

**$\psi(4040)$** 

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

 **$\psi(4040)$  MASS**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>4039 ± 1 OUR ESTIMATE</b>			
<b>4039.6 ± 4.3</b>	<sup>1</sup> ABLIKIM	08D BES2	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
4034 ± 6	<sup>2</sup> MO	10 RVUE	$e^+e^- \rightarrow$ hadrons
4037 ± 2	<sup>3</sup> SETH	05A RVUE	$e^+e^- \rightarrow$ hadrons
4040 ± 1	<sup>4</sup> SETH	05A RVUE	$e^+e^- \rightarrow$ hadrons
4040 ± 10	BRANDELIK	78C DASP	$e^+e^-$

<sup>1</sup> Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the  $\psi(3770)$ ,  $\psi(4040)$ ,  $\psi(4160)$ , and  $\psi(4415)$  resonances. Phase angle fixed in the fit to  $\delta = (130 \pm 46)^\circ$ .

<sup>2</sup> Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8–4.8 GeV covering the  $\psi(4040)$ ,  $\psi(4160)$  and  $\psi(4415)$  resonances and including interference effects.

<sup>3</sup> From a fit to Crystal Ball (OSTERHELD 86) data.

<sup>4</sup> From a fit to BES (BAI 02C) data.

 **$\psi(4040)$  WIDTH**

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>80 ± 10 OUR ESTIMATE</b>			
<b>84.5 ± 12.3</b>	<sup>5</sup> ABLIKIM	08D BES2	$e^+e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
87 ± 11	<sup>6</sup> MO	10 RVUE	$e^+e^- \rightarrow$ hadrons
85 ± 10	<sup>7</sup> SETH	05A RVUE	$e^+e^- \rightarrow$ hadrons
89 ± 6	<sup>8</sup> SETH	05A RVUE	$e^+e^- \rightarrow$ hadrons
52 ± 10	BRANDELIK	78C DASP	$e^+e^-$

<sup>5</sup> Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the  $\psi(3770)$ ,  $\psi(4040)$ ,  $\psi(4160)$ , and  $\psi(4415)$  resonances. Phase angle fixed in the fit to  $\delta = (130 \pm 46)^\circ$ .

<sup>6</sup> Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8–4.8 GeV covering the  $\psi(4040)$ ,  $\psi(4160)$  and  $\psi(4415)$  resonances and including interference effects.

<sup>7</sup> From a fit to Crystal Ball (OSTERHELD 86) data.

<sup>8</sup> From a fit to BES (BAI 02C) data.

**$\psi(4040)$  DECAY MODES**

Due to the complexity of the  $c\bar{c}$  threshold region, in this listing, “seen” (“not seen”) means that a cross section for the mode in question has been measured at effective  $\sqrt{s}$  near this particle’s central mass value, more (less) than  $2\sigma$  above zero, without regard to any peaking behavior in  $\sqrt{s}$  or absence thereof. See mode listing(s) for details and references.

Mode	Fraction ( $\Gamma_i/\Gamma$ )	Confidence level
$\Gamma_1$ $e^+e^-$	$(1.07 \pm 0.16) \times 10^{-5}$	
$\Gamma_2$ $D\bar{D}$	seen	
$\Gamma_3$ $D^0\bar{D}^0$	seen	
$\Gamma_4$ $D^+D^-$	seen	
$\Gamma_5$ $D^*\bar{D} + \text{c.c.}$	seen	
$\Gamma_6$ $D^*(2007)^0\bar{D}^0 + \text{c.c.}$	seen	
$\Gamma_7$ $D^*(2010)^+D^- + \text{c.c.}$	seen	
$\Gamma_8$ $D^*\bar{D}^*$	seen	
$\Gamma_9$ $D^*(2007)^0\bar{D}^*(2007)^0$	seen	
$\Gamma_{10}$ $D^*(2010)^+D^*(2010)^-$	seen	
$\Gamma_{11}$ $D\bar{D}\pi$ (excl. $D^*\bar{D}$ )		
$\Gamma_{12}$ $D^0D^-\pi^+ + \text{c.c.}$ (excl. $D^*(2007)^0\bar{D}^0 + \text{c.c.}$ , $D^*(2010)^+D^- + \text{c.c.}$ )	not seen	
$\Gamma_{13}$ $D\bar{D}^*\pi$ (excl. $D^*\bar{D}^*$ )	not seen	
$\Gamma_{14}$ $D^0\bar{D}^{*-}\pi^+ + \text{c.c.}$ (excl. $D^*(2010)^+D^*(2010)^-$ )	seen	
$\Gamma_{15}$ $D_s^+D_s^-$	seen	
$\Gamma_{16}$ $J/\psi(1S)$ hadrons		
$\Gamma_{17}$ $J/\psi\pi^+\pi^-$	$< 4 \times 10^{-3}$	90%
$\Gamma_{18}$ $J/\psi\pi^0\pi^0$	$< 2 \times 10^{-3}$	90%
$\Gamma_{19}$ $J/\psi\eta$	$(5.2 \pm 0.7) \times 10^{-3}$	
$\Gamma_{20}$ $J/\psi\pi^0$	$< 2.8 \times 10^{-4}$	90%
$\Gamma_{21}$ $J/\psi\pi^+\pi^-\pi^0$	$< 2 \times 10^{-3}$	90%
$\Gamma_{22}$ $\chi_{c1}\gamma$	$< 3.4 \times 10^{-3}$	90%
$\Gamma_{23}$ $\chi_{c2}\gamma$	$< 5 \times 10^{-3}$	90%
$\Gamma_{24}$ $\chi_{c1}\pi^+\pi^-\pi^0$	$< 1.1 \%$	90%
$\Gamma_{25}$ $\chi_{c2}\pi^+\pi^-\pi^0$	$< 3.2 \%$	90%
$\Gamma_{26}$ $h_c(1P)\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%
$\Gamma_{27}$ $\phi\pi^+\pi^-$	$< 3 \times 10^{-3}$	90%
$\Gamma_{28}$ $\Lambda\bar{\Lambda}\pi^+\pi^-$	$< 2.9 \times 10^{-4}$	90%
$\Gamma_{29}$ $\Lambda\bar{\Lambda}\pi^0$	$< 9 \times 10^{-5}$	90%
$\Gamma_{30}$ $\Lambda\bar{\Lambda}\eta$	$< 3.0 \times 10^{-4}$	90%
$\Gamma_{31}$ $\Sigma^+\bar{\Sigma}^-$	$< 1.3 \times 10^{-4}$	90%
$\Gamma_{32}$ $\Sigma^0\bar{\Sigma}^0$	$< 7 \times 10^{-5}$	90%

$\Gamma_{33}$	$\Xi^+ \Xi^-$	$< 1.6$	$\times 10^{-4}$	90%
$\Gamma_{34}$	$\Xi^0 \Xi^0$	$< 1.8$	$\times 10^{-4}$	90%
$\Gamma_{35}$	$\mu^+ \mu^-$			

### $\psi(4040)$ PARTIAL WIDTHS

$\Gamma(e^+ e^-)$   $\Gamma_1$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
<b><math>0.86 \pm 0.07</math> OUR ESTIMATE</b>			
<b><math>0.83 \pm 0.20</math></b>	<sup>9</sup> ABLIKIM	08D BES2	$e^+ e^- \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.6 to 1.4	<sup>10</sup> MO	10 RVUE	$e^+ e^- \rightarrow$ hadrons
$0.88 \pm 0.11$	<sup>11</sup> SETH	05A RVUE	$e^+ e^- \rightarrow$ hadrons
$0.91 \pm 0.13$	<sup>12</sup> SETH	05A RVUE	$e^+ e^- \rightarrow$ hadrons
$0.75 \pm 0.15$	BRANDELIK	78C DASP	$e^+ e^-$

<sup>9</sup> Reanalysis of data presented in BAI 02C. From a global fit over the center-of-mass energy region 3.7–5.0 GeV covering the  $\psi(3770)$ ,  $\psi(4040)$ ,  $\psi(4160)$ , and  $\psi(4415)$  resonances. Phase angle fixed in the fit to  $\delta = (130 \pm 46)^\circ$ .

<sup>10</sup> Reanalysis of data presented in BAI 00 and BAI 02C. From a global fit over the center-of-mass energy 3.8–4.8 GeV covering the  $\psi(4040)$ ,  $\psi(4160)$  and  $\psi(4415)$  resonances and including interference effects. Four sets of solutions are obtained with the same fit quality, mass and total width, but with different  $e^+ e^-$  partial widths. We quote only the range of values.

<sup>11</sup> From a fit to Crystal Ball (OSTERHELD 86) data.

<sup>12</sup> From a fit to BES (BAI 02C) data.

### $\psi(4040) \Gamma(i) \times \Gamma(e^+ e^-) / \Gamma(\text{total})$

$\Gamma(\chi_{c1} \gamma) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$   $\Gamma_{22} \Gamma_1 / \Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 2.9</math></b>	90	<sup>13</sup> HAN	15 BELL	$10.58 e^+ e^- \rightarrow \chi_{c1} \gamma$

<sup>13</sup> Using  $B(\eta \rightarrow \gamma \gamma) = (39.41 \pm 0.21)\%$ .

$\Gamma(\chi_{c2} \gamma) \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$   $\Gamma_{23} \Gamma_1 / \Gamma$

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT
<b><math>&lt; 4.6</math></b>	90	<sup>14</sup> HAN	15 BELL	$10.58 e^+ e^- \rightarrow \chi_{c2} \gamma$

<sup>14</sup> Using  $B(\eta \rightarrow \gamma \gamma) = (39.41 \pm 0.21)\%$ .

### $\psi(4040) \Gamma(i) \times \Gamma(e^+ e^-) / \Gamma^2(\text{total})$

$\Gamma(J/\psi \eta) / \Gamma_{\text{total}} \times \Gamma(e^+ e^-) / \Gamma_{\text{total}}$   $\Gamma_{19} / \Gamma \times \Gamma_1 / \Gamma$

VALUE (units $10^{-8}$ )	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

$5.1 \pm 1.4 \pm 1.5$  <sup>15</sup> WANG 13B BELL  $e^+ e^- \rightarrow J/\psi \eta \gamma$

$12.8 \pm 2.1 \pm 1.9$  <sup>16</sup> WANG 13B BELL  $e^+ e^- \rightarrow J/\psi \eta \gamma$

<sup>15</sup> Solution I of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4039 MeV and 80 MeV, respectively.

<sup>16</sup> Solution II of two equivalent solutions in a fit using two interfering resonances. Mass and width fixed at 4039 MeV and 80 MeV, respectively.

$\psi(4040)$  BRANCHING RATIOS $\Gamma(e^+e^-)/\Gamma_{\text{total}}$   $\Gamma_1/\Gamma$ 

VALUE (units $10^{-5}$ )	DOCUMENT ID	TECN	COMMENT
$\sim 1.0$	FELDMAN	77	MRK1 $e^+e^-$

 $\Gamma(D^0\bar{D}^0)/\Gamma_{\text{total}}$   $\Gamma_3/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	AUBERT	09M	BABR $e^+e^- \rightarrow D^0\bar{D}^0\gamma$
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^0\bar{D}^0$
<b>seen</b>	PAKHLOVA	08	BELL $e^+e^- \rightarrow D^0\bar{D}^0\gamma$

 $\Gamma(D^+D^-)/\Gamma_{\text{total}}$   $\Gamma_4/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	AUBERT	09M	BABR $e^+e^- \rightarrow D^+D^-\gamma$
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^+D^-$
<b>seen</b>	PAKHLOVA	08	BELL $e^+e^- \rightarrow D^+D^-\gamma$

 $\Gamma(D\bar{D})/\Gamma(D^*\bar{D} + \text{c.c.})$   $\Gamma_2/\Gamma_5$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.24 ± 0.05 ± 0.12</b>	AUBERT	09M	BABR $e^+e^- \rightarrow \gamma D^{(*)}\bar{D}$

 $\Gamma(D^0\bar{D}^0)/\Gamma(D^*(2007)^0\bar{D}^0 + \text{c.c.})$   $\Gamma_3/\Gamma_6$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.05 ± 0.03</b>	<sup>17</sup> GOLDHABER	77	MRK1 $e^+e^-$

<sup>17</sup> Phase-space factor ( $p^3$ ) explicitly removed. $\Gamma(D^*(2007)^0\bar{D}^0 + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_6/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	AUBERT	09M	BABR $e^+e^- \rightarrow D^{*0}\bar{D}^0\gamma$
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^{*0}\bar{D}^0$

 $\Gamma(D^*(2010)^+D^- + \text{c.c.})/\Gamma_{\text{total}}$   $\Gamma_7/\Gamma$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>seen</b>	<sup>18</sup> ZHUKOVA	18	BELL $e^+e^- \rightarrow D^{*+}D^-\gamma$
<b>seen</b>	AUBERT	09M	BABR $e^+e^- \rightarrow D^{*+}D^-\gamma$
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^{*+}D^-$

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

seen PAKHLOVA 07 BELL  $e^+e^- \rightarrow D^{*+}D^-\gamma$ <sup>18</sup> Supersedes PAKHLOVA 07. $\Gamma(D^*(2010)^+D^- + \text{c.c.})/\Gamma(D^*(2007)^0\bar{D}^0 + \text{c.c.})$   $\Gamma_7/\Gamma_6$ 

VALUE	DOCUMENT ID	TECN	COMMENT
<b>0.95 ± 0.09 ± 0.10</b>	AUBERT	09M	BABR $e^+e^- \rightarrow \gamma D^*\bar{D}$

$\Gamma(D^*\bar{D}^*)/\Gamma(D^*\bar{D} + \text{c.c.})$					$\Gamma_8/\Gamma_5$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>0.18 ± 0.14 ± 0.03</b>	AUBERT	09M	BABR	$e^+e^- \rightarrow \gamma D^{(*)}\bar{D}^{(*)}$	
$\Gamma(D^*(2007)^0\bar{D}^*(2007)^0)/\Gamma_{\text{total}}$					$\Gamma_9/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>seen</b>	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*0}\bar{D}^{*0}\gamma$	
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^{*0}\bar{D}^{*0}$		
$\Gamma(D^*(2007)^0\bar{D}^*(2007)^0)/\Gamma(D^*(2007)^0\bar{D}^0 + \text{c.c.})$					$\Gamma_9/\Gamma_6$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>32.0 ± 12.0</b>	<sup>19</sup> GOLDHABER	77	MRK1	$e^+e^-$	
<sup>19</sup> Phase-space factor ( $p^3$ ) explicitly removed.					
$\Gamma(D^*(2010)^+D^*(2010)^-)/\Gamma_{\text{total}}$					$\Gamma_{10}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>seen</b>	<sup>20</sup> ZHUKOVA	18	BELL	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$	
<b>seen</b>	AUBERT	09M	BABR	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$	
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D^{*+}D^{*-}$		
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<b>seen</b>	PAKHLOVA	07	BELL	$e^+e^- \rightarrow D^{*+}D^{*-}\gamma$	
<sup>20</sup> Supersedes PAKHLOVA 07.					
$\Gamma(D^0D^-\pi^+ + \text{c.c. (excl. } D^*(2007)^0\bar{D}^0 + \text{c.c., } D^*(2010)^+D^- + \text{c.c.))}/\Gamma_{\text{total}}$					$\Gamma_{12}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>not seen</b>	PAKHLOVA	08A	BELL	$e^+e^- \rightarrow D^0D^-\pi^+\gamma$	
$\Gamma(D\bar{D}^*\pi(\text{excl. } D^*\bar{D}^*))/\Gamma_{\text{total}}$					$\Gamma_{13}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>not seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D\bar{D}^*\pi$		
$\Gamma(D^0\bar{D}^{*-}\pi^+ + \text{c.c. (excl. } D^*(2010)^+D^*(2010)^-))/\Gamma_{\text{total}}$					$\Gamma_{14}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>seen</b>	PAKHLOVA	09	BELL	$e^+e^- \rightarrow D^0D^{*-}\pi^+\gamma$	
$\Gamma(D_s^+D_s^-)/\Gamma_{\text{total}}$					$\Gamma_{15}/\Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT		
<b>seen</b>	PAKHLOVA	11	BELL	$e^+e^- \rightarrow D_s^+D_s^-\gamma$	
<b>seen</b>	DEL-AMO-SA..10N	BABR	$e^+e^- \rightarrow D_s^+D_s^-\gamma$		
<b>seen</b>	CRONIN-HEN..09	CLEO	$e^+e^- \rightarrow D_s^+D_s^-$		
$\Gamma(J/\psi\pi^+\pi^-)/\Gamma_{\text{total}}$					$\Gamma_{17}/\Gamma$
VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT	
<b>&lt;4</b>	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons	

$\Gamma(J/\psi\pi^0\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{18}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<2	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(J/\psi\eta)/\Gamma_{\text{total}}$   $\Gamma_{19}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<b>5.2±0.5±0.5</b>		<sup>21</sup> ABLIKIM	12K	BES3 $e^+e^- \rightarrow \ell^+\ell^-2\gamma$

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

<7	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons
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<sup>21</sup> ABLIKIM 12K measure  $\sigma(e^+e^- \rightarrow J/\psi\eta) = 32.1 \pm 2.8 \pm 1.3$  pb. They assume the  $\eta J/\psi$  fully originates from  $\psi(4040)$  decays.

$\Gamma(J/\psi\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{20}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<0.28	90	<sup>22</sup> ABLIKIM	12K	BES3 $e^+e^- \rightarrow \ell^+\ell^-2\gamma$

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

<2	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons
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<sup>22</sup> ABLIKIM 12K measure  $\sigma(e^+e^- \rightarrow J/\psi\pi^0) < 1.6$  pb. They assume the  $\eta J/\psi$  fully originates from  $\psi(4040)$  decays.

$\Gamma(J/\psi\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{21}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<2	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c1}\gamma)/\Gamma_{\text{total}}$   $\Gamma_{22}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<11	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons
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$\Gamma(\chi_{c2}\gamma)/\Gamma_{\text{total}}$   $\Gamma_{23}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<17	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons
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$\Gamma(\chi_{c1}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{24}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<11	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(\chi_{c2}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{25}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
<32	90	COAN	06	CLEO 3.97–4.06 $e^+e^- \rightarrow$ hadrons

$\Gamma(h_c(1P)\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{26}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;3</b>	90	<sup>23</sup> PEDLAR	11	CLEO $e^+e^- \rightarrow h_c(1P)\pi^+\pi^-$
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<sup>23</sup> From several values of  $\sqrt{s}$  near the peak of the  $\psi(4040)$ , PEDLAR 11 measures  $\sigma(e^+e^- \rightarrow h_c(1P)\pi^+\pi^-) = 1.0 \pm 8.0 \pm 5.4 \pm 0.2$  pb, where the errors are statistical, systematic, and due to uncertainty in  $B(\psi(2S) \rightarrow \pi^0 h_c(1P))$ , respectively.

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{27}/\Gamma$

VALUE (units $10^{-3}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;3</b>	90	COAN	06	CLEO $3.97\text{--}4.06 e^+e^- \rightarrow \text{hadrons}$
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$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$   $\Gamma_{28}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;2.9</b>	90	<sup>24</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>24</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Lambda\bar{\Lambda}\pi^0)/\Gamma_{\text{total}}$   $\Gamma_{29}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.9</b>	90	<sup>25</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>25</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Lambda\bar{\Lambda}\eta)/\Gamma_{\text{total}}$   $\Gamma_{30}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;3.0</b>	90	<sup>26</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>26</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$   $\Gamma_{31}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;1.3</b>	90	<sup>27</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>27</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$   $\Gamma_{32}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;0.7</b>	90	<sup>28</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>28</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Xi^+\bar{\Xi}^-)/\Gamma_{\text{total}}$   $\Gamma_{33}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;1.6</b>	90	<sup>29</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>29</sup> Assuming that interference effects between resonance and continuum can be neglected.

$\Gamma(\Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}}$   $\Gamma_{34}/\Gamma$

VALUE (units $10^{-4}$ )	CL%	DOCUMENT ID	TECN	COMMENT
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<b>&lt;1.8</b>	90	<sup>30</sup> ABLIKIM	13Q	BES3 $e^+e^- \rightarrow \psi(4040)$
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<sup>30</sup> Assuming that interference effects between resonance and continuum can be neglected.

## $\psi(4040)$ REFERENCES

ZHUKOVA	18	PR D97 012002	V. Zhukova <i>et al.</i>	(BELLE Collab.)
HAN	15	PR D92 012011	Y.L. Han <i>et al.</i>	(BELLE Collab.)
ABLIKIM	13Q	PR D87 112011	Ablikim M. <i>et al.</i>	(BES III Collab.)
WANG	13B	PR D87 051101	X.L. Wang <i>et al.</i>	(BELLE Collab.)
ABLIKIM	12K	PR D86 071101	M. Ablikim <i>et al.</i>	(BES III Collab.)
PAKHLOVA	11	PR D83 011101	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
PEDLAR	11	PRL 107 041803	T. Pedlar <i>et al.</i>	(CLEO Collab.)
DEL-AMO-SA...	10N	PR D82 052004	P. del Amo Sanchez <i>et al.</i>	(BABAR Collab.)
MO	10	PR D82 077501	X.H. Mo, C.Z. Yuan, P. Wang	(BHEP)
AUBERT	09M	PR D79 092001	B. Aubert <i>et al.</i>	(BABAR Collab.)
CRONIN-HEN...	09	PR D80 072001	D. Cronin-Hennessy <i>et al.</i>	(CLEO Collab.)
PAKHLOVA	09	PR D80 091101	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
ABLIKIM	08D	PL B660 315	M. Ablikim <i>et al.</i>	(BES Collab.)
PAKHLOVA	08	PR D77 011103	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
PAKHLOVA	08A	PRL 100 062001	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
PAKHLOVA	07	PRL 98 092001	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
COAN	06	PRL 96 162003	T.E. Coan <i>et al.</i>	(CLEO Collab.)
SETH	05A	PR D72 017501	K.K. Seth	
BAI	02C	PRL 88 101802	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	00	PRL 84 594	J.Z. Bai <i>et al.</i>	(BES Collab.)
OSTERHELD	86	SLAC-PUB-4160	A. Osterheld <i>et al.</i>	(SLAC Crystal Ball Collab.)
BRANDELIK	78C	PL 76B 361	R. Brandelik <i>et al.</i>	(DASP Collab.)
Also		ZPHY C1 233	R. Brandelik <i>et al.</i>	(DASP Collab.)
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)
GOLDHABER	77	PL 69B 503	G. Goldhaber <i>et al.</i>	(Mark I Collab.)

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