NODE=M144

$h_c(1P)$

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

Quantum numbers are quark model prediction, $C = -$ established by $\eta_c\gamma$ decay.

NODE=M144

$h_c(1P)$ MASS

NODE=M144M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3525.37±0.14 OUR AVERAGE		Error includes scale factor of 1.2.			
3525.32±0.06±0.15	23k	ABLIKIM	22AQ	BES3	$\psi(2S) \to \pi^0$ hadrons; $\pi^0\gamma(\eta_c)$
3525.20±0.18±0.12	1282	[1] DOBBS	08A	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
3525.8 ±0.2 ±0.2	13	ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c\gamma$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3525.31±0.11±0.14	832	[2,3] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma$ hadrons
3525.40±0.13±0.18	3679	[2] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0\gamma\eta_c$
3525.6 ±0.5	92	ADAMS	09	CLEO	$\psi(2S) \to 2(\pi^+\pi^-\pi^0)$
3524.4 ±0.6 ±0.4	168	[4] ROSNER	05	CLEO	$\psi(2S) \to \pi^0\eta_c\gamma$
3527 ±8	42	ANTONIAZZI	94	E705	300 $\pi^\pm$, pLi $\to$ $J/\psi\pi^0$X
3526.28±0.18±0.19	59	[5] ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$
3525.4 ±0.8 ±0.4	5	BAGLIN	86	SPEC	$\overline{p}p \to J/\psi$X

[1] Combination of exclusive and inclusive analyses for the reaction $\psi(2S) \to \pi^0 h_c \to \pi^0\eta_c\gamma$. This result is the average of DOBBS 08A and ROSNER 05.

NODE=M144M;LINKAGE=DO

[2] Superseded by ABLIKIM 22AQ

NODE=M144M;LINKAGE=A

[3] With floating width.

NODE=M144M;LINKAGE=AB

[4] Superseded by DOBBS 08A.

NODE=M144M;LINKAGE=RO

[5] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03.

NODE=M144M;LINKAGE=NW

$h_c(1P)$ WIDTH

NODE=M144W

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.78^{+0.27}_{-0.24}\pm0.12}$		23k	ABLIKIM	22AQ	BES3	$\psi(2S) \to \pi^0$ hadrons; $\pi^0\gamma(\eta_c)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
0.70±0.28±0.22		832	[1,2] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma$ hadrons
< 1.44	90	3679	[3] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0\gamma\eta_c$
< 1		13	ANDREOTTI	05B	E835	$\overline{p}p \to \eta_c\gamma$
< 1.1	90	59	ARMSTRONG	92D	E760	$\overline{p}p \to J/\psi\pi^0$

[1] Superseded by ABLIKIM 22AQ

NODE=M144W;LINKAGE=A

[2] With floating mass.

NODE=M144W;LINKAGE=AL

[3] The central value is $\Gamma = 0.73 \pm 0.45 \pm 0.28$ MeV.

NODE=M144W;LINKAGE=AB

$h_c(1P)$ DECAY MODES

NODE=M144215;NODE=M144

	Mode	Fraction (Γ_i/Γ)	Confidence level	
Γ_1	$J/\psi(1S)\pi^0$	$< 5 \times 10^{-4}$	90%	DESIG=1
Γ_2	$J/\psi(1S)\pi\pi$	$< 9 \times 10^{-5}$	90%	DESIG=2
Γ_3	$J/\psi(1S)\pi^+\pi^-$	$< 9 \times 10^{-4}$	90%	DESIG=10
Γ_4	$p\overline{p}$	$< 4 \times 10^{-5}$	90%	DESIG=3
Γ_5	$p\overline{p}\pi^0$	$< 8 \times 10^{-4}$	90%	DESIG=24
Γ_6	$p\overline{p}\pi^+\pi^-$	$(3.3 \pm 0.6) \times 10^{-3}$		DESIG=11
Γ_7	$p\overline{p}\pi^0\pi^0$	$< 6 \times 10^{-4}$	90%	DESIG=13
Γ_8	$p\overline{p}\pi^+\pi^-\pi^0$	$(4.4 \pm 1.3) \times 10^{-3}$		DESIG=25
Γ_9	$p\overline{p}\eta$	$(7.4 \pm 2.2) \times 10^{-4}$		DESIG=23
Γ_{10}	$\pi^+\pi^-\pi^0$	$(1.57 \pm 0.13) \times 10^{-3}$		DESIG=5
Γ_{11}	$\pi^+\pi^-\eta$	$< 5 \times 10^{-4}$	90%	DESIG=31
Γ_{12}	$\pi^+\pi^-\pi^0\eta$	$(8.3 \pm 2.4) \times 10^{-3}$		DESIG=14
Γ_{13}	$2\pi^+2\pi^-\pi^0\eta$	$(7.2 \pm 1.7) \times 10^{-3}$		DESIG=29

Γ_{14}	$2\pi^+2\pi^-\pi^0$	(9.4 ±1.7) × 10^{-3}			DESIG=6
Γ_{15}	$2\pi^+2\pi^-\eta$	< 6 × 10^{-4}	90%		DESIG=30
Γ_{16}	$3\pi^+3\pi^-\pi^0$	(9.1 ±1.5) × 10^{-3}			DESIG=7
Γ_{17}	$2\pi^+2\pi^-\omega$	(3.9 ±1.0) × 10^{-3}			DESIG=28
Γ_{18}	$K^+K^-\pi^+\pi^-$	< 7 × 10^{-4}	90%		DESIG=12
Γ_{19}	$K^+K^-\pi^+\pi^-\pi^0$	(3.8 ±0.8) × 10^{-3}			DESIG=15
Γ_{20}	$K^+K^-\pi^+\pi^-\eta$	< 2.7 × 10^{-3}	90%		DESIG=16
Γ_{21}	$K^+K^-\pi^0$	(3.8 ±0.9) × 10^{-4}			DESIG=17
Γ_{22}	$K^+K^-\pi^0\eta$	< 2.4 × 10^{-3}	90%		DESIG=18
Γ_{23}	$K^+K^-\eta$	(3.6 ±1.2) × 10^{-4}			DESIG=19
Γ_{24}	$2K^+2K^-\pi^0$	< 2.8 × 10^{-4}	90%		DESIG=20
Γ_{25}	$K^0_S K^\pm\pi^\mp$	(7.1 ±1.9) × 10^{-4}			DESIG=21
Γ_{26}	$K^0_S K^\pm\pi^\mp\pi^+\pi^-$	(3.2 ±1.0) × 10^{-3}			DESIG=22
	Radiative decays				NODE=M144;CLUMP=R
Γ_{27}	$\gamma\eta$	(3.8 ±0.6) × 10^{-4}			DESIG=9
Γ_{28}	$\gamma\eta'(958)$	(1.41±0.15) × 10^{-3}			DESIG=8
Γ_{29}	$\gamma\pi^0$	< 5 × 10^{-5}			DESIG=32
Γ_{30}	$\gamma\eta_c(1S)$	(60 ±4) %			DESIG=4
Γ_{31}	$e^+e^-\eta_c(1S)$	(3.5 ±0.7) × 10^{-3}			DESIG=33

FIT INFORMATION

A multiparticle fit to $\eta_c(1S)$, $J/\psi(1S)$, $\psi(2S)$, $h_c(1P)$, and $B^\pm$ with the total width, 10 combinations of partial widths obtained from integrated cross section, and 38 branching ratios uses 113 measurements to determine 19 parameters. The overall fit has a $\chi^2 = 184.6$ for 94 degrees of freedom.

$h_c(1P)$ PARTIAL WIDTHS

NODE=M144220

$h_c(1P)$ Γ(i)Γ($\bar{p}p$)/Γ(total)

NODE=M144223

$\Gamma(\gamma\eta_c(1S)) \times \Gamma(p\bar{p})/\Gamma_{\text{total}}$ $\Gamma_{30}\Gamma_4/\Gamma$

NODE=M144G1

VALUE (eV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
12.0±4.5	13	[1] ANDREOTTI	05B	E835	$\bar{p}p \to \eta_c\gamma$

[1] Assuming Γ = 1 MeV.

NODE=M144G1
NODE=M144G1;LINKAGE=AN

$h_c(1P)$ BRANCHING RATIOS

NODE=M144225

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(\gamma\eta_c(1S))$ Γ_1/Γ_{30}

NODE=M144R24

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-4}	90	[1] ABLIKIM	22N	BES3	$e^+e^- \to \pi^+\pi^- h_c$

[1] ABLIKIM 22N reports [Γ($h_c(1P) \to J/\psi(1S)\pi^0$)/Γ($h_c(1P) \to \gamma\eta_c(1S)$)] / [B($\eta_c \to K^+K^-\pi^0$)] < 7.5×10^{-2} which we multiply by our best value B($\eta_c \to K^+K^-\pi^0$) = 1/6 B($\eta_c(1S) \to K\bar{K}\pi$) = 1/6 ($7.1 \times 10^{-2}$).

NODE=M144R24
NODE=M144R24;LINKAGE=B

$\Gamma(J/\psi(1S)\pi\pi)/\Gamma(J/\psi(1S)\pi^0)$ Γ_2/Γ_1

NODE=M144R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.18	90	ARMSTRONG	92D	E760	$\bar{p}p \to J/\psi\pi^0$

NODE=M144R1

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_3/Γ

NODE=M144R07

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<9 × 10^{-4}	90	[1] ABLIKIM	24BY	BES3	$\psi(2S) \to \pi^0\pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.7 × 10^{-3}	90	[2] ABLIKIM	18M	BES3	$\psi(2S) \to \pi^0\pi^+\pi^- J/\psi$

[1] ABLIKIM 24BY reports [Γ($h_c(1P) \to J/\psi(1S)\pi^+\pi^-$)/$\Gamma_{\text{total}}$] × [B($\psi(2S) \to h_c(1P)\pi^0$)] < 6.7×10^{-7} which we divide by our best value B($\psi(2S) \to h_c(1P)\pi^0$) = 7.4×10^{-4}.

[2] ABLIKIM 18M reports [Γ($h_c(1P) \to J/\psi(1S)\pi^+\pi^-$)/$\Gamma_{\text{total}}$] × [B($\psi(2S) \to h_c(1P)\pi^0$)] < 2.0×10^{-6} which we divide by our best value B($\psi(2S) \to h_c(1P)\pi^0$) = 7.4×10^{-4}.

NODE=M144R07
NODE=M144R07;LINKAGE=C
OCCUR=2
NODE=M144R07;LINKAGE=B

$\Gamma(p\bar{p})/\Gamma_{total}$ Γ_4/Γ

NODE=M144R20
NODE=M144R20

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4\times10^{-5}$	90	[1] ABLIKIM	24R	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24R reports $[\Gamma(h_c(1P)\to\ p\bar{p})/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 3.22\times10^{-8}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R20;LINKAGE=B

$\Gamma(p\bar{p}\pi^0)/\Gamma_{total}$ Γ_5/Γ

NODE=M144R22
NODE=M144R22

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8\times10^{-4}$	90	[1] ABLIKIM	22M	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 22M reports $[\Gamma(h_c(1P)\to\ p\bar{p}\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 5.67\times10^{-7}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R22;LINKAGE=A

$\Gamma(p\bar{p}\pi^+\pi^-)/\Gamma_{total}$ Γ_6/Γ

NODE=M144R08
NODE=M144R08

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.3±0.5±0.2	230	[1] ABLIKIM	19AG	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P)\to\ p\bar{p}\pi^+\pi^-)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(2.49\pm0.27\pm0.28)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R08;LINKAGE=A

$\Gamma(p\bar{p}\pi^0\pi^0)/\Gamma_{total}$ Γ_7/Γ

NODE=M144R10
NODE=M144R10

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<6\times10^{-4}$	90	12	[1] ABLIKIM	20AH	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P)\to\ p\bar{p}\pi^0\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 4.4\times10^{-7}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R10;LINKAGE=A

$\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_8/Γ

NODE=M144R23
NODE=M144R23

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
4.4±1.2±0.3	86	[1] ABLIKIM	22M	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 22M reports $[\Gamma(h_c(1P)\to\ p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(3.30\pm0.71\pm0.59)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R23;LINKAGE=A

$\Gamma(p\bar{p}\eta)/\Gamma_{total}$ Γ_9/Γ

NODE=M144R21
NODE=M144R21

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
7.4±2.1±0.5	20	[1] ABLIKIM	22M	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 22M reports $[\Gamma(h_c(1P)\to\ p\bar{p}\eta)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(5.51\pm1.50\pm0.46)\times10^{-7}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R21;LINKAGE=A

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{10}/Γ

NODE=M144R01
NODE=M144R01

VALUE (units 10^{-3})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.57±0.06±0.11		472	[1] ABLIKIM	24BF	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.9 ±0.5 ±0.1		101	[2,3] ABLIKIM	19AG	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
<2.6	90		[4] ADAMS	09	CLEO	$\psi(2S)\to\ \pi^0\gamma\eta_c$

[1] ABLIKIM 24BF reports $(1.36\pm0.16\pm0.14)\times10^{-3}$ from a measurement of $[\Gamma(h_c(1P)\to\ \pi^+\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]$ assuming $B(\psi(2S)\to\ h_c(1P)\pi^0)=(8.6\pm1.3)\times10^{-4}$, which we rescale to our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R01;LINKAGE=B

[2] ABLIKIM 19AG reports $[\Gamma(h_c(1P)\to\ \pi^+\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(1.38\pm0.35\pm0.17)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R01;LINKAGE=A

[3] Superseded by ABLIKIM 24BF.

NODE=M144R01;LINKAGE=C

[4] ADAMS 09 reports $[\Gamma(h_c(1P)\to\ \pi^+\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 0.19\times10^{-5}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R01;LINKAGE=AD

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

NODE=M144R28
NODE=M144R28

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<5\times10^{-4}$	90	44.5	[1] ABLIKIM	24BF	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24BF reports $<4.0\times10^{-4}$ from a measurement of $[\Gamma(h_c(1P)\to\ \pi^+\pi^-\eta)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]$ assuming $B(\psi(2S)\to\ h_c(1P)\pi^0)=(8.6\pm1.3)\times10^{-4}$, which we rescale to our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R28;LINKAGE=A

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

NODE=M144R11
NODE=M144R11

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$8.3\pm2.3\pm0.6$	35	[1] ABLIKIM	20AH	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P)\to\ \pi^+\pi^-\pi^0\eta)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(6.2\pm1.6\pm0.7)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R11;LINKAGE=A

$\Gamma(2\pi^+2\pi^-\pi^0\eta)/\Gamma_{total}$ Γ_{13}/Γ

NODE=M144R26
NODE=M144R26

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
$7.2\pm1.7\pm0.5$	[1] ABLIKIM	24R	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24R reports $[\Gamma(h_c(1P)\to\ 2\pi^+2\pi^-\pi^0\eta)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(5.33\pm1.10\pm0.56)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R26;LINKAGE=A

$\Gamma(2\pi^+2\pi^-\pi^0)/\Gamma_{total}$ Γ_{14}/Γ

NODE=M144R02
NODE=M144R02

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
0.94 ± 0.17 OUR AVERAGE					
$0.86\pm0.16\pm0.06$	254	[1] ABLIKIM	19AG	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
$2.5\ ^{+0.9}_{-0.7}\ \pm0.2$	92	[2] ADAMS	09	CLEO	$\psi(2S)\to\ \pi^0\gamma\eta_c$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P)\to\ 2\pi^+2\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(6.40\pm0.81\pm0.87)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R02;LINKAGE=A

[2] ADAMS 09 reports $[\Gamma(h_c(1P)\to\ 2\pi^+2\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(1.88^{+0.48}_{-0.45}{}^{+0.47}_{-0.30})\times10^{-5}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R02;LINKAGE=AD

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

NODE=M144R27
NODE=M144R27

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6\times10^{-4}$	90	[1] ABLIKIM	24R	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24R reports $[\Gamma(h_c(1P)\to\ 2\pi^+2\pi^-\eta)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 4.53\times10^{-7}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R27;LINKAGE=A

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

NODE=M144R03
NODE=M144R03

VALUE (units 10^{-3})	CL%	DOCUMENT ID		TECN	COMMENT
$9.1\pm1.3\pm0.6$		[1] ABLIKIM	24R	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<10	90	[2] ABLIKIM	19AG	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
<34	90	[3] ADAMS	09	CLEO	$\psi(2S)\to\ \pi^0\gamma\eta_c$

OCCUR=3

[1] ABLIKIM 24R reports $[\Gamma(h_c(1P)\to\ 3\pi^+3\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]=(6.79\pm0.83\pm0.56)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=(7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R03;LINKAGE=H

[2] ABLIKIM 19AG reports $[\Gamma(h_c(1P)\to\ 3\pi^+3\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 7.5\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$. Superseded by ABLIKIM 24R.

NODE=M144R03;LINKAGE=A

[3] ADAMS 09 reports $[\Gamma(h_c(1P)\to\ 3\pi^+3\pi^-\pi^0)/\Gamma_{total}]\times[B(\psi(2S)\to\ h_c(1P)\pi^0)]<\ 2.5\times10^{-5}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R03;LINKAGE=AD

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

NODE=M144R25
NODE=M144R25

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
3.9±0.9±0.3	[1] ABLIKIM	24R	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 24R reports $[\Gamma(h_c(1P) \to 2\pi^+2\pi^-\omega)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (2.93 \pm 0.63 \pm 0.26) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R25;LINKAGE=A

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

NODE=M144R09
NODE=M144R09

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7 \times 10^{-4}$	90	[1] ABLIKIM	19AG	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 19AG reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 0.5 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 7.4 \times 10^{-4}$.

NODE=M144R09;LINKAGE=A

$\Gamma(K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}$ Γ_{19}/Γ

NODE=M144R12
NODE=M144R12

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.8±0.3	80	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (2.8 \pm 0.5 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R12;LINKAGE=A

$\Gamma(K^+K^-\pi^+\pi^-\eta)/\Gamma_{total}$ Γ_{20}/Γ

NODE=M144R13
NODE=M144R13

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.7 \times 10^{-3}$	90	24	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^+\pi^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 2.0 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 7.4 \times 10^{-4}$.

NODE=M144R13;LINKAGE=A

$\Gamma(K^+K^-\pi^0)/\Gamma_{total}$ Γ_{21}/Γ

NODE=M144R14
NODE=M144R14

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.8±0.9±0.3		62	[1] ABLIKIM	24BF	BES3	$\psi(2S) \to \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<6	90	20	[2,3] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 24BF reports $(3.26 \pm 0.84 \pm 0.36) \times 10^{-4}$ from a measurement of $[\Gamma(h_c(1P) \to K^+K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)]$ assuming $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, which we rescale to our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Significance 3.5σ.

NODE=M144R14;LINKAGE=B

[2] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^0)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 4.8 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 7.4 \times 10^{-4}$.

NODE=M144R14;LINKAGE=A

[3] Superseded by ABLIKIM 24BF.

NODE=M144R14;LINKAGE=C

$\Gamma(K^+K^-\pi^0\eta)/\Gamma_{total}$ Γ_{22}/Γ

NODE=M144R15
NODE=M144R15

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.4 \times 10^{-3}$	90	20	[1] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\pi^0\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 1.8 \times 10^{-6}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 7.4 \times 10^{-4}$.

NODE=M144R15;LINKAGE=A

$\Gamma(K^+K^-\eta)/\Gamma_{total}$ Γ_{23}/Γ

NODE=M144R16
NODE=M144R16

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
3.6±1.2±0.3		32	[1] ABLIKIM	24BF	BES3	$\psi(2S) \to \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<10	90	18	[2,3] ABLIKIM	20AH	BES3	$\psi(2S) \to \pi^0 h_c(1P)$

[1] ABLIKIM 24BF reports $(3.13 \pm 1.08 \pm 0.38) \times 10^{-4}$ from a measurement of $[\Gamma(h_c(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)]$ assuming $B(\psi(2S) \to h_c(1P)\pi^0) = (8.6 \pm 1.3) \times 10^{-4}$, which we rescale to our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. Significance 3.3σ.

NODE=M144R16;LINKAGE=B

[2] ABLIKIM 20AH reports $[\Gamma(h_c(1P) \to K^+K^-\eta)/\Gamma_{total}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] < 7.5 \times 10^{-7}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = 7.4 \times 10^{-4}$.

NODE=M144R16;LINKAGE=A

[3] Superseded by ABLIKIM 24BF.

NODE=M144R16;LINKAGE=C

$\Gamma(2K^+2K^-\pi^0)/\Gamma_{total}$ Γ_{24}/Γ

NODE=M144R17
NODE=M144R17

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$<2.8\times10^{-4}$	90	11	[1] ABLIKIM	20AH	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P)\ \to\ \ 2K^+2K^-\pi^0)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]\ <\ 2.1\times10^{-7}$ which we divide by our best value $B(\psi(2S)\ \to\ h_c(1P)\pi^0)\ =\ 7.4\times10^{-4}$.

NODE=M144R17;LINKAGE=A

$\Gamma(K^0_S K^\pm\pi^\mp)/\Gamma_{total}$ Γ_{25}/Γ

NODE=M144R18
NODE=M144R18

VALUE (units 10^{-4})	CL%	DOCUMENT ID		TECN	COMMENT
$7.1\pm1.8\pm0.5$		[1] ABLIKIM	24Y	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<6	90	[2,3] ABLIKIM	20AH	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24Y reports $[\Gamma(h_c(1P)\ \to\ K^0_S K^\pm\pi^\mp)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]\ =\ (5.3\pm1.3\pm0.4)\times10^{-7}$ which we divide by our best value $B(\psi(2S)\ \to\ h_c(1P)\pi^0)\ =\ (7.4\pm0.5)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R18;LINKAGE=B

[2] ABLIKIM 20AH reports $[\Gamma(h_c(1P)\ \to\ K^0_S K^\pm\pi^\mp)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]\ <\ 4.8\times10^{-7}$ which we divide by our best value $B(\psi(2S)\ \to\ h_c(1P)\pi^0)=7.4\times10^{-4}$.

NODE=M144R18;LINKAGE=A

[3] Superseded by ABLIKIM 24Y.

NODE=M144R18;LINKAGE=C

$\Gamma(K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}$ Γ_{26}/Γ

NODE=M144R19
NODE=M144R19

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
$3.2\pm1.0\pm0.2$	41	[1] ABLIKIM	20AH	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 20AH reports $[\Gamma(h_c(1P)\ \to\ \ K^0_S K^\pm\pi^\mp\pi^+\pi^-)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]=(2.4\pm0.7\pm0.3)\times10^{-6}$ which we divide by our best value $B(\psi(2S)\to\ h_c(1P)\pi^0)\ =\ (7.4\ \pm\ 0.5)\ \times\ 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

NODE=M144R19;LINKAGE=A

RADIATIVE DECAYS

NODE=M144230

$\Gamma(\gamma\eta)/\Gamma_{total}$ Γ_{27}/Γ

NODE=M144R06
NODE=M144R06

VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
3.8 ± 0.6 OUR AVERAGE					
$3.8\pm0.6\pm0.3$		[1] ABLIKIM	24BJ	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$
$4.7\pm1.5\pm1.4$	18	ABLIKIM	16I	BES3	$\psi(2S)\to\ \pi^0\gamma\eta$

[1] ABLIKIM 24BJ reports $(3.77\pm0.55\pm0.29)\times10^{-4}$ from a measurement of $[\Gamma(h_c(1P)\to\gamma\eta)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]$ assuming $B(\psi(2S)\ \to\ h_c(1P)\pi^0)\ =\ (7.4\ \pm\ 0.5)\ \times\ 10^{-4}$.

NODE=M144R06;LINKAGE=A

$\Gamma(\gamma\eta'(958))/\Gamma_{total}$ Γ_{28}/Γ

NODE=M144R00
NODE=M144R00

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
1.41 ± 0.15 OUR AVERAGE					
$1.40\pm0.11\pm0.11$		[1] ABLIKIM	24BJ	BES3	$\psi(2S)\to\ \pi^0\gamma\eta'$
$1.52\pm0.27\pm0.29$	44	ABLIKIM	16I	BES3	$\psi(2S)\to\ \pi^0\gamma\eta'(958)$

[1] ABLIKIM 24BJ reports $(1.40\pm0.11\pm0.11)\times10^{-3}$ from a measurement of $[\Gamma(h_c(1P)\to\gamma\eta'(958))/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]$ assuming $B(\psi(2S)\ \to\ h_c(1P)\pi^0)\ =\ (7.4\ \pm\ 0.5)\ \times\ 10^{-4}$.

NODE=M144R00;LINKAGE=A

$\Gamma(\gamma\pi^0)/\Gamma_{total}$ Γ_{29}/Γ

NODE=M144R29
NODE=M144R29

VALUE	DOCUMENT ID		TECN	COMMENT
$<5\times10^{-5}$	[1] ABLIKIM	24BJ	BES3	$\psi(2S)\to\ \pi^0 h_c(1P)$

[1] ABLIKIM 24BJ reports $<5.0\times10^{-5}$ from a measurement of $[\Gamma(h_c(1P)\to\gamma\pi^0)/\Gamma_{total}]\ \times\ [B(\psi(2S)\ \to\ h_c(1P)\pi^0)]$ assuming $B(\psi(2S)\ \to\ h_c(1P)\pi^0)\ =\ (7.4\ \pm\ 0.5)\ \times\ 10^{-4}$.

NODE=M144R29;LINKAGE=A

$\Gamma(\gamma\eta_c(1S))/\Gamma_{total}$ Γ_{30}/Γ

NODE=M144R2
NODE=M144R2

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$60\pm\ 4$ OUR FIT					
$57\pm\ 5$ OUR AVERAGE					
$57\pm\ 4\pm4$	23k	[1] ABLIKIM	22AQ	BES3	$\psi(2S)\to\ \pi^0$ hadrons; $\pi^0\gamma(\eta_c)$
$56\pm\ 6\pm4$		[2] DOBBS	08A	CLEO	$\psi(2S)\to\ \pi^0\eta_c\gamma$

OCCUR=2

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

62± 9±4	3679	[3,4] ABLIKIM	10B	BES3	$\psi(2S) \to \pi^0 \eta_c \gamma$	
56± 7±4	1282	[5] DOBBS	08A	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$	
54±14±4	168	[6] ROSNER	05	CLEO	$\psi(2S) \to \pi^0 \eta_c \gamma$	

[1] ABLIKIM 22AQ reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.22^{+0.27}_{-0.26} \pm 0.19) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R2;LINKAGE=C

[2] Average of DOBBS 08A and ROSNER 05. DOBBS 08A reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.16 \pm 0.30 \pm 0.37) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R2;LINKAGE=DB

[3] ABLIKIM 10B reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.58 \pm 0.40 \pm 0.50) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R2;LINKAGE=A

[4] Superseded by ABLIKIM 22AQ NODE=M144R2;LINKAGE=B

[5] DOBBS 08A reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.19 \pm 0.32 \pm 0.45) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R2;LINKAGE=DO

[6] ROSNER 05 reports $[\Gamma(h_c(1P) \to \gamma\eta_c(1S))/\Gamma_{\text{total}}] \times [B(\psi(2S) \to h_c(1P)\pi^0)] = (4.0 \pm 0.8 \pm 0.7) \times 10^{-4}$ which we divide by our best value $B(\psi(2S) \to h_c(1P)\pi^0) = (7.4 \pm 0.5) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. NODE=M144R2;LINKAGE=RO

$\Gamma(e^+e^-\eta_c(1S))/\Gamma(\gamma\eta_c(1S))$ Γ_{31}/Γ_{30}

NODE=M144R30
NODE=M144R30

VALUE (units 10^{-3})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
5.9±1.0±0.4	961	[1] ABLIKIM	24CC	BES3	$\psi(3686) \to \pi^0 h_c$, $e^+e^- \to \pi^+\pi^- h_c$

[1] Average between $\pi^0 h_c$ $(4.6 \pm 1.2 \pm 0.5) \times 10^{-3}$ and $\pi^+\pi^- h_c$ $(8.9 \pm 1.8 \pm 0.9) \times 10^{-3}$. NODE=M144R30;LINKAGE=A

$h_c(1P)$ REFERENCES

NODE=M144

ABLIKIM	24BF	PR D110 032023	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62905
ABLIKIM	24BJ	JHEP 2408 180	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62945
ABLIKIM	24BY	PR D110 112010	M. Ablikim *et al.*	(BESIII Collab.)	REFID=63030
ABLIKIM	24CC	PR D110 L111101	M. Ablikim *et al.*	(BESIII Collab.)	REFID=63034
ABLIKIM	24R	PR D109 072018	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62669
ABLIKIM	24Y	PR D110 012007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62678
ABLIKIM	22AQ	PR D106 072007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61889
ABLIKIM	22M	JHEP 2205 108	M. Ablikim *et al.*	(BESIII Collab.)	REFID=61650
Also		JHEP 2303 022 (errat.)	M. Ablikim *et al.*	(BESIII Collab.)	REFID=62053
ABLIKIM	22N	JHEP 2205 003	M. Ablikim	(BESIII Collab.)	REFID=61651
ABLIKIM	20AH	PR D102 112007	M. Ablikim *et al.*	(BESIII Collab.)	REFID=60750
ABLIKIM	19AG	PR D99 072008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=59858
ABLIKIM	18M	PR D97 052008	M. Ablikim *et al.*	(BESIII Collab.)	REFID=58901
ABLIKIM	16I	PRL 116 251802	M. Ablikim *et al.*	(BESIII Collab.)	REFID=57450
ABLIKIM	12N	PR D86 092009	M. Ablikim *et al.*	(BESIII Collab.)	REFID=54741
ABLIKIM	10B	PRL 104 132002	M. Ablikim *et al.*	(BESIII Collab.)	REFID=53348
ADAMS	09	PR D80 051106	G.S. Adams *et al.*	(CLEO Collab.)	REFID=53103
DOBBS	08A	PRL 101 182003	S. Dobbs *et al.*	(CLEO Collab.)	REFID=52579
ANDREOTTI	05B	PR D72 032001	M. Andreotti *et al.*	(FNAL E835 Collab.)	REFID=50768
ROSNER	05	PRL 95 102003	J.L. Rosner *et al.*	(CLEO Collab.)	REFID=50812
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)	REFID=44074
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
ARMSTRONG	92D	PRL 69 2337	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43174
BAGLIN	86	PL B171 135	C. Baglin *et al.*	(LAPP, CERN, TORI, STRB+)	REFID=43180