

**X(4660)**

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

Seen in radiative return from  $e^+e^-$  collisions at  $\sqrt{s} = 9.54\text{--}10.58$  GeV by WANG 07D. Also obtained in a combined fit of WANG 07D, AUBERT 07S, and LEES 14F. See also the review under the X(3872) particle listings. (See the index for the page number.)

**X(4660) MASS**

| <u>VALUE (MeV)</u>  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                      |
|---|--------------------|-------------|---|
| <b>4665 ± 10 OUR AVERAGE</b>  |                    |             |   |
| 4669 ± 21 ± 3   | <sup>1</sup> LEES  | 14F BABR    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| 4664 ± 11 ± 5   | WANG               | 07D BELL    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • •         |                    |             |   |
| 4661 <sup>+</sup> <sub>−8</sub> ± 6   | <sup>2</sup> LIU   | 08H RVUE    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| <sup>1</sup> From a two-resonance fit.  |                    |             |   |
| <sup>2</sup> From a combined fit of AUBERT 07S and WANG 07D data with two resonances. |                    |             |   |

**X(4660) WIDTH**

| <u>VALUE (MeV)</u>  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                      |
|---|--------------------|-------------|---|
| <b>53 ± 16 OUR AVERAGE</b> Error includes scale factor of 1.1.                        |                    |             |   |
| 104 ± 48 ± 10   | <sup>1</sup> LEES  | 14F BABR    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| 48 ± 15 ± 3   | WANG               | 07D BELL    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • •         |                    |             |   |
| 42 <sup>+</sup> <sub>−12</sub> ± 6  | <sup>2</sup> LIU   | 08H RVUE    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |
| <sup>1</sup> From a two-resonance fit.  |                    |             |   |
| <sup>2</sup> From a combined fit of AUBERT 07S and WANG 07D data with two resonances. |                    |             |   |

**X(4660) DECAY MODES**

| Mode                            | Fraction ( $\Gamma_i/\Gamma$ ) |
|---------------------------------|--------------------------------|
| $\Gamma_1$ $e^+e^-$             |                                |
| $\Gamma_2$ $\psi(2S)\pi^+\pi^-$ | seen                           |
| $\Gamma_3$ $J/\psi\eta$         |                                |
| $\Gamma_4$ $D^0D^{*-}\pi^+$     |                                |

**X(4660)  $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$** 

| <u>VALUE (eV)</u>   | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                      | $\Gamma_2\Gamma_1/\Gamma$ |
|---|--------------------|-------------|---|---------------------------|
| • • • We do not use the following data for averages, fits, limits, etc. • • • |                    |             |   |                           |
| 2.7 ± 1.3 ± 0.5   | <sup>1</sup> LEES  | 14F BABR    | 10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^-\psi(2S)$ |                           |

|                       |                   |     |      |   |
|-----------------------|-------------------|-----|------|---|
| $7.5 \pm 1.7 \pm 0.7$ | <sup>2</sup> LEES | 14F | BABR | $10.58 e^+ e^- \rightarrow \gamma \pi^+ \pi^- \psi(2S)$ |
| $2.2^{+0.7}_{-0.6}$   | <sup>3</sup> LIU  | 08H | RVUE | $10.58 e^+ e^- \rightarrow \gamma \pi^+ \pi^- \psi(2S)$ |
| $5.9 \pm 1.6$         | <sup>4</sup> LIU  | 08H | RVUE | $10.58 e^+ e^- \rightarrow \gamma \pi^+ \pi^- \psi(2S)$ |
| $3.0 \pm 0.9 \pm 0.3$ | <sup>1</sup> WANG | 07D | BELL | $10.58 e^+ e^- \rightarrow \gamma \pi^+ \pi^- \psi(2S)$ |
| $7.6 \pm 1.8 \pm 0.8$ | <sup>2</sup> WANG | 07D | BELL | $10.58 e^+ e^- \rightarrow \gamma \pi^+ \pi^- \psi(2S)$ |

<sup>1</sup> Solution I of two equivalent solutions in a fit using two interfering resonances.

<sup>2</sup> Solution II of two equivalent solutions in a fit using two interfering resonances.

<sup>3</sup> Solution I in a combined fit of AUBERT 07S and WANG 07D data with two resonances.

<sup>4</sup> Solution II in a combined fit of AUBERT 07S and WANG 07D data with two resonances.

### $\Gamma(J/\psi\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_3\Gamma_1/\Gamma$

| VALUE (eV)  | CL% | DOCUMENT ID | TECN | COMMENT                                    |
|---|-----|-------------|------|--|
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● |     |             |      |  |
| <0.94   | 90  | WANG        | 13B  | BELL $e^+e^- \rightarrow J/\psi\eta\gamma$ |

### X(4660) BRANCHING RATIOS

#### $\Gamma(D^0 D^{*-} \pi^+)/\Gamma(\psi(2S)\pi^+\pi^-)$ $\Gamma_4/\Gamma_2$

| VALUE | CL% | DOCUMENT ID | TECN | COMMENT   |
|-------|-----|-------------|------|---|
| <10   | 90  | PAKHLOVA 09 | BELL | $e^+e^- \rightarrow X(4660) \rightarrow D^0 D^{*-} \pi^+$ |

#### $\Gamma(D^0 D^{*-} \pi^+)/\Gamma_{\text{total}} \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_4/\Gamma \times \Gamma_1/\Gamma$

| VALUE                  | CL% | DOCUMENT ID              | TECN | COMMENT   |
|------------------------|-----|--------------------------|------|---|
| $<0.37 \times 10^{-6}$ | 90  | <sup>1</sup> PAKHLOVA 09 | BELL | $e^+e^- \rightarrow X(4660) \rightarrow D^0 D^{*-} \pi^+$ |

<sup>1</sup> Using  $4664 \pm 11 \pm 5$  MeV for the mass of X(4660).

### X(4660) REFERENCES

|          |     |               |                               |                 |
|----------|-----|---------------|-------------------------------|-----------------|
| LEES     | 14F | PR D89 111103 | J.P. Lees <i>et al.</i>       | (BABAR Collab.) |
| WANG     | 13B | PR D87 051101 | X.L. Wang <i>et al.</i>       | (BELLE Collab.) |
| PAKHLOVA | 09  | PR D80 091101 | G. Pakhlova <i>et al.</i>     | (BELLE Collab.) |
| LIU      | 08H | PR D78 014032 | Z.Q. Liu, X.S. Qin, C.Z. Yuan |                 |
| AUBERT   | 07S | PRL 98 212001 | B. Aubert <i>et al.</i>       | (BABAR Collab.) |
| WANG     | 07D | PRL 99 142002 | X.L. Wang <i>et al.</i>       | (BELLE Collab.) |