

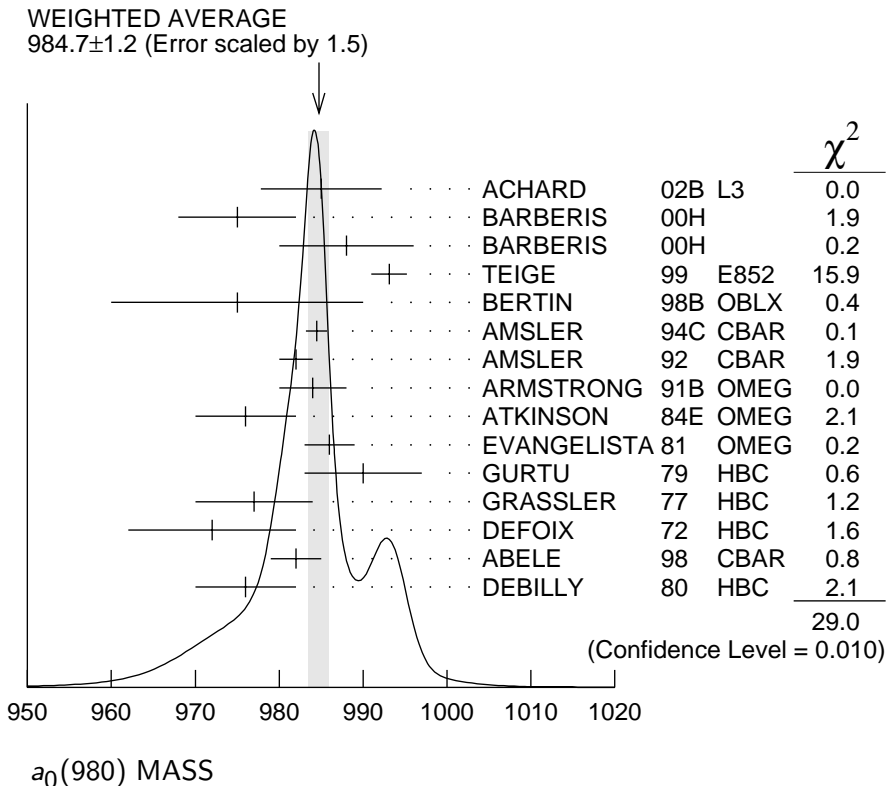
a₀(980)

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

See our minireview on scalar mesons under f₀(600). (See the index for the page number.)

a₀(980) MASS

VALUE (MeV) DOCUMENT ID
984.7 ± 1.2 OUR AVERAGE Includes data from the 2 datablocks that follow this one. Error includes scale factor of 1.5. See the ideogram below.



ηπ FINAL STATE ONLY

VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT
 The data in this block is included in the average printed for a previous datablock.

985.1 ± 1.3 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

985 ± 4 ± 6	318	ACHARD	02B L3		183–209 e ⁺ e ⁻ → e ⁺ e ⁻ ηπ ⁺ π ⁻
975 ± 7		BARBERIS	00H		450 pp → p _f ηπ ⁰ p _s
988 ± 8		BARBERIS	00H		450 pp → Δ _f ⁺⁺ ηπ ⁻ p _s
993.1 ± 2.1		¹ TEIGE	99 E852		18.3 π ⁻ p → ηπ ⁺ π ⁻ n

975	± 15		BERTIN	98B OBLX	$0.0 \bar{p} p \rightarrow K^{\pm} K_S^{\mp} \pi^{\mp}$
984.45	$\pm 1.23 \pm 0.34$		AMSLER	94C CBAR	$0.0 \bar{p} p \rightarrow \omega \eta \pi^0$
982	± 2		² AMSLER	92 CBAR	$0.0 \bar{p} p \rightarrow \eta \eta \pi^0$
984	± 4	1040	² ARMSTRONG	91B OMEG \pm	$300 p p \rightarrow p p \eta \pi^+ \pi^-$
976	± 6		ATKINSON	84E OMEG \pm	$25-55 \gamma p \rightarrow \eta \pi n$
986	± 3	500	³ EVANGELISTA	81 OMEG \pm	$12 \pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$
990	± 7	145	³ GURTU	79 HBC \pm	$4.2 K^- p \rightarrow \Lambda \eta 2\pi$
977	± 7		GRASSLER	77 HBC $-$	$16 \pi^{\mp} p \rightarrow p \eta 3\pi$
972	± 10	150	DEFOIX	72 HBC \pm	$0.7 \bar{p} p \rightarrow 7\pi$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
995	$+52$ -10	36	⁴ ACHASOV	00F SND	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
994	$+33$ -8	36	⁵ ACHASOV	00F SND	$e^+ e^- \rightarrow \eta \pi^0 \gamma$
~ 1055			⁶ OLLER	99 RVUE	$\eta \pi, K \bar{K}$
~ 1009.2			⁶ OLLER	99B RVUE	$\pi \pi \rightarrow \pi \pi, K \bar{K}$
988	± 6		⁶ ANISOVICH	98B RVUE	Compilation
987			TORNQVIST	96 RVUE	$\pi \pi \rightarrow \pi \pi, K \bar{K}, K \pi, \eta \pi$
991			JANSSEN	95 RVUE	$\eta \pi \rightarrow \eta \pi, K \bar{K}, K \pi, \eta \pi$
980	± 11	47	CONFORTO	78 OSPK $-$	$4.5 \pi^- p \rightarrow p X^-$
978	± 16	50	CORDEN	78 OMEG \pm	$12-15 \pi^- p \rightarrow n \eta 2\pi$
989	± 4	70	WELLS	75 HBC $-$	$3.1-6 K^- p \rightarrow \Lambda \eta 2\pi$
970	± 15	20	BARNES	69C HBC $-$	$4-5 K^- p \rightarrow \Lambda \eta 2\pi$
980	± 10		CAMPBELL	69 DBC \pm	$2.7 \pi^+ d$
980	± 10	15	MILLER	69B HBC $-$	$4.5 K^- N \rightarrow \eta \pi \Lambda$
980	± 10	30	AMMAR	68 HBC \pm	$5.5 K^- p \rightarrow \Lambda \eta 2\pi$

¹ Breit-Wigner fit, average between a_0^{\pm} and a_0^0 . The fit favors a slightly heavier a_0^{\pm} .

² From a single Breit-Wigner fit.

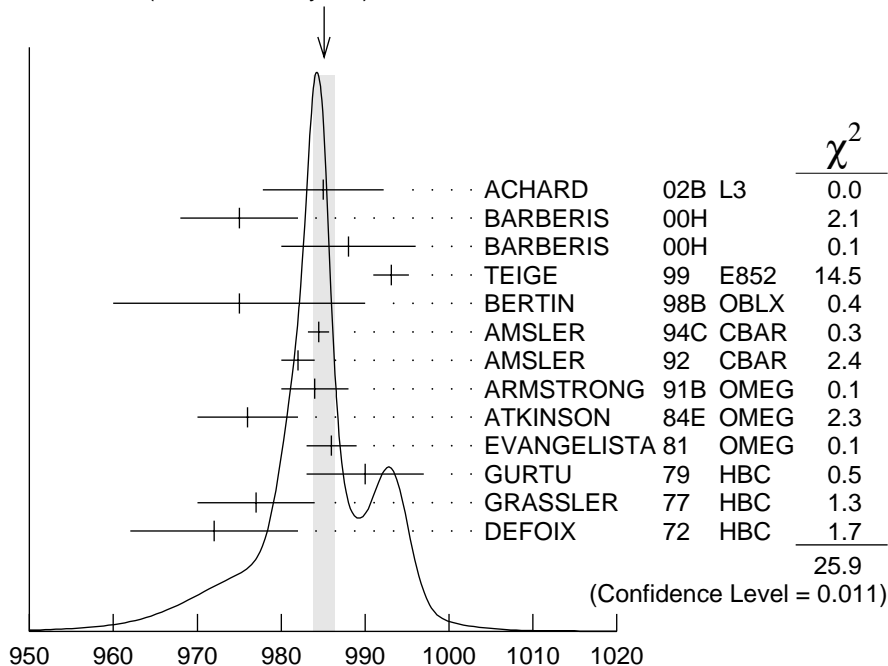
³ From $f_1(1285)$ decay.

⁴ Supersedes ACHASOV 98B. Using the model of ACHASOV 89.

⁵ Supersedes ACHASOV 98B. Using the model of JAFFE 77.

⁶ T-matrix pole.

WEIGHTED AVERAGE
 985.1 ± 1.3 (Error scaled by 1.5)



$\eta\pi$ FINAL STATE ONLY

$K\bar{K}$ ONLY

VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT

The data in this block is included in the average printed for a previous datablock.

980.8 ± 2.7 OUR AVERAGE

982 ± 3		⁷ ABELE	98 CBAR		0.0 $\bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
976 ± 6	316	DEBILLY	80 HBC ±		1.2-2 $\bar{p}p \rightarrow f_1(1285)\omega$

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

~ 1053		⁸ OLLER	99C RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
1016 ± 10	100	⁹ ASTIER	67 HBC ±		0.0 $\bar{p}p$
1003.3 ± 7.0	143	¹⁰ ROSENFELD	65 RVUE ±		

⁷ T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV.

⁸ T-matrix pole.

⁹ ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65.

¹⁰ Plus systematic errors.

$a_0(980)$ WIDTH

VALUE (MeV) EVTS DOCUMENT ID TECN CHG COMMENT

50 to 100 OUR ESTIMATE Width determination very model dependent. Peak width in $\eta\pi$ is about 60 MeV, but decay width can be much larger.

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

50	± 13	± 4	318	ACHARD	02B L3	183–209 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
72	± 16			BARBERIS	00H	450 $pp \rightarrow p_f\eta\pi^0 p_s$
61	± 19			BARBERIS	00H	450 $pp \rightarrow \Delta_f^{++}\eta\pi^- p_s$
~ 42				¹¹ OLLER	99 RVUE	$\eta\pi, K\bar{K}$
~ 112				¹¹ OLLER	99B RVUE	$\pi\pi \rightarrow \eta\pi, K\bar{K}$
71	± 7			TEIGE	99 E852	18.3 $\pi^- p \rightarrow \eta\pi^+\pi^- n$
92	± 20			¹¹ ANISOVICH	98B RVUE	Compilation
65	± 10			BERTIN	98B OBLX	0.0 $\bar{p}p \rightarrow K^\pm K_S^0 \pi^\mp$
~ 100				TORNQVIST	96 RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, K\pi, \eta\pi$
202				JANSSEN	95 RVUE	$\eta\pi \rightarrow \eta\pi, K\bar{K}, K\pi, \eta\pi$
54.12 \pm 0.34 \pm 0.12				AMSLER	94C CBAR	0.0 $\bar{p}p \rightarrow \omega\eta\pi^0$
54	± 10			¹² AMSLER	92 CBAR	0.0 $\bar{p}p \rightarrow \eta\eta\pi^0$
95	± 14	1040		¹² ARMSTRONG	91B OMEG \pm	300 $pp \rightarrow p\rho\eta\pi^+\pi^-$
62	± 15	500		¹³ EVANGELISTA	81 OMEG \pm	12 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$
60	± 20	145		¹³ GURTU	79 HBC \pm	4.2 $K^- p \rightarrow \Lambda\eta 2\pi$
60	$\begin{smallmatrix} +50 \\ -30 \end{smallmatrix}$	47		CONFORTO	78 OSPK $-$	4.5 $\pi^- p \rightarrow \rho X^-$
86.0	$\begin{smallmatrix} +60.0 \\ -50.0 \end{smallmatrix}$	50		CORDEN	78 OMEG \pm	12–15 $\pi^- p \rightarrow n\eta 2\pi$
44	± 22			GRASSLER	77 HBC $-$	16 $\pi^\mp p \rightarrow \rho\eta 3\pi$
80	to 300			¹⁴ FLATTE	76 RVUE $-$	4.2 $K^- p \rightarrow \Lambda\eta 2\pi$
16.0	$\begin{smallmatrix} +25.0 \\ -16.0 \end{smallmatrix}$	70		WELLS	75 HBC $-$	3.1–6 $K^- p \rightarrow \Lambda\eta 2\pi$
30	± 5	150		DEFOIX	72 HBC \pm	0.7 $\bar{p}p \rightarrow 7\pi$
40	± 15			CAMPBELL	69 DBC \pm	2.7 $\pi^+ d$
60	± 30	15		MILLER	69B HBC $-$	4.5 $K^- N \rightarrow \eta\pi\Lambda$
80	± 30	30		AMMAR	68 HBC \pm	5.5 $K^- p \rightarrow \Lambda\eta 2\pi$

¹¹ T-matrix pole.

¹² From a single Breit-Wigner fit.

¹³ From $f_1(1285)$ decay.

¹⁴ Using a two-channel resonance parametrization of GAY 76B data.

$K\bar{K}$ ONLY

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
92 \pm 8		¹⁵ ABELE	98 CBAR		0.0 $\bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$

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

~ 24		¹⁶ OLLER	99C RVUE		$\pi\pi \rightarrow \pi\pi, K\bar{K}$
~ 25	100	¹⁷ ASTIER	67 HBC	\pm	
57 \pm 13	143	¹⁸ ROSENFELD	65 RVUE	\pm	

¹⁵ T-matrix pole on sheet II, the pole on sheet III is at 1006-i49 MeV.

¹⁶ T-matrix pole.

¹⁷ ASTIER 67 includes data of BARLOW 67, CONFORTO 67, ARMENTEROS 65.

¹⁸ Plus systematic errors.

$a_0(980)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 $\eta\pi$	dominant
Γ_2 $K\bar{K}$	seen
Γ_3 $\rho\pi$	
Γ_4 $\gamma\gamma$	seen
Γ_5 e^+e^-	

$a_0(980)$ PARTIAL WIDTHS

$\Gamma(\gamma\gamma)$				Γ_4
VALUE (keV)	DOCUMENT ID	TECN		
0.30 ± 0.10	¹⁹ AMSLER	98	RVUE	
¹⁹ Using $\Gamma_{\gamma\gamma} B(a_0(980) \rightarrow \eta\pi) = 0.24 \pm 0.08$ keV.				

$a_0(980)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(\eta\pi) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$					$\Gamma_1\Gamma_4/\Gamma$
VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT	
$0.24^{+0.08}_{-0.07}$ OUR AVERAGE					
$0.28 \pm 0.04 \pm 0.10$	44	OEST	90	JADE	$e^+e^- \rightarrow e^+e^-\pi^0\eta$
$0.19 \pm 0.07^{+0.10}_{-0.07}$		ANTREASYAN 86	CBAL		$e^+e^- \rightarrow e^+e^-\pi^0\eta$
$\Gamma(\eta\pi) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$					$\Gamma_1\Gamma_5/\Gamma$
VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT	
<1.5	90	VOROBYEV	88	ND	$e^+e^- \rightarrow \pi^0\eta$

$a_0(980)$ BRANCHING RATIOS

$\Gamma(K\bar{K})/\Gamma(\eta\pi)$					Γ_2/Γ_1
VALUE	DOCUMENT ID	TECN	CHG	COMMENT	
0.183 ± 0.024 OUR AVERAGE	Error includes scale factor of 1.2.				
0.57 ± 0.16	²⁰ BARGIOTTI	03	OBLX		$\bar{p}p$
0.23 ± 0.05	²¹ ABELE	98	CBAR		$0.0 \bar{p}p \rightarrow K_L^0 K^\pm \pi^\mp$
$0.166 \pm 0.01 \pm 0.02$	²² BARBERIS	98c	OMEG	450	$pp \rightarrow \rho_f f_1(1285) p_S$

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

~ 0.60	OLLER	99B	RVUE	$\pi\pi \rightarrow \eta\pi, K\bar{K}$
1.16 ± 0.18	²³ BUGG	94	RVUE	$\bar{p}p \rightarrow \eta\eta\pi^0$
0.7 ± 0.3	²² CORDEN	78	OMEG	12-15 $\pi^- p \rightarrow$ $n\eta 2\pi$
0.25 ± 0.08	²² DEFOIX	72	HBC ±	0.7 $\bar{p} \rightarrow 7\pi$

$\Gamma(\rho\pi)/\Gamma(\eta\pi)$

$\rho\pi$ forbidden.

Γ_3/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.25	70	AMMAR	70	HBC ±	4.1, 5.5 $K^- p \rightarrow$ $\Lambda\eta 2\pi$
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²⁰ Coupled channel analysis of $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, and $K^\pm K_S^0\pi^\mp$.

²¹ Using $\pi^0\pi^0\eta$ from AMSLER 94D.

²² From the decay of $f_1(1285)$.

²³ BUGG 94 uses AMSLER 94C data. This is a ratio of couplings.

$a_0(980)$ REFERENCES

BARGIOTTI	03	EPJ C26 371	M. Bargiotti <i>et al.</i>	(OBELIX Collab.)
ACHARD	02B	PL B526 269	P. Achard <i>et al.</i>	(L3 Collab.)
ACHASOV	00F	PL B479 53	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
BARBERIS	00H	PL B488 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)
OLLER	99	PR D60 099906 (erratum)	J.A. Oller <i>et al.</i>	
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset	
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset	
TEIGE	99	PR D59 012001	S. Teige <i>et al.</i>	(BNL E852 Collab.)
ABELE	98	PR D57 3860	A. Abele <i>et al.</i>	(Crystal Barrel Collab.)
ACHASOV	98B	PL B438 441	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AMSLER	98	RMP 70 1293	C. Amsler	
ANISOVICH	98B	UFN 41 419	V.V. Anisovich <i>et al.</i>	
BARBERIS	98C	PL B440 225	D. Barberis <i>et al.</i>	(WA 102 Collab.)
BERTIN	98B	PL B434 180	A. Bertin <i>et al.</i>	(OBELIX Collab.)
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)
JANSSEN	95	PR D52 2690	G. Janssen <i>et al.</i>	(STON, ADLD, JULI)
AMSLER	94C	PL B327 425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER	94D	PL B333 277	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
BUGG	94	PR D50 4412	D.V. Bugg <i>et al.</i>	(LOQM)
AMSLER	92	PL B291 347	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ARMSTRONG	91B	ZPHY C52 389	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)
OEST	90	ZPHY C47 343	T. Oest <i>et al.</i>	(JADE Collab.)
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko	
VOROBYEV	88	SJNP 48 273	P.V. Vorobiev <i>et al.</i>	(NOVO)
ANTREASYAN	86	PR D33 1847	D. Antreasyan <i>et al.</i>	(Crystal Ball Collab.)
ATKINSON	84E	PL 138B 459	M. Atkinson <i>et al.</i>	(BONN, CERN, GLAS+)
EVANGELISTA	81	NP B178 197	C. Evangelista <i>et al.</i>	(BARI, BONN, CERN+)
DEBILLY	80	NP B176 1	L. de Billy <i>et al.</i>	(CURIN, LAUS, NEUC+)
GURTU	79	NP B151 181	A. Gurtu <i>et al.</i>	(CERN, ZEEM, NIJM, OXF)
CONFORTO	78	LNC 23 419	B. Conforto <i>et al.</i>	(RHEL, TNTO, CHIC+)
CORDEN	78	NP B144 253	M.J. Corden <i>et al.</i>	(BIRM, RHEL, TELA+)
GRASSLER	77	NP B121 189	H. Grassler <i>et al.</i>	(AACH3, BERL, BONN+)
JAFFE	77	PR D15 267,281	R. Jaffe	(MIT)
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)
GAY	76B	PL 63B 220	J.B. Gay <i>et al.</i>	(CERN, AMST, NIJM) JP
WELLS	75	NP B101 333	J. Wells <i>et al.</i>	(OXF)
DEFOIX	72	NP B44 125	C. Defoix <i>et al.</i>	(CDEF, CERN)
AMMAR	70	PR D2 430	R. Ammar <i>et al.</i>	(KANS, NWES, ANL, WISC)
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CAMPBELL	69	PRL 22 1204	J.H. Campbell <i>et al.</i>	(PURD)
MILLER	69B	PL 29B 255	D.H. Miller <i>et al.</i>	(PURD)
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AMMAR	68	PRL 21 1832	R. Ammar <i>et al.</i>	(NWES, ANL)
ASTIER	67	PL 25B 294	A. Astier <i>et al.</i>	(CDEF, CERN, IRAD)
Includes data of BARLOW 67, CONFORTO 67, and ARMENTEROS 65.				
BARLOW	67	NC 50A 701	J. Barlow <i>et al.</i>	(CERN, CDEF, IRAD, LIPV)
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CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist	
FURMAN	02	PL B538 266	A. Furman, L. Lesniak	
ACHASOV	01F	PR D63 094007	N.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
CLOSE	01	PL B515 13	F.E. Close, A. Kirk	
ANISOVICH	99D	PL B452 180	A.V. Anisovich <i>et al.</i>	
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ACHASOV	98J	SPU 41 1149	N.N. Achasov	
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WEINSTEIN	90	PR D41 2236	J. Weinstein, N. Isgur	(TNTO)
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