ \begin{split} & \Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}} & \Gamma_{17}/\Gamma \\ \hline \\ & \text{VALUE} & CL\% & DOCUMENT ID & TECN & COMMENT \\ \hline \\ & \bullet \bullet We do not use the following data for averages, fits, limits, etc. \bullet \bullet \bullet \\ & < 0.002 & 90 & ^1 NAIK & 09 & CLEO & J/\psi \rightarrow \gamma \eta' \\ & < 0.01 & 90 & RITTENBERG 69 & HBC & 1.7-2.7 & K^-p \\ & ^1 Not independent of measured value of \Gamma_{17}/\Gamma_1 from NAIK 09. \\ \hline \\ & \Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta) & \Gamma_{17}/\Gamma_1 \\ & TAIK & 09 & CLEO & J/\psi \rightarrow \gamma \eta' \\ & ^1 NAIK & 09 reports [\Gamma(\eta'(958) \rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)] \\ & < 11 \times 10^{-3} & which we multiply by our best value B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \\ & \Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{\text{total}} & DOCUMENT ID & TECN & COMMENT \\ \hline \\ & C0.01 & 95 & KALBFLEISCH 64B & HBC & K^-p \rightarrow A2(\pi^+\pi^-) + MM \\ & \bullet \bullet We do not use the following data for averages, fits, limits, etc. \bullet \bullet \bullet \\ & < 0.01 & 90 & LONDON & 66 & HBC & Compilation \\ \hline \\ & \Gamma(3(\pi^+\pi^-))/\Gamma_{\text{total}} & DOCUMENT ID & TECN & COMMENT \\ \hline \\ & VALUE (units 10^{-5}) & CL\% & DOCUMENT ID & TECN & COMMENT \\ & < 3.1 & 90 & ^1 ABLIKIM & 13U & BES3 & J/\psi \rightarrow \gamma 3(\pi^+\pi^-) \\ & \bullet \bullet We do not use the following data for averages, fits, limits, etc. \bullet \bullet \bullet \\ & < 5.3 & 90 & ^2 NAIK & 09 & CLEO & J/\psi \rightarrow \gamma \eta' \\ & SOO0 & 95 & KALBFLEISCH 64B & HBC & K^-p \rightarrow A2(\pi^+\pi^-) \\ & ^1 Using B(J/\psi \rightarrow \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}. \\ & ^2 Not independent of measured value of \Gamma_{19}/\Gamma_1 from NAIK 09. \\ \hline \\ \hline \\ & \Gamma(3(\pi^+\pi^-))/\Gamma(\rho^0 \gamma(iss) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)] \\ & < 3.0 \times 10^{-3} & which we multiply by our best value B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \\ \hline \\ \hline \\ \hline \\ & VALUE & CL\% & DOCUMENT ID \\ & TECN & COMMENT \\ \hline \\ $	<0.01	90	RITTENBERG	69 HBC	1.7–2.7 K <sup>–</sup>	р
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••• We do not use the following data for averages, fits, limits, etc. ••• <0.002 90 INAIK 09 CLEO $J/\psi \rightarrow \gamma \eta'$ <0.01 90 RITTENBERG 69 HBC 1.7-2.7 $K^-p$ <sup>1</sup> Not independent of measured value of $\Gamma_{17}/\Gamma_1$ from NAIK 09. $\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta)$ $\Gamma_{17}/\Gamma_1$ <sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ < 11 × 10 <sup>-3</sup> which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ $\Gamma_{18}/\Gamma$ <sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ < 11 × 10 <sup>-3</sup> which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}$ $\Gamma_{18}/\Gamma$ <sup>2</sup> (0.01 95 KALBFLEISCH 64B HBC $K^-p \rightarrow \Lambda 2(\pi^+\pi^-) + MM$ ••• We do not use the following data for averages, fits, limits, etc. ••• <0.01 90 LONDON 66 HBC Compilation $\Gamma(3(\pi^+\pi^-))/\Gamma_{total}$ $\Gamma_{19}/\Gamma$ <sup>2</sup> (31 $\Gamma_{19}/\Gamma$ $\Gamma_{10}$ $\Gamma_{10}$ $\Gamma_{10}/\psi \rightarrow \gamma \eta'(\gamma^+(\gamma^+\pi^-))$ ••• We do not use the following data for averages, fits, limits, etc. ••• <53 90 <sup>2</sup> NAIK 09 CLEO $J/\psi \rightarrow \gamma \eta'(\gamma^+(\gamma^+\pi^-))$ <sup>1</sup> Using $B(J/\psi \rightarrow \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}$ . <sup>2</sup> Not independent of measured value of $\Gamma_{19}/\Gamma_1$ from NAIK 09. $\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ $\Gamma_{19}/\Gamma_1$ <sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ < $3.0 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$ )) $\Gamma_{20}/\Gamma_2$ $\Gamma_{41}$ $\Gamma_{13}$ $\Gamma_{13$	VALUE	<u> </u>	DOCUMENT ID	<u>TECN</u>	<u>COMMENT</u>	
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<pre>&lt;0.01 90 RITTENBERG 69 HBC 1.7-2.7 K<sup>-</sup>p <sup>1</sup>Not independent of measured value of <math>\Gamma_{17}/\Gamma_1</math> from NAIK 09. <math>\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta)</math> <math>\Gamma_{17}/\Gamma_1</math> <math>\frac{VALUE (units 10^{-3})}{&lt;4}</math> <math>\frac{CL\%}{90}</math> <math>\frac{DOCUMENT ID}{1 \text{ NAIK } 09}</math> <math>\frac{TECN}{CLEO}</math> <math>\frac{COMMENT}{J/\psi \rightarrow \gamma \eta'}</math> <sup>1</sup>NAIK 09 reports <math>[\Gamma(\eta'(958) \rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]</math> <math>&lt; 11 \times 10^{-3}</math> which we multiply by our best value <math>B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}</math>. <math>\Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total}</math> <math>\Gamma_{18}/\Gamma</math> VALUE <math>CL%</math> <math>DOCUMENT ID</math> <math>TECN</math> <math>COMMENT <math>&lt; 0.01</math> 95 KALBFLEISCH 64B HBC <math>K^-p \rightarrow \Lambda 2(\pi^+\pi^-) + MM</math> <math>\bullet \bullet We do not use the following data for averages, fits, limits, etc. <math>\bullet \bullet \bullet</math> &lt; 0.01</math> 90 LONDON 66 HBC Compilation <math>\Gamma(3(\pi^+\pi^-))/\Gamma_{total}</math> <math>\Gamma_{19}/\Gamma</math> <math>&lt; 3.1</math> 90 <math>^2</math> NAIK 130 <math>BES3</math> <math>J/\psi \rightarrow \gamma 3(\pi^+\pi^-)</math> <math>&lt; \bullet We do not use the following data for averages, fits, limits, etc. <math>\bullet \bullet \bullet</math> <math>&lt; 53</math> 90 <math>^2</math> NAIK 09 CLEO <math>J/\psi \rightarrow \gamma \eta'</math> <math>&lt; 500</math> 95 KALBFLEISCH 64B HBC <math>K^-p \rightarrow \Lambda 2(\pi^+\pi^-)</math> <math>^1 Using B(J/\psi \rightarrow \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}</math>. <math>^2 Not independent of measured value of <math>\Gamma_{19}/\Gamma_1</math> from NAIK 09. <math>\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)</math> <math>\Gamma_{19}/\Gamma_1</math> <math>VALUE (units 10^{-3})</math> <math>CL\%</math> <math>DOCUMENT ID</math> <math>TECN</math> <math>COMMENT</math> <math>&lt; 1.2</math> 90 <math>1</math> NAIK 09 CLEO <math>J/\psi \rightarrow \gamma \eta'</math> <math>^1 NAIK 09</math> reports <math>[\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-)))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]</math> <math>&lt; 3.0 \times 10^{-3}</math> which we multiply by our best value <math>B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}</math>. <math>\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma (including non-resonant \pi^+\pi^-\gamma))</math> <math>\Gamma_{20}/\Gamma_2</math> VALUE</math> <math>CL%</math> <math>DOCUMENT ID</math> <math>TECN</math> <math>COMMENT <math>&lt; 1.3 \times 10^{-4}</math> 90 ABLIKIM 16M BES3 <math>e^+e^- \rightarrow J/\psi \rightarrow hadrons</math></math></math></math></pre>	< 0.002	90	<sup>1</sup> NAIK	09 CLE	$O  J/\psi \to \gamma \eta'$	
<sup>1</sup> Not independent of measured value of $\Gamma_{17}/\Gamma_1$ from NAIK 09. $\begin{aligned} & \Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma(\pi^+\pi^-\eta) & \Gamma_{17}/\Gamma_1 \\ \hline NAIK 09 \text{ reports } [\Gamma(\eta'(958) \rightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)] \\ < 11 \times 10^{-3} \text{ which we multiply by our best value } B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \Gamma(2(\pi^+\pi^-)2\pi^0)/\Gamma_{total} & \Gamma_{10} \\ \hline VALUE & CL_{\infty} & DOCUMENT ID \\ < 0.01 & 95 & KALBFLEISCH 64B & HBC & K^-p \rightarrow A2(\pi^+\pi^-) + MM \\ \bullet \bullet We do not use the following data for averages, fits, limits, etc. \bullet \bullet \bullet \\ < 0.01 & 90 & LONDON & 66 & HBC & Compilation \\ \hline \Gamma(3(\pi^+\pi^-))/\Gamma_{total} & \Gamma_{10} & TECN & COMMENT \\ \hline VALUE (units 10^{-5}) & CL_{\infty} & DOCUMENT ID & TECN & COMMENT \\ < 3.1 & 90 & 1 & ABLIKIM & 130 & BES3 & COMMENT \\ < 3.1 & 90 & 1 & ABLIKIM & 130 & BES3 & COMMENT \\ < 5.3 & 90 & 2 & NAIK & 09 & CLEO & J/\psi \rightarrow \gamma\eta' \\ < 5.53 & 90 & 2 & NAIK & 09 & CLEO & J/\psi \rightarrow \gamma\eta' \\ < 5.53 & 90 & 2 & NAIK & 09 & CLEO & J/\psi \rightarrow \gamma\eta' \\ < 5.53 & 90 & 2 & NAIK & 09 & CLEO & J/\psi \rightarrow \gamma\eta' \\ < 5.00 & 95 & KALBFLEISCH 64B & HBC & K^-p \rightarrow A2(\pi^+\pi^-) \\ ^1 Using B(J/\psi \rightarrow \gamma\eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}. \\ ^2 Not independent of measured value of \Gamma_{19}/\Gamma_1 from NAIK 09. \\ \hline \Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta) & \Gamma_{19}/\Gamma_1 \\ \hline VALUE (units 10^{-3}) & CL_{\infty} & 1 \\ \hline VALUE (units 10^{-3}) & CL_{\infty} & 1 \\ < .3.0 \times 10^{-3} & which we multiply by our best value B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma (including non-resonant \pi^+\pi^-\gamma)) & \Gamma_{20}/\Gamma_2 \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE & CL_{\infty} & DOCUMENT ID & TECN \\ \hline VALUE $	< 0.01	90	RITTENBERG	69 HBC	$1.7-2.7 K^{-1}$	р
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	VALUE (units $10^{-3}$ )	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 2(\pi^{+}\pi^{-})\pi^{0})/\Gamma(\eta'(958) \rightarrow \pi^{+}\pi^{-}\eta)] / [B(\eta \rightarrow 2\gamma)]$ $< 11 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . <b>F(2(<math>\pi^{+}\pi^{-}</math>)2<math>\pi^{0}</math>)/<math>\Gamma_{total}</math></b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b> <b>CL</b>	<4	90	<sup>1</sup> NAIK	09 CLE	$0  J/\psi \rightarrow \gamma \eta'$	,
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$^1$ NAIK 09 reports $<~11 imes10^{-3}$ v	s [Г $(\eta'(958))$ which we mu	$ ightarrow 2(\pi^+\pi^-)\pi^0)/\Gamma$ Itiply by our best va	$\Gamma(\eta'(958)  ightarrow 0.058)$ lue B $(\eta  ightarrow 0.058)$	$\Rightarrow \pi^+ \pi^- \eta)] / [1$ 2 $\gamma$ ) = 39.36 ×	$ B(\eta \to 2\gamma)] $ 10 <sup>-2</sup> .
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\Gamma(2(\pi^+\pi^-)2\pi^0)$	/Γ <sub>total</sub>	DOCUMENT ID	TECN	COMMENT	Г <sub>18</sub> /Г
••• We do not use the following data for averages, fits, limits, etc. ••• <0.01 90 LONDON 66 HBC Compilation $\Gamma(3(\pi^+\pi^-))/\Gamma_{total} \qquad \Gamma_{19}/\Gamma$ $\xrightarrow{VALUE (units 10^{-5})} CL\% \qquad DOCUMENT ID \qquad TECN \qquad COMMENT$ $(3.1 90 1 ABLIKIM 13U BES3 J/\psi \to \gamma 3(\pi^+\pi^-))$ ••• 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 $K^- \rho \to A2(\pi^+\pi^-)$ 1 Using B $(J/\psi \to \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}$ . 2 Not independent of measured value of $\Gamma_{19}/\Gamma_1$ from NAIK 09. $\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta) \qquad \Gamma_{19}/\Gamma_1$ $\frac{VALUE (units 10^{-3})}{< 3.0 \times 10^{-3}} CL\% \qquad 3(\pi^+\pi^-))/\Gamma(\eta'(958) \to \pi^+\pi^-\eta)] / [B(\eta \to 2\gamma)]$ < 3.0 × 10^{-3} which we multiply by our best value $B(\eta \to 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma (including non-resonant \pi^+\pi^-\gamma)) \qquad \Gamma_{20}/\Gamma_2$ $\frac{VALUE}{<1.3 \times 10^{-4}} 90 \qquad ABLIKIM 16M BES3 e^+e^- \to J/\psi \to hadrons$	<u></u>	05			$K^{-} p \rightarrow \Lambda 2(\pi^{-})$	
(3) The do not use the following data for oreneges, ins, initial, etc. 0.0 To the dot interval to the following data for oreneges, ins, initial, etc. 0.0 To the dot interval to the following data for oreneges, its, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the following data for averages, fits, limits, etc. 0.0 To the dot interval to the dot inte	• • • We do not us	e the follow	ing data for average	s fits limits	$p \rightarrow \pi_2(\pi)$	л ) <del>т</del> ійни
$ \begin{split} & \Gamma(3(\pi^{+}\pi^{-}))/\Gamma_{\text{total}} & \Gamma_{19}/\Gamma \\ \hline \\ & \frac{VALUE \ (\text{units}\ 10^{-5})}{< 3.1} & \frac{CL\%}{90} & \frac{DOCUMENT\ ID}{1\ \text{ABLIKIM}} & \frac{TECN}{13U} & \frac{COMMENT}{J/\psi \rightarrow \gamma 3(\pi^{+}\pi^{-})} \\ \bullet \bullet \text{ We do not use the following data for averages, fits, limits, etc. } \bullet \bullet \bullet \\ & < 53 & 90 & ^2\ \text{NAIK} & 09 & \text{CLEO} & J/\psi \rightarrow \gamma \eta' \\ & <500 & 95 & \text{KALBFLEISCH 64B} & \text{HBC} & K^{-}p \rightarrow \Lambda 2(\pi^{+}\pi^{-}) \\ & ^1\ \text{Using B}(J/\psi \rightarrow \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}. \\ & ^2\ \text{Not independent of measured value of } \Gamma_{19}/\Gamma_1 & \text{from NAIK 09}. \\ \hline \\ & \Gamma(3(\pi^{+}\pi^{-}))/\Gamma(\pi^{+}\pi^{-}\eta) & \Gamma_{19}/\Gamma_1 \\ \hline \\ & \frac{VALUE \ (\text{units}\ 10^{-3})}{< 1.2} & \frac{CL\%}{90} & \frac{DOCUMENT\ ID}{1\ \text{NAIK}} & 09 & \frac{TECN}{CLEO} & \frac{COMMENT}{J/\psi \rightarrow \gamma \eta'} \\ & ^1\ \text{NAIK 09 reports } [\Gamma(\eta'(958) \rightarrow 3(\pi^{+}\pi^{-}))/\Gamma(\eta'(958) \rightarrow \pi^{+}\pi^{-}\eta)] \ / \ [B(\eta \rightarrow 2\gamma)] \\ & < 3.0 \times 10^{-3} \ \text{which we multiply by our best value } B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline \\ \hline \\ & \Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^{0}\gamma(\text{including non-resonant } \pi^{+}\pi^{-}\gamma)) & \Gamma_{20}/\Gamma_2 \\ \hline \\ & \frac{VALUE}{\sqrt{ALUE}} & \frac{CL\%}{90} & \frac{DOCUMENT\ ID}{ABLIKIM} & 16M\ BES3 & \frac{COMMENT}{6^{+}e^{-}} \rightarrow J/\psi \rightarrow \text{ hadrons} \\ \hline \end{aligned}$	<0.01	90	LONDON 66	HBC	Compilation	
$\frac{VALUE (units 10^{-5})}{< 3.1} \qquad \begin{array}{c} CL\% \\ 90 \end{array} \qquad 1 \begin{array}{c} DOCUMENT \ ID \\ ABLIKIM \qquad 130 \end{array} \qquad \begin{array}{c} TECN \\ BES3 \end{array} \qquad \begin{array}{c} COMMENT \\ J/\psi \rightarrow \gamma 3(\pi^+\pi^-) \end{array}$ • • • We do not use the following data for averages, fits, limits, etc. • • • • < 53 90 2 NAIK 99 CLEO $J/\psi \rightarrow \gamma \eta' \\ <500 95 \qquad KALBFLEISCH 64B \qquad HBC \qquad K^-p \rightarrow \Lambda 2(\pi^+\pi^-) \end{array}$ <sup>1</sup> Using B( $J/\psi \rightarrow \gamma \eta'(958)$ ) = (5.16 ± 0.15) × 10^{-3}. <sup>2</sup> Not independent of measured value of $\Gamma_{19}/\Gamma_1$ from NAIK 09. $\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta) \qquad \Gamma_{19}/\Gamma_1 \\ \hline VALUE (units 10^{-3}) \\ < 3.0 \times 10^{-3} \end{array} \qquad \begin{array}{c} CL\% \\ 90 \end{array} \qquad 1 \begin{array}{c} DOCUMENT \ ID \\ NAIK \ 09 \end{array} \qquad \begin{array}{c} TECN \\ Op \end{array} \qquad \begin{array}{c} COMMENT \\ CLEO \end{array} \qquad \begin{array}{c} OMMENT \\ J/\psi \rightarrow \gamma \eta' \\ \Gamma_{10}/\Gamma_1 \\ \hline J/\psi \rightarrow \gamma \eta' \\ \Gamma_{10}/\Gamma_1 \\ \hline J/\psi \rightarrow \gamma \eta' \\ \Gamma_{10}/\Psi \rightarrow \gamma \eta' $	$\Gamma(3(\pi^+\pi^-))/\Gamma_{tc}$	otal				Г <sub>19</sub> /Г
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID	TECN	COMMENT	-
• • We do not use the following data for averages, fits, limits, etc. • • • < 53 90 <sup>2</sup> NAIK 09 CLEO $J/\psi \rightarrow \gamma \eta'$ <500 95 KALBFLEISCH 64B HBC $K^- p \rightarrow \Lambda 2(\pi^+ \pi^-)$ <sup>1</sup> Using B( $J/\psi \rightarrow \gamma \eta'(958)$ ) = (5.16 ± 0.15) × 10 <sup>-3</sup> . <sup>2</sup> Not independent of measured value of $\Gamma_{19}/\Gamma_1$ from NAIK 09. $\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ $\Gamma_{19}/\Gamma_1$ <u>VALUE (units 10<sup>-3</sup>)</u> <u>CL%</u> <u>1</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>(1.2</b> 90 <sup>1</sup> NAIK 09 <u>CLEO</u> $J/\psi \rightarrow \gamma \eta'$ <sup>1</sup> NAIK 09 reports [ $\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)$ ] / [B( $\eta \rightarrow 2\gamma$ )] < 3.0 × 10 <sup>-3</sup> which we multiply by our best value B( $\eta \rightarrow 2\gamma$ ) = 39.36 × 10 <sup>-2</sup> . $\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$ )) $\Gamma_{20}/\Gamma_2$ <u>VALUE</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>(CMMENT</b> ) <b>(CMMENT</b> ) $\Gamma_{20}/\Gamma_2$ <b>(CMMENT</b> ) $\Gamma_{20}/\Gamma_2$ <b>(CMMENT</b> ) $\Gamma_{13} \times 10^{-4}$ 90 ABLIKIM 16M BES3 $e^+e^- \rightarrow J/\psi \rightarrow$ hadrons	< 3.1	90	<sup>1</sup> ABLIKIM	13U BES	$\frac{1}{3} J/\psi \rightarrow \gamma 30$	$(\pi^{+}\pi^{-})$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	• • • We do not us	e the follow	ing data for averages	s, fits, limits	s, etc. ● ● ●	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	< 53	90	<sup>2</sup> NAIK	09 CLE	$O  J/\psi \rightarrow \gamma n'$	,
<sup>1</sup> Using $B(J/\psi \rightarrow \gamma \eta'(958)) = (5.16 \pm 0.15) \times 10^{-3}$ . <sup>2</sup> Not independent of measured value of $\Gamma_{19}/\Gamma_1$ from NAIK 09. $\Gamma(3(\pi^+\pi^-))/\Gamma(\pi^+\pi^-\eta)$ $\Gamma_{19}/\Gamma_1$ <u>VALUE (units 10^{-3})</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>(LEO)</b> $J/\psi \rightarrow \gamma \eta'$ <sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ $< 3.0 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$ )) $\Gamma_{20}/\Gamma_2$ <u>VALUE</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>(I)</b> ABLIKIM 16M BES3 $e^+e^- \rightarrow J/\psi \rightarrow$ hadrons	<500	95	KALBFLEISCH	164B HBC	$K^- p \rightarrow \Lambda$	$2(\pi^{+}\pi^{-})$
$ \begin{array}{c c} \Gamma(3(\pi^{+}\pi^{-}))/\Gamma(\pi^{+}\pi^{-}\eta) & \Gamma_{19}/\Gamma_{1} \\ \hline \\ $	${1\over 2}$ Using B $(J/\psi ightarrow 2$ Not independen	$\gamma \eta'$ (958)) t of measure	= (5.16 $\pm$ 0.15) × 1 ed value of $\Gamma_{19}/\Gamma_1$ f	10 <sup>—3</sup> . rom NAIK (	09.	. ,
$ \begin{array}{c cccc} \hline & \underline{VALUE \ (units \ 10^{-3})} & \underline{CL\%} & \underline{DOCUMENT \ ID} & \underline{TECN} & \underline{COMMENT} \\ \hline & 1.2 & 90 & 1 & \mathbf{NAIK} & 09 & \mathbf{CLEO} & J/\psi \rightarrow \gamma \eta' \\ \hline & 1 & \mathbf{NAIK} & 09 \ \text{reports} \ [\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] \ / \ [B(\eta \rightarrow 2\gamma)] \\ & < 3.0 \times 10^{-3} \ \text{which we multiply by our best value} \ B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}. \\ \hline & \mathbf{\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^{0}\gamma(\text{including non-resonant } \pi^{+}\pi^{-}\gamma)) & \mathbf{\Gamma_{20}/\Gamma_{2}} \\ \hline & \underline{VALUE} & \underline{CL\%} & \underline{DOCUMENT \ ID} & \underline{TECN} & \underline{COMMENT} \\ \hline & \mathbf{ABLIKIM} & \mathbf{16M} & \underline{BES3} & \underline{e^{+}e^{-}} \rightarrow J/\psi \rightarrow \text{ hadrons} \\ \hline \end{array} $	$\Gamma(3(\pi^+\pi^-))/\Gamma(4\pi^+\pi^-))$	$\pi^+\pi^-\eta)$				$\Gamma_{19}/\Gamma_1$
<b>&lt;1.2</b> 90 <sup>1</sup> NAIK 09 CLEO $J/\psi \rightarrow \gamma \eta'$ <sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ $< 3.0 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . <b><math>\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma)</math> (including non-resonant <math>\pi^+\pi^-\gamma)</math>) <b><math>\Gamma_{20}/\Gamma_2</math> VALUE CL% DOCUMENT ID DOCUMENT ID TECN COMMENT COMMENT OCCUMENT ID TECN COMMENT COMMENT COMMENT OCCUMENT ID TECN COMMENT COMMENT OCCUMENT ID O</b></b>	VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN		
<sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow 3(\pi^+\pi^-))/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B(\eta \rightarrow 2\gamma)]$ $< 3.0 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times 10^{-2}$ . $\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^0\gamma$ (including non-resonant $\pi^+\pi^-\gamma$ )) $\Gamma_{20}/\Gamma_2$ <u>VALUE</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> $<1.3 \times 10^{-4}$ 90 ABLIKIM 16M BES3 $e^+e^- \rightarrow J/\psi \rightarrow$ hadrons	<1.2	90	<sup>1</sup> NAIK	09 CLE	$O  J/\psi \to \gamma \eta'$	,
$ \frac{\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^{0}\gamma(\text{including non-resonant }\pi^{+}\pi^{-}\gamma))}{\sqrt{2}} \qquad \Gamma_{20}/\Gamma_{2} \qquad \Gamma_{2$	$^{1}$ NAIK 09 report $< 3.0  imes 10^{-3}$ ,	s [Г $(\eta'(958)$ which we mi	$ ightarrow 3(\pi^+\pi^-))/\Gamma(\pi)$	$\eta^{\prime}(958)  ightarrow$ alue B $(\eta  ightarrow$	$\pi^+ \pi^- \eta)$ ] / [E 2 $\gamma$ ) = 39.36 ×	$3(\eta \rightarrow 2\gamma)]$ $10^{-2}.$
<b>&lt;1.3 × 10<sup>-4</sup></b> 90 ABLIKIM 16M BES3 $e^+e^- \rightarrow J/\psi \rightarrow$ hadrons	$\Gamma(K^{\pm}\pi^{\mp})/\Gamma(\rho^{0})$	γ <b>(includin</b>	<b>g non-resonant</b> π <sup>-1</sup>	<sup>+</sup> π <sup>-</sup> γ))	COMMENT	$\Gamma_{20}/\Gamma_2$
	<1.3 × 10 <sup>-4</sup>	90	ABLIKIM 16	M BES3	$e^+e^- \rightarrow J/\psi$	$\rightarrow$ hadrons

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 $\Gamma(\pi^+\pi^-e^+e^-)/\Gamma_{total}$  $\Gamma_{21}/\Gamma$ *VALUE* (units  $10^{-3}$ ) CL% EVTS DOCUMENT ID TECN COMMENT 2.42±0.10 OUR FIT • • • We do not use the following data for averages, fits, limits, etc. • • • <sup>1</sup> ABLIKIM 130 BES3  $J/\psi \rightarrow \gamma \eta'$ 429  $2.11 \pm 0.12 \pm 0.14$  $2.5 \ {}^{+1.2}_{-0.9} \ {}^{\pm 0.5}_{-0.5}$  $^{2}$  NAIK CLEO  $J/\psi \rightarrow \gamma \eta'$ 09 90 **RITTENBERG 65** HBC  $2.7 K^{-} p$ <6 <sup>1</sup> Using  $\Gamma_2/\Gamma = (29.3 \pm 0.6)\%$  from PDG 12. <sup>2</sup>Not independent of measured value of  $\Gamma_{21}/\Gamma_1$  from NAIK 09.  $\Gamma(\pi^+\pi^-e^+e^-)/\Gamma(\pi^+\pi^-\eta)$  $\Gamma_{21}/\Gamma_1$ **5.69±0.25 OUR FIT** DOCUMENT ID TECN COMMENT  $5.51^{+3.00}_{-2.30} \pm 0.03$ <sup>1</sup> NAIK 09 CLEO  $J/\psi \rightarrow \gamma \eta'$ 8 <sup>1</sup>NAIK 09 reports  $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^-e^+e^-)/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)]$  /  $[B(\eta \rightarrow \pi^+\pi^-\eta)]$  /  $[B(\eta \rightarrow \pi^+\pi^-\eta)]$  $2\gamma)]$  = (14 $^{+7}_{-5}$   $\pm$  3) imes 10 $^{-3}$  which we multiply by our best value B( $\eta$  ightarrow  $2\gamma)$  =  $(39.36\pm0.18) imes10^{-2}.$  Our first error is their experiment's error and our second error is the systematic error from using our best value.  $\Gamma(\pi^+\pi^-e^+e^-)/\Gamma(\rho^0\gamma(\text{including non-resonant }\pi^+\pi^-\gamma))$  $\Gamma_{21}/\Gamma_2$ *VALUE* (units  $10^{-3}$ ) DOCUMENT ID EVTS TECN COMMENT 8.20±0.31 OUR FIT 21J BES3  $J/\psi \rightarrow \gamma \eta'$  $8.20 \pm 0.16 \pm 0.27$ 2584 ABLIKIM • • • We do not use the following data for averages, fits, limits, etc. • • • <sup>1</sup> ABLIKIM 429 130 BES3  $J/\psi \rightarrow \gamma \eta'$  $7.2 \pm 0.4 \pm 0.5$ <sup>1</sup>Superseded by ABLIKIM 21J.  $\Gamma(\pi^+ e^- \nu_e + \text{c.c.}) / \Gamma(\pi^+ \pi^- \eta)$  $\Gamma_{22}/\Gamma_1$ *VALUE* (units  $10^{-4}$ ) TECN COMMENT DOCUMENT ID 13G BES3  $J/\psi \rightarrow \phi \eta'$ <5.0 90 ABLIKIM  $\Gamma(\gamma e^+ e^-)/\Gamma_{\text{total}}$  $\Gamma_{23}/\Gamma$ VALUE (units  $10^{-3}$ ) CL% DOCUMENT ID TECN COMMENT • • We do not use the following data for averages, fits, limits, etc. • • • CLEO 10.6  $e^+e^-$ BRIERE 00 < 0.9 90  $\Gamma(\gamma e^+ e^-)/\Gamma(\gamma \gamma)$  $\Gamma_{23}/\Gamma_7$ VALUE (units  $10^{-2}$ ) DOCUMENT ID TECN COMMENT EVTS 150 BES3  $J/\psi \rightarrow \gamma e^+ e^ 2.13 \pm 0.09 \pm 0.07$ 864 ABLIKIM  $\Gamma(\pi^0 \gamma \gamma) / \Gamma_{\text{total}}$  $\Gamma_{24}/\Gamma$ *VALUE* (units  $10^{-3}$ ) DOCUMENT ID EVTS TECN <u>COMMENT</u> 17T BES3  $J/\psi \rightarrow \gamma n'$  $3.20 \pm 0.07 \pm 0.23$ 3.4k ABLIKIM

$\Gamma(\pi^0\gamma\gamma)/\Gamma(\pi^0\pi^0)$	οη)					Γ <sub>24</sub> /Γ <sub>4</sub>
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID		TECN	COMMENT	
<37	90	ALDE	<b>87</b> B	GAM2	38 $\pi^- p \rightarrow$	n4 $\gamma$
$\Gamma(\pi^0\gamma\gamma)$ (non reso	nant))/Γ <sub>to</sub>	tal				Г <sub>25</sub> /Г
VALUE (units $10^{-4}$ )	EVTS	DOCUMENT ID		TECN	COMMENT	
6.16±0.64±0.67	655	ABLIKIM	17T	BES3	$J/\psi \rightarrow \gamma \eta$	/
$\Gamma(\eta\gamma\gamma)/\Gamma_{ ext{total}}$						Г <sub>26</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<1.33 × 10 <sup>-4</sup>	90	ABLIKIM	19AW	BES3	$J/\psi \rightarrow \gamma \eta'$	$\rightarrow \gamma \gamma \gamma 2 \gamma$
$\Gamma(4\pi^0)/\Gamma_{total}$						Г <sub>27</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<4.94 × 10 <sup>-5</sup>	90	ABLIKIM	20E	BES3	$J/\psi \rightarrow \eta' \gamma$	γ
• • • We do not use $(2.2 \times 10^{-4})$	the followin	g data for average	s, fits,	limits, e	etc. • • •	. /
<3.2 × 10	90	DONSKOV	14	GAIVI4	32.5 π p -	$\rightarrow \eta^{\prime} n$
$\Gamma(4\pi^0)/\Gamma(\pi^0\pi^0\eta$	)					Γ <sub>27</sub> /Γ <sub>4</sub>
VALUE (units $10^{-4}$ )	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
• • • We do not use	the followin	g data for average	s, fits,	limits, e	etc. ● ● ●	
<23	90	ALDE	<b>87</b> B	GAM2	$38 \ \pi^- p \rightarrow$	n $8\gamma$
$\Gamma(e^+e^-)/\Gamma_{total}$			_			Г <sub>28</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID	<u> </u>	<u>ECN</u> <u>C</u>	<u>OMMENT</u>	
< 5.0 × 10 - • • • We do not use	90 the followin	<sup>+</sup> ACHASOV g data for average	15 S s. fits.	ND 0 limits. e	.958 e ' e - etc. ● ● ●	$\rightarrow \pi \pi \eta$
$< 12 \times 10^{-9}$	90	2 AKHMETSHIN 1	15 C	MD3_0	958 e <sup>+</sup> e <sup>-</sup>	$\rightarrow \pi^+\pi^-n$
$< 2.1 \times 10^{-7}$	90	VOROBYEV 8	38 N	ID e	$^+e^- \rightarrow \pi^+$	$\pi^-\eta$
$^1$ Combining data c	of ACHASOV	15 and AKHMETS	SHIN 1	5 and us	ing $\Gamma(\eta')=0$	$0.198 \pm 0.009$
MeV. <sup>2</sup> Using Γ=	- 198 + 9 ke	$V B(n'(958) \rightarrow c$	<sub>π</sub> + <sub>π</sub> -	(n) = (4)	29 + 07%	and $R(n \rightarrow$
$\gamma \gamma \gamma = (39.41 \pm 10^{-1})$	0.20)%.	v, D(// (300) / /		() = ()	2.5 ± 0.1 ) /0,	
$\Gamma(e^+e^-e^+e^-)/l$	- total					Г <sub>29</sub> /Г
VALUE (units $10^{-6}$ )	EVTS	DOCUMENT ID		TECN	COMMENT	
4.5±1.0±0.5	30	<sup>1</sup> ABLIKIM	22E	BES3	$J/\psi \rightarrow \gamma \eta$	/
<sup>1</sup> ABLIKIM 22E re	ports (4.5 $\pm$	$1.0\pm0.5) imes10^{-6}$	<sup>5</sup> from	a meas	urement of [[	$(\eta'(958) \rightarrow$
$e^+e^-e^+e^-)/\Gamma$	total] × [I	${ m B}(J/\psi(1S) ~ ightarrow$	$\gamma \eta'$ (9	58))] a	ssuming B(.	$J/\psi(1S)  ightarrow T$
$\gamma \eta'$ (958)) = (5.2	$25 \pm 0.07)  imes$	10 <sup>-3</sup> .				
$\Gamma(invisible)/\Gamma_{total}$						Г <sub>30</sub> /Г
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID		TECN	COMMENT	
• • • We do not use	the followin	g data for average	s, fits,	limits, e	etc. • • •	
<9.5	90	<sup>1</sup> NAIK	09	CLEO	$J/\psi \rightarrow \gamma \eta$	/
<sup>1</sup> Not independent	of measured	value of $\Gamma_{30}/\Gamma_1$ f	from N	IAIK 09.		

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VALUE (units 10^{-3})CL%DOCUMENT IDTECNCOMMENT• • We do not use the following data for averages, fits, limits, etc. • • •<2.190 <sup>1</sup> NAIK09CLEO $J/\psi \rightarrow \gamma\eta$ <sup>1</sup> NAIK09reports [ $\Gamma(\eta'(958) \rightarrow \text{ invisible})/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)$ ] / [B< 5.4 × 10^{-3} which we multiply by our best value B( $\eta \rightarrow 2\gamma$ ) = 39.36 × <b>CL%</b> DOCUMENT IDTECNCOMMENTVALUE (units 10^{-2})CL%DOCUMENT IDTECNCOMMENT <b>4</b> 90ABLIKIM13BES3 $J/\psi \rightarrow \phi\eta$	$(\eta \rightarrow 2\gamma)$ $(10^{-2}.)$
• • • We do not use the following data for averages, fits, limits, etc. • • <2.1 90 <sup>1</sup> NAIK 09 CLEO $J/\psi \rightarrow \gamma\eta$ <sup>1</sup> NAIK 09 reports [ $\Gamma(\eta'(958) \rightarrow \text{ invisible})/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)$ ] / [B < 5.4 × 10 <sup>-3</sup> which we multiply by our best value B( $\eta \rightarrow 2\gamma$ ) = 39.36 × <b><math>\Gamma(\text{invisible})/\Gamma(\gamma\gamma)</math></b> <u>VALUE (units 10<sup>-2</sup>)</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>4</b> ABLIKIM 13 <u>BES3</u> $J/\psi \rightarrow \phi\eta$	$(\eta \rightarrow 2\gamma)]$ $(10^{-2}.$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$(\eta \rightarrow 2\gamma)]$ $(10^{-2}.$
<sup>1</sup> NAIK 09 reports $[\Gamma(\eta'(958) \rightarrow \text{ invisible})/\Gamma(\eta'(958) \rightarrow \pi^+\pi^-\eta)] / [B < 5.4 \times 10^{-3}$ which we multiply by our best value $B(\eta \rightarrow 2\gamma) = 39.36 \times \Gamma(\text{invisible})/\Gamma(\gamma\gamma)$ <u>VALUE (units 10<sup>-2</sup>)</u> <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> <b>4.1 4.1 4.1 5.1 4.1 5.1</b>	$S(\eta \rightarrow 2\gamma)] \approx 10^{-2}.$
$\Gamma(\text{invisible})/\Gamma(\gamma \gamma)$ VALUE (units 10^{-2})CL%Q0ABLIKIM13BES3 $J/\psi \rightarrow \phi \eta$	
VALUE (units $10^{-2}$ )CL%DOCUMENT IDTECNCOMMENT <b>&lt;2.4</b> 90ABLIKIM13BES3 $J/\psi \to \phi \eta$	Г <sub>30</sub> /Г <sub>7</sub>
<b>&lt;2.4</b> 90 ABLIKIM 13 BES3 $J/\psi \rightarrow \phi \eta$	
	1
ullet $ullet$ We do not use the following data for averages, fits, limits, etc. $ullet$ $ullet$	
$<$ 6.69 90 ABLIKIM 06Q BES $J/\psi  ightarrow \phi \eta$	/
$\Gamma(\pi^+\pi^-)/\Gamma_{total}$	Г <sub>31</sub> /Г
VALUE (units 10 <sup>-4</sup> )     CL%     DOCUMENT ID     TECN     COMMENT	
< 0.18 90 <sup>1</sup> AAIJ 17D LHCB $D^+_{(s)} \rightarrow \pi^-$	$+\pi^{-}\pi^{+}$
• • • We do not use the following data for averages, fits, limits, etc. • •	
$<$ 0.5 90 $^2$ ABLIKIM 11G BES3 $J/\psi  ightarrow \gamma\pi$	$+\pi^{-}$
< 29 90 <sup>3</sup> MORI 07A BELL $\gamma \gamma \rightarrow \pi^+ \gamma$	π
< 3.3 90 <sup>4</sup> MORI 07A BELL $\gamma \gamma \rightarrow \pi^+ \gamma$	π
$<$ 800 95 DANBURG 73 HBC 2.2 $K^- p \rightarrow$	$\rightarrow \Lambda X^0$
<200 90 RITTENBERG 69 HBC 1.7–2.7 K <sup>-</sup>	р
<sup>1</sup> Using branching fractions of $D^+_{(s)}$ decays from PDG 15.	
<sup>2</sup> ABLIKIM 11G reports $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^-)/\Gamma_{total}] \times [B(J/\psi(15) \rightarrow \gamma 2.84 \times 10^{-7} \text{ which we divide by our best value } B(J/\psi(15) \rightarrow \gamma \eta'(958)) = 5$ <sup>3</sup> Taking into account interference with the $\gamma \gamma \rightarrow \pi^+\pi^-$ continuum. <sup>4</sup> Without interference with the $\gamma \gamma \rightarrow \pi^+\pi^-$ continuum.	$(\eta'(958))] < 5.25 \times 10^{-3}$
$\Gamma(\pi^{0}\pi^{0})/\Gamma_{\text{total}}$	Г <sub>32</sub> /Г
VALUE <u>CL%</u> <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u>	0 0
$<4 \times 10^{-4} \qquad 90 \qquad ^{1} \text{ ABLIKIM} \qquad 11 \text{G BES3}  J/\psi \to \gamma \pi$	$0_{\pi}0$
<sup>1</sup> ABLIKIM 11G reports $[\Gamma(\eta'(958) \rightarrow \pi^+\pi^-)/\Gamma_{\text{total}}] \times [B(J/\psi(1S) \rightarrow \gamma 2.84 \times 10^{-7} \text{ which we divide by our best value } B(J/\psi(1S) \rightarrow \gamma \eta'(958)) = 5$	$(\eta'(958))] < 5.25  imes 10^{-3}$
$\Gamma(\pi^0\pi^0)/\Gamma(\pi^0\pi^0\eta)$	Г <sub>32</sub> /Г <sub>4</sub>
$\frac{VALUE (units 10^{-4})}{CL\%} \qquad \frac{DOCUMENT ID}{TECN} \qquad \frac{COMMENT}{COMMENT}$	
$\textbf{<45} \qquad 90 \qquad \text{ALDE} \qquad 87\text{B}  \text{GAM2}  38 \ \pi^- p \rightarrow$	$n4\gamma$
$\Gamma(\pi^0 e^+ e^-)/\Gamma_{\text{total}}$	Г <sub>33</sub> /Г
$\frac{VALUE \text{ (units } 10^{-3}\text{)}}{L} CL\% DOCUMENT ID TECN COMMENT$	
< 1.4 90 BRIERE 00 CLEO 10.6 $e^+e^-$	
• • • we do not use the following data for averages, fits, limits, etc. • • •	
<13 90 KITTENBERG 65 HBC $2.7 K^- p$	

$\Gamma(\pi^0 \rho^0) / \Gamma_{\text{total}}$						Г <sub>34</sub> /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<0.04	90	RITTENBERG	65	HBC	2.7 K <sup>-</sup> p	
$\Gamma(\eta e^+ e^-) / \Gamma_{total}$						Г <sub>35</sub> /Г
VALUE (units 10 <sup>-3</sup> )	CL%	DOCUMENT ID		TECN	COMMENT	
< 2.4	90	BRIERE	00	CLEO	$10.6 \ e^+ \ e^-$	
$\bullet$ $\bullet$ $\bullet$ We do not use the	following d	ata for averages	, fits,	limits, e	etc. • • •	
<11	90	RITTENBERG	65	HBC	2.7 K <sup>-</sup> p	
$\Gamma(3\gamma)/\Gamma(\pi^0\pi^0\eta)$						Г <sub>36</sub> /Г <sub>4</sub>
VALUE (units 10 <sup>-4</sup> )	CL%	DOCUMENT ID		TECN	COMMENT	
<4.6	90	ALDE	<b>87</b> B	GAM2	38 $\pi^- p \rightarrow$	$n 3\gamma$
$\Gamma(\mu^+\mu^-\pi^0)/\Gamma_{\rm total}$						Г <sub>37</sub> /Г
VALUE (units $10^{-5}$ )	CL%	DOCUMENT ID		TECN	COMMENT	,
<6.0	90	DZHELYADIN	81	CNTR	$30 \pi^- p \rightarrow$	$\eta'$ n
$\Gamma(\mu^+\mu^-\eta)/\Gamma_{ m total}$						Г <sub>38</sub> /Г
VALUE (units 10 <sup>-5</sup> )	CL%	DOCUMENT ID		TECN	COMMENT	
<1.5	90	DZHELYADIN	81	CNTR	30 $\pi^- p \rightarrow$	$\eta'$ n
$\Gamma(e\mu)/\Gamma_{total}$						Г <sub>39</sub> /Г
VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID		TECN	COMMENT	
<4.7	90	BRIERE	00	CLEO	$10.6 \ e^+ \ e^-$	

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

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

X and Y are Dalitz variables;  $\alpha$  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  $\eta'(958) \rightarrow \eta \pi^+ \pi^-$  and  $\eta'(958) \rightarrow \eta \pi^0 \pi^0$  decays. Because of different initial assumptions and strong correlations of the parameters we do not average the parameters in the section below.

### $Re(\alpha)$ decay parameter

VALUE	EVTS	<u>DOCUMENT ID</u>		TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the	e followin	g data for average	es, fits,	limits, e	etc. • • •
$-0.034\!\pm\!0.002\!\pm\!0.002$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$-0.054\!\pm\!0.004\!\pm\!0.001$	56k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.033\!\pm\!0.005\!\pm\!0.003$	44k	<sup>1</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$-0.072\!\pm\!0.012\!\pm\!0.006$	7k	<sup>2</sup> AMELIN	05A	VES	28 $\pi^- A \rightarrow$
$-0.021 \pm 0.018 \pm 0.017$	6.7k	<sup>3</sup> BRIERE	00	CLEO	$\eta \pi^+ \pi^- \pi^- A^*$ 10.6 $e^+ e^- \rightarrow \eta \pi^+ \pi^- X$

<sup>4</sup> ALDE 86 GAM2 38  $\pi^- p \rightarrow n \eta \pi^0 \pi^0$  $-0.058 \pm 0.013 \pm 0.003$  5.4k <sup>4,5</sup> KALBFLEISCH 74 RVUE  $\eta' \rightarrow \eta \pi^+ \pi^ -0.08 \pm 0.03$ 

 ${}^{1}$ See ABLIKIM 11 for the full correlation matrix.  ${}^{2}$ Superseded by DOROFEEV 07, which found this parameterization unacceptable. See <sup>3</sup>Assuming Im( $\alpha$ ) = 0, C = 0, and D = 0.

<sup>4</sup>Assuming C = 0.

<sup>5</sup> From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JA-COBS 73, and DANBURG 73.

### $Im(\alpha)$ decay parameter

VALUE	<u>EVTS</u>	<u>DOCUMENT ID</u>		TECN	COMMENT
$\bullet \bullet \bullet$ We do not use th	e followi	ng data for averages	, fits,	limits, e	etc. ● ● ●
$0.000\!\pm\!0.019\!\pm\!0.001$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$0.000\!\pm\!0.038\!\pm\!0.002$	56k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^0 \pi^0$
$0.000\!\pm\!0.049\!\pm\!0.001$	44k	<sup>1</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$0.0 \pm 0.1 \pm 0.0$	7k	<sup>2</sup> AMELIN	05A	VES	$28 \pi^{-} A \rightarrow$
		_			$\eta \pi^+ \pi^- \pi^- A^*$
$-0.00 \pm 0.13 \pm 0.00$	5.4k	<sup>3</sup> ALDE	86	GAM2	$38 \pi^- p \rightarrow n\eta \pi^0 \pi^0$
0.0 ±0.3		<sup>3,4</sup> KALBFLEISCH	74	RVUE	$\eta' \rightarrow \eta \pi^+ \pi^-$
$0.0 \pm 0.3$		<sup>3,4</sup> KALBFLEISCH	74	RVUE	$\eta' \rightarrow \eta \pi^+ \pi^-$

 $^1_2$  See ABLIKIM 11 for the full correlation matrix.  $^2_2$  Superseded by DOROFEEV 07, which found this parameterization unacceptable. See <sup>3</sup> Assuming C = 0.

<sup>4</sup> From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JA-COBS 73. and DANBURG 73.

### C decay parameter

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

 $^1_2 See \ ABLIKIM \ 11$  for the full correlation matrix.  $^2_2 Superseded \ by \ DOROFEEV \ 07, \ which \ found \ this \ parameterization \ unacceptable. See$ below.

#### D decay parameter

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the	e followi	ng data for averages	, fits,	limits, e	etc. • • •
$-0.053 \pm 0.004 \pm 0.004$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$-0.061 \pm 0.009 \pm 0.005$	56k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.059 \pm 0.012 \pm 0.004$	44k	<sup>1</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$-0.066 \pm 0.030 \pm 0.015$	7k	<sup>2</sup> AMELIN	05A	VES	$28 \pi^{-} A \rightarrow$
					$\eta \pi^+ \pi^- \pi^- A^*$
$0.00 \ \pm 0.03 \ \pm 0.00$	5.4k	<sup>3</sup> ALDE	86	GAM2	$38 \pi^- p \rightarrow n\eta \pi^0 \pi^0$
0		<sup>3,4</sup> KALBFLEISCH	l 74	RVUE	$\eta' \rightarrow \eta \pi^+ \pi^-$
<sup>1</sup> See ABLIKIM 11 for <sup>2</sup> Superseded by DOR	the full OFEEV	correlation matrix. 07, which found th	is par	ameteriz	zation unacceptable. See

<sup>3</sup> Assuming C = 0.

 $^{4}$  From the data of DAUBER 64, RITTENBERG 69, AGUILAR-BENITEZ 72B, JA-COBS 73, and DANBURG 73.

## $\eta'(958) \rightarrow \eta \pi \pi$ DECAY PARAMETERS

# $|MATRIX ELEMENT|^2 \propto 1 + a Y + b Y^2 + c X + d X^2$

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

#### a decay parameter

VALUE	EVIS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the	e follow	ing data for averages	s, fits,	limits, e	tc. ● ● ●
$-0.056\!\pm\!0.004\!\pm\!0.002$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$-0.087\!\pm\!0.009\!\pm\!0.006$	56k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.074\!\pm\!0.008\!\pm\!0.006$	124k	ADLARSON	18A	A2MM	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.072\!\pm\!0.007\!\pm\!0.008$		<sup>1</sup> GONZALEZ-S.	.18A	RVUE	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.047\!\pm\!0.011\!\pm\!0.003$	44k	<sup>2</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$-0.066 \!\pm\! 0.016 \!\pm\! 0.003$	15k	<sup>3</sup> BLIK	09	GAM4	32.5 $\pi^- p \rightarrow \eta' n$
$-0.127\!\pm\!0.016\!\pm\!0.008$	20k	<sup>4</sup> DOROFEEV	07	VES	27 $\pi^- p \rightarrow \eta' n$ ,
					$\pi^- A \rightarrow \eta' \pi^- A^*$

<sup>1</sup>Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop.

<sup>2</sup> See ABLIKIM 11 for the full correlation matrix. <sup>3</sup> From  $\eta' \rightarrow \eta \pi^0 \pi^0$  decay.

<sup>4</sup> From  $\eta' \rightarrow \eta \pi^+ \pi^-$  decay.

### b decay parameter

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

<sup>1</sup> Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop.

<sup>2</sup>See ABLIKIM 11 for the full correlation matrix. <sup>3</sup>From  $\eta' \rightarrow \eta \pi^0 \pi^0$  decay.

## <sup>4</sup> From $\eta' \rightarrow \eta \pi^+ \pi^-$ decay.

### c decay parameter

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the fo	llowing	data for averages,	fits, l	imits, etc	2. ● ● ●
$0.0027 \!\pm\! 0.0024 \!\pm\! 0.0018$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$0.019\ \pm 0.011\ \pm 0.003$	44k	<sup>1</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$-0.107 \ \pm 0.096 \ \pm 0.003$	15k	<sup>2</sup> BLIK	09	GAM4	32.5 $\pi^- p \rightarrow \eta' n$

<sup>3</sup> DOROFEEV  $\begin{array}{rcl} 27 \ \pi^{-} p \rightarrow & \eta' n, \\ \pi^{-} A \rightarrow & \eta' \pi^{-} A^{*} \end{array}$ 07 VES  $0.015 \ \pm 0.011 \ \pm 0.014$ 20k

 $\begin{array}{l} {}^1 \, {\rm See} \, \, {\rm ABLIKIM} \, \, 11 \, \, {\rm for} \, \, {\rm the} \, \, {\rm full} \, \, {\rm correlation} \, \, {\rm matrix.} \\ {}^2 \, {\rm From} \, \, \eta' \, \rightarrow \, \, \eta \, \pi^0 \, \pi^0 \, \, {\rm decay.} \\ {}^3 \, {\rm From} \, \, \eta' \, \rightarrow \, \, \eta \, \pi^+ \, \pi^- \, \, {\rm decay.} \end{array}$ 

### d decay parameter

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$\bullet$ $\bullet$ $\bullet$ We do not use th	e followii	ng data for averages	, fits,	limits, et	tc. ● ● ●
$-0.063\!\pm\!0.004\!\pm\!0.003$	351k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^+ \pi^-$
$-0.074\!\pm\!0.009\!\pm\!0.004$	56k	ABLIKIM	18	BES3	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.050\!\pm\!0.009\!\pm\!0.005$	124k	ADLARSON	18A	A2MM	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.051\!\pm\!0.008\!\pm\!0.006$		<sup>1</sup> GONZALEZ-S.	.18A	RVUE	$\eta' \rightarrow \eta \pi^0 \pi^0$
$-0.073\!\pm\!0.012\!\pm\!0.003$	44k	<sup>2</sup> ABLIKIM	11	BES3	$J/\psi \rightarrow \gamma \eta \pi^+ \pi^-$
$0.018\!\pm\!0.078\!\pm\!0.006$	15k	<sup>3</sup> BLIK	09	GAM4	32.5 $\pi^- p \rightarrow \eta' n$
$-0.082\!\pm\!0.017\!\pm\!0.008$	20k	<sup>4</sup> DOROFEEV	07	VES	27 $\pi^- p \rightarrow \eta' n$ ,
					$\pi^- A \rightarrow \eta' \pi^- A^*$
1					

<sup>1</sup> Theoretical analysis of ADLARSON 18A using resonance chiral perturbation theory to one loop.

<sup>2</sup>See ABLIKIM 11 for the full correlation matrix. <sup>3</sup>From  $\eta' \rightarrow \eta \pi^0 \pi^0$  decay. If  $c \equiv 0$  from Bose-Einstein symmetry,  $d = -0.067 \pm$  $0.020 \pm 0.003.$ 

<sup>4</sup> From  $\eta' \rightarrow \eta \pi^+ \pi^-$  decay.

## $\eta'(958) \beta$ PARAMETER $|MATRIX ELEMENT|^2 = (1 + 2\beta Z)$

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

### $\beta$ decay parameter

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
$-0.61 \pm 0.08$ OUR AV	/ERAGE	Error includes sc	ale fact	or of 1.2	2.
$-0.640\!\pm\!0.046\!\pm\!0.047$	1.8k	ABLIKIM	15G	BES3	$J/\psi \rightarrow \gamma (\pi^0 \pi^0 \pi^0)$
$-0.59 \pm 0.18$	235	BLIK	08	GAMS	32 $\pi^- p \rightarrow \eta' n$
$-0.1 \pm 0.3$		ALDE	<b>87</b> B	GAM2	$38 \pi^- p \rightarrow n 3 \pi^0$

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

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

DECAY ASYMMETRY PARAMETER FOR $\pi^+\pi^-\gamma$									
VALUE	EVTS	DOCUMENT ID		TECN	COMMENT				
$-0.03 \pm 0.04$ C	OUR AVERAGE								
$-0.019\!\pm\!0.056$		AIHARA	87	TPC	$2\gamma \rightarrow \pi^+ \pi^- \gamma$				
$-0.069\!\pm\!0.078$	295	GRIGORIAN	75	STRC	2.1 $\pi^{-}p$				
$0.00\ \pm 0.10$	103	KALBFLEISCH	H 75	HBC	2.18 $K^- p \rightarrow \Lambda \pi^+ \pi^- \gamma$				
• • • We do not	use the follow	ng data for aver	ages,	fits, limi	ts, etc. ● ● ●				
$0.07 \ \pm 0.08$	152	RITTENBERG	G 65	HBC	2.1–2.7 K <sup>-</sup> p				

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

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

VALUE (GeV $^{-2}$ )	EVTS	DOCUMENT ID		TECN	COMMENT
$1.62\pm0.17$ OUR AVERA	GE				
$1.60\!\pm\!0.17\!\pm\!0.08$	864	<sup>1</sup> ABLIKIM	150 l	BES3	$J/\psi \rightarrow \gamma e^+ e^-$
$1.7 \pm 0.4$	33	<sup>1</sup> VIKTOROV	80		25,33 $\pi^- p \rightarrow 2\mu\gamma$

<sup>1</sup> In the single-pole Ansatz where slope =  $1/(\Lambda^2 + \gamma^2)$  with  $\Lambda$ ,  $\gamma$  being a Breit-Wigner mass, width for the effective contributing vector meson.

## $\eta'(958)$ REFERENCES

ABLIKIM	22E	PR D105 112010	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	211	PR D103 072006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	21J	PR D103 092005	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	20E	PR D101 032001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19AW	PR D100 052015	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	19T	PRL 122 142002	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	18	PR D97 012003	M Ablikim <i>et al</i>	(BESIII Collab.)
ABLIKIM	180	PRI 120 242003	M Ablikim <i>et al</i>	(BESIII Collab.)
ADLARSON	18A	PR D98 012001	P Adlarson <i>et al</i>	(A2 Collab at MAMI)
GONZALEZ-S	184	FP1 C78 758	S Gonzalez-Solis E Passemar	(RELL IND+)
	17D	PI B764 233	R Apii et al	(1  HCb,  Collab)
	17	PRI 118 012001	M Ablikim et $2l$	(BESIII Collab.)
	17T	PR D06 012001	M Ablikim et al.	(BESIII Collab.)
	16M	DD D02 072009	M Ablikim at al	(DESITI Collab.)
		PR D93 072000	M Ablikim et al.	(BESIII Collab.)
	15AD	PR D92 031101	M Ablikim at al	(BESIII Collab.)
	150	PR D92 012014	M Ablikim at al	(BESIII Collab.)
	150	PR D92 012001	IVI. ADIIKIM <i>et al.</i>	
	15P	PR D92 012007	IVI. ADIIKIM <i>et al.</i>	(BESIII Collab.)
ACHASOV	15	PR D91 092010	MI.N. Achasov <i>et al.</i>	(SND Collab.)
AKHMEISHIN	15	PL B/40 2/3	R.R. Akhmetshin <i>et al.</i>	(CMD-3 Collab.)
PDG	15	RPP 2015 at pdg.lbl.g	çov	(PDG Collab.)
ABLIKIM	14M	PRL 112 251801	M. Ablikim <i>et al.</i>	(BESIII Collab.)
DONSKOV	14	MPL A29 1450213	S. Donskov <i>et al.</i>	(GAMS-4 $\pi$ Collab.)
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
ABLIKIM	13	PR D87 012009	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13G	PR D87 032006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	130	PR D87 092011	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	13U	PR D88 091502	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	12E	PRL 108 182001	M. Ablikim <i>et al.</i>	(BESIII Collab.)
PDG	12	PR D86 010001	J. Beringer <i>et al.</i>	(PDG Collab.)
ABLIKIM	11	PR D83 012003	M. Ablikim <i>et al.</i>	(BESIII Collab.)
ABLIKIM	11G	PR D84 032006	M. Ablikim <i>et al.</i>	(BESIII Collab.)
CZERWINSKI	10	PRL 105 122001	E. Czerwinski <i>et al.</i>	(COSY-11 Collab.)
BLIK	09	PAN 72 231	A.M. Blik <i>et al.</i>	(IHEP (Protvino))
		Translated from YAF 7	2 258.	
NAIK	09	PRL 102 061801	P. Naik <i>et al.</i>	(CLEO Collab.)
PEDLAR	09	PR D79 111101	T.K. Pedlar <i>et al.</i>	(CLEO Collab.)
BLIK	08	PAN 71 2124	A. Blik <i>et al.</i>	(GAMS-4 $\pi$ Collab.)
		Translated from YAF 7	'1 2161.	
LIBBY	08	PRL 101 182002	J. Libby <i>et al.</i>	(CLEO Collab.)
WICHT	08	PL B662 323	J. Wicht <i>et al.</i>	(BELLE Collab.)
DOROFEEV	07	PL B651 22	V. Dorofeev <i>et al.</i>	(VES Collab.)
MORI	07A	JPSJ 76 074102	T. Mori <i>et al.</i>	(BELLE Collab.)
ABLIKIM	06E	PR D73 052008	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06Q	PRL 97 202002	M. Ablikim <i>et al.</i>	(BES Collab.)
AMELIN	05A	PAN 68 372	D.V. Amelin <i>et al.</i>	(VES Collab.)
		Translated from YAF 6	68 401.	
AMSLER	04B	EPJ C33 23	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
BAI	04J	PL B594 47	J.Z. Bai <i>et al.</i>	(BES Collab.)
BRIERE	00	PRL 84 26	R. Briere <i>et al.</i>	(CLEO Collab.)
ACCIARRI	98Q	PL B418 399	M. Acciarri <i>et al.</i>	(L3 Collab.)
BARBERIS	98C	PL B440 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)
WURZINGER	96	PL B374 283	R. Wurzinger et al.	(BONN, ORSAY, SACL+)
PDG	94	PR D50 1173	L. Montanet <i>et al.</i>	(CERN, LBL, BOST+)

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AMSLER BELADIDZE	93 92C	ZPHY C58 175 SJNP 55 1535	C. Amsler <i>et al.</i> G.M. Beladidze, S.I. Bityukov	(Crystal Barrel Collab.) , G.V. Borisov (SERP+)	
		Translated from YAF 55 2	2748.		
KARCH	92	ZPHY C54 33	K. Karch <i>et al.</i>	(Crystal Ball Collab.)	
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)	
BEHREND	91	ZPHY C49 401	H.J. Behrend <i>et al.</i>	(CELLO Collab.)	
AUGUSTIN	90	PR D42 10	J.E. Augustin <i>et al.</i>	(DM2 Collab.)	
BARU	90	ZPHY C48 581	S.E. Baru <i>et al.</i>	(MD-1 Collab.)	
BUILER	90	PR D42 1368	F. Butler <i>et al.</i>	(Mark II Collab.)	
KARCH	90	PL B249 353	K. Karch <i>et al.</i>	(Crystal Ball Collab.)	
ROE	90	PR D41 17	N.A. Roe <i>et al.</i>	(ASP Collab.)	
AIHARA	88C	PR D38 1	H. Aihara <i>et al.</i>	$(1PC-2\gamma \text{ Collab.})$	
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev <i>et al.</i>	(NOVO)	
	00	DD D29 1265	130.	(Crucital Ball Callab)	
	00 07	PR D30 1303	U.A. Williams et al.	(Crystal Ball Collab.)	п
	07 07 D	PR D35 2050 DL D100 457	H. Albrecht et el	(APCUS Collab.)	JP
	01 D 07 D	7DUV C26 602	$ \begin{array}{c} \square & \text{Aldrecht } et al. \\ \square & \text{Aldrecht } et al. \\ \end{array} $		
ALUL	070		D. Antropy on at al	(Gruetal Ball Callab.)	
	07	PR D30 2033	C. Cidal at al		
	01	PRL 39 2012 DI D177 115	G. Giual et al. $(9)$	(LDL, JLAC, HARV)	
	00 05 E	PL DI// 113 DI 160P 421	D.W. Alde et al. $(3)$	(IADE Callab)	
	00L	PL 1000 421 DDDI 100 201	VV. Darter et al.	(JADE COND.)	
	0J 0/E	DI 147D 497	M Althoff of al	(JLRF)	
	04L 04D	PL 147D 407 DL 142D 125	C Porgor	(TASSO Collab.)	
	04D 04	PL 142B 123	E C Pinon et al		
	04	PD D27 1021	P. Jonni et al.	(SLKF, BLLG, LAFF+)	
	00	DI 112D 100	W Partal at al	(JADE Callab.)	
BEHREND	82C	DI 11/12 379	H   Bohrond of al	(CELLO Collab.)	
Also	02C	PL 114D 570 PL 125B 518 (orratum)	H L Bohrond of al	(CELLO Collab.)	
	Q1	PL 105B 230	RI Dzholvadin ot al	(CEEEO CONAD.)	
STANTON	80	PL B02 353	N.R. Stanton <i>et al.</i>	(OSU CARI MCGL)	
VIKTOROV	80	SINP 32 520	V A Viktorov et al	(USU, CARE, MEGI+)	
	00	Translated from YAF 32	1005	(SERT)	
APEL	79	PL 83B 131	W.D. Apel. K.H. Augenstein.	E. Bertolucci (KARLK+)	
BINNIE	79	PL 83B 141	D.M. Binnie <i>et al.</i>	(LOIC)	
ZANFINO	77	PRL 38 930	C. Zanfino <i>et al.</i>	(CARL. MCGI. OHIO+)	
GRIGORIAN	75	NP B91 232	A. Grigorian <i>et al.</i>	(+)	
KALBFLEISCH	75	PR D11 987	G.R. Kalbfleisch, R.C. Strand	, J.W. Chapman $(BNL+)$	
DUANE	74	PRL 32 425	A. Duane <i>et al.</i>	(LOIC, SHMP)	
KALBFLEISCH	74	PR D10 916	G.R. Kalbfleisch	) (BNL)	
DANBURG	73	PR D8 3744	J.S. Danburg <i>et al.</i>	(BNL, MICH).	JP
JACOBS	73	PR D8 18	S.M. Jacobs et al.	(BRAN, UMD, SYRA+).	JP
AGUILAR	72B	PR D6 29	M. Aguilar-Benitez <i>et al.</i>	(BNL)	
APEL	72	PL 40B 680	W.D. Apel <i>et al.</i>	(KARLK, KARLE, PISA)	
DALPIAZ	72	PL 42B 377	P.F. Dalpiaz <i>et al.</i>	(CERN)	
BASILE	71	NC 3A 371	M. Basile <i>et al.</i>	(CERN, BGNA, STRB)	
HARVEY	71	PRL 27 885	E.H. Harvey <i>et al.</i>	(MINN, MICH)	
BENSINGER	70	PL 33B 505	J.R. Bensinger et al.	(WISC)	
RITTENBERG	69	Thesis UCRL 18863	A. Rittenberg	(LRL) I	
DAVIS	68	PL 27B 532	R. Davis et al.	(NWES, ANL)	
LONDON	66	PR 143 1034	G.W. London <i>et al.</i>	(BNL, SYRA) I	IJР
BADIER	65B	PL 17 337	J. Badier <i>et al.</i>	(EPOL, SACL, AMST)	
RITTENBERG	65	PRL 15 556	A. Rittenberg, G.R. Kalbfleisc	ch (LRL, BNL)	
DAUBER	64	PRL 13 449	P.M. Dauber <i>et al.</i>	(UCLA)	JP
KALBFLEISCH	64B	PRL 13 349	G.R. Kalbfleisch, O.I. Dahl, A	A. Rittenberg (LRL) .	JP