

Further States

OMITTED FROM SUMMARY TABLE

This section contains states observed by a single group or states poorly established that thus need confirmation.

QUANTUM NUMBERS, MASSES, WIDTHS, AND BRANCHING RATIOS

| <b>X(360)</b> $I^G(J^{PC}) = ?^?(?^{++})$                              |                    |             |                           |             |                                      |
|------------------------------------------------------------------------|--------------------|-------------|---------------------------|-------------|--------------------------------------|
| <u>MASS (MeV)</u>                                                      | <u>WIDTH (MeV)</u> | <u>EVTs</u> | <u>DOCUMENT ID</u>        | <u>TECN</u> | <u>COMMENT</u>                       |
| 360±7±9                                                                | 64 ± 18            | 2.3k        | <sup>1</sup> ABRAAMYAN 09 | CNTR        | 2.75 $dC \rightarrow \gamma\gamma X$ |
| <sup>1</sup> Not seen in $pC \rightarrow \gamma\gamma X$ at 5.5 GeV/c. |                    |             |                           |             |                                      |

| <b>X(1070)</b> $I^G(J^{PC}) = ?^?(0^{++})$ |                    |  |                              |    |                                              |
|--------------------------------------------|--------------------|--|------------------------------|----|----------------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |  | <u>DOCUMENT ID</u>           |    | <u>COMMENT</u>                               |
| 1072±1                                     | 3.5 ± 0.5          |  | <sup>1</sup> VLADIMIRSK...08 | 40 | $\pi^- p \rightarrow K_S^0 K_S^0 n + m\pi^0$ |
| <sup>1</sup> Supersedes GRIGOR'EV 05.      |                    |  |                              |    |                                              |

| <b>X(1110)</b> $I^G(J^{PC}) = 0^+(\text{even}^{++})$ |                    |  |                    |             |                                              |
|------------------------------------------------------|--------------------|--|--------------------|-------------|----------------------------------------------|
| <u>MASS (MeV)</u>                                    | <u>WIDTH (MeV)</u> |  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                               |
| 1107±4                                               | 111 ± 8 ± 15       |  | DAFTARI 87         | DBC         | 0. $\bar{p}n \rightarrow \rho^- \pi^+ \pi^-$ |

| <b>f<sub>0</sub>(1200–1600)</b> $I^G(J^{PC}) = 0^+(0^{++})$                                                                                                                                                                                                                                                                                                                                                                                     |                                     |              |                    |             |                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------|--------------------|-------------|----------------------------------------|
| <u>MASS (MeV)</u>                                                                                                                                                                                                                                                                                                                                                                                                                               | <u>WIDTH (MeV)</u>                  |              | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                         |
| 1323± 8                                                                                                                                                                                                                                                                                                                                                                                                                                         | 237 ± 20                            |              | VLADIMIRSK...06    | SPEC        | 40 $\pi^- p \rightarrow K_S^0 K_S^0 n$ |
| 1480 <sup>+100</sup> <sub>−150</sub>                                                                                                                                                                                                                                                                                                                                                                                                            | 1030 <sup>+80</sup> <sub>−170</sub> | <sup>1</sup> | ANISOVICH 03       | SPEC        |                                        |
| 1530 <sup>+90</sup> <sub>−250</sub>                                                                                                                                                                                                                                                                                                                                                                                                             | 560 ± 40                            | <sup>2</sup> | ANISOVICH 03       | SPEC        |                                        |
| <sup>1</sup> K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0 \pi^0 n$ , $\pi^- p \rightarrow K \bar{K} n$ , $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$ , $\bar{p}p \rightarrow \pi^0 \pi^0 \pi^0$ , $\pi^0 \eta \eta$ , $\pi^0 \pi^0 \eta$ , $\pi^+ \pi^- \pi^0$ , $K^+ K^- \pi^0$ , $K_S^0 K_S^0 \pi^0$ , $K^+ K_S^0 \pi^-$ at rest, $\bar{p}n \rightarrow \pi^- \pi^- \pi^+$ , $K_S^0 K^- \pi^0$ , $K_S^0 K_S^0 \pi^-$ at rest. |                                     |              |                    |             |                                        |
| <sup>2</sup> K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0 \pi^0 n$ , $\pi^- p \rightarrow K \bar{K} n$ , $\bar{p}p \rightarrow \pi^0 \pi^0 \pi^0$ , $\pi^0 \eta \eta$ , $\pi^0 \pi^0 \eta$ at rest.                                                                                                                                                                                                                       |                                     |              |                    |             |                                        |

| <b>X(1420)</b> $I^G(J^{PC}) = 2^+(0^{++})$ |                    |  |                    |             |                                            |
|--------------------------------------------|--------------------|--|--------------------|-------------|--------------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |  | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                             |
| 1420±20                                    | 160 ± 10           |  | FILIPPI 00         | OBLX        | 0 $\bar{p}p \rightarrow \pi^+ \pi^+ \pi^-$ |

| <b>X(1545)</b> $I^G(J^{PC}) = ?^?(?^{++})$ |                    |              |                    |    |                                              |
|--------------------------------------------|--------------------|--------------|--------------------|----|----------------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |              | <u>DOCUMENT ID</u> |    | <u>COMMENT</u>                               |
| 1545±3                                     | 6.0 ± 2.5          | <sup>1</sup> | VLADIMIRSK...08    | 40 | $\pi^- p \rightarrow K_S^0 K_S^0 n + m\pi^0$ |

<sup>1</sup>Supersedes VLADIMIRSKII 00.

| <b>X(1575)</b> $I^G(J^{PC}) = ?^?(1^- -)$ |                          |                      |         |                                    |  |
|-------------------------------------------|--------------------------|----------------------|---------|------------------------------------|--|
| MASS (MeV)                                | WIDTH (MeV)              | DOCUMENT ID          | TECN    | COMMENT                            |  |
| $1576^{+49+98}_{-55-91}$                  | $818^{+22+64}_{-23-133}$ | <sup>1</sup> ABLIKIM | 06S BES | $J/\psi \rightarrow K^+ K^- \pi^0$ |  |

<sup>1</sup>A broad peak observed at  $K^+ K^-$  invariant mass. Mass and width above are its pole position. The observed branching ratio is  $B(J/\psi \rightarrow X \pi^0) B(X \rightarrow K^+ K^-) = (8.5 \pm 0.6^{+2.7}_{-3.6}) \times 10^{-4}$ .

| <b>X(1600)</b> $I^G(J^{PC}) = 2^+(2^{++})$ |               |                       |         |                                                   |  |
|--------------------------------------------|---------------|-----------------------|---------|---------------------------------------------------|--|
| MASS (MeV)                                 | WIDTH (MeV)   | DOCUMENT ID           | TECN    | COMMENT                                           |  |
| $1600 \pm 100$                             | $400 \pm 200$ | <sup>1</sup> ALBRECHT | 91F ARG | $10.2 e^+ e^- \rightarrow e^+ e^- 2(\pi^+ \pi^-)$ |  |

<sup>1</sup>Our estimate.

| <b>X(1650)</b> $I^G(J^{PC}) = 0^-(?^{*-})$ |             |      |               |      |                                         |
|--------------------------------------------|-------------|------|---------------|------|-----------------------------------------|
| MASS (MeV)                                 | WIDTH (MeV) | EVTS | DOCUMENT ID   | TECN | COMMENT                                 |
| $1652 \pm 7$                               | $< 50$      | 100  | PROKOSHKIN 96 | GAM2 | $32,38 \pi p \rightarrow \omega \eta n$ |

| <b>X(1730)</b> $I^G(J^{PC}) = ?^?(?^{*+})$ |                       |      |                 |      |                                        |
|--------------------------------------------|-----------------------|------|-----------------|------|----------------------------------------|
| MASS (MeV)                                 | WIDTH (MeV)           | EVTS | DOCUMENT ID     | TECN | COMMENT                                |
| $1731.0 \pm 1.2 \pm 2.0$                   | $3.2 \pm 0.8 \pm 1.3$ | 58   | VLADIMIRSK...07 | SPEC | $40 \pi^- p \rightarrow K_S^0 K_S^0 X$ |

| <b>f<sub>2</sub>(1750)</b> $I^G(J^{PC}) = 0^+(2^{++})$ |             |      |                             |      |                                        |
|--------------------------------------------------------|-------------|------|-----------------------------|------|----------------------------------------|
| MASS (MeV)                                             | WIDTH (MeV) | EVTS | DOCUMENT ID                 | TECN | COMMENT                                |
| $1755 \pm 10$                                          | $67 \pm 12$ | 870  | <sup>1</sup> SCHEGELSKY 06A | RVUE | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

**$\Gamma(K\bar{K})$**

| VALUE (MeV) | EVTS | DOCUMENT ID                 | TECN | COMMENT                                |
|-------------|------|-----------------------------|------|----------------------------------------|
| $17 \pm 5$  | 870  | <sup>2</sup> SCHEGELSKY 06A | RVUE | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

**$\Gamma(\gamma\gamma)$**

| VALUE (keV)     | EVTS | DOCUMENT ID                 | TECN | COMMENT                                |
|-----------------|------|-----------------------------|------|----------------------------------------|
| $0.13 \pm 0.04$ | 870  | <sup>2</sup> SCHEGELSKY 06A | RVUE | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

**$\Gamma(\pi\pi)$**

| VALUE (MeV)   | EVTS | DOCUMENT ID                 | TECN | COMMENT                                |
|---------------|------|-----------------------------|------|----------------------------------------|
| $1.3 \pm 1.0$ | 870  | <sup>2</sup> SCHEGELSKY 06A | RVUE | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

**$\Gamma(\eta\eta)$** 

| VALUE (MeV)   | EVTS | DOCUMENT ID                 | TECN | COMMENT                                |
|---------------|------|-----------------------------|------|----------------------------------------|
| $2.0 \pm 0.5$ | 870  | <sup>2</sup> SCHEGELSKY 06A | RVUE | $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

<sup>1</sup> From analysis of L3 data at 91 and 183–209 GeV.<sup>2</sup> From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations. **$X(1775)$**   $I^G(J^{PC}) = 1^-(?^-+)$ 

| MASS (MeV)    | WIDTH (MeV)  | DOCUMENT ID | TECN | COMMENT                                          |
|---------------|--------------|-------------|------|--------------------------------------------------|
| $1763 \pm 20$ | $192 \pm 60$ | CONDO 91    | SHF  | $\gamma p \rightarrow (p\pi^+)(\pi^+\pi^-\pi^-)$ |
| $1787 \pm 18$ | $118 \pm 60$ | CONDO 91    | SHF  | $\gamma p \rightarrow n\pi^+\pi^+\pi^-$          |

 **$X(1850 - 3100)$**   $I^G(J^{PC}) = ??(1^{--})$ 

| $\Gamma(e^+e^-) \cdot B(X \rightarrow \text{hadrons})$ (eV) | CL% | DOCUMENT ID             | TECN | COMMENT                             |
|-------------------------------------------------------------|-----|-------------------------|------|-------------------------------------|
| <120                                                        | 90  | <sup>1</sup> ANASHIN 11 | KEDR | $e^+e^- \rightarrow \text{hadrons}$ |

<sup>1</sup> This limit is center-of-mass energy dependent. We quote the most stringent one. **$X(1855)$**   $I^G(J^{PC}) = ??(???)$ 

| MASS (MeV)     | WIDTH (MeV) | DOCUMENT ID | TECN | COMMENT                            |
|----------------|-------------|-------------|------|------------------------------------|
| $1856.6 \pm 5$ | $20 \pm 5$  | BRIDGES 86D | SPEC | 0. $\bar{p}d \rightarrow \pi\pi N$ |

 **$X(1870)$**   $I^G(J^{PC}) = ??(2^{??})$ 

| MASS (MeV)    | WIDTH (MeV)  | DOCUMENT ID | TECN | COMMENT                           |
|---------------|--------------|-------------|------|-----------------------------------|
| $1870 \pm 40$ | $250 \pm 30$ | ALDE 86D    | GAM4 | 100 $\pi^- p \rightarrow 2\eta X$ |

 **$a_3(1875)$**   $I^G(J^{PC}) = 1^-(3^{++})$ 

| MASS (MeV)           | WIDTH (MeV)           | DOCUMENT ID | TECN | COMMENT                                      |
|----------------------|-----------------------|-------------|------|----------------------------------------------|
| $1874 \pm 43 \pm 96$ | $385 \pm 121 \pm 114$ | CHUNG 02    | B852 | 18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$ |

 **$B(a_3(1875) \rightarrow f_2(1270)\pi)/B(a_3(1875) \rightarrow \rho\pi)$** 

| VALUE         | DOCUMENT ID           | TECN | COMMENT                                      |
|---------------|-----------------------|------|----------------------------------------------|
| $0.8 \pm 0.2$ | <sup>1</sup> CHUNG 02 | B852 | 18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$ |

<sup>1</sup> Using the observable fractions of 50.0%  $\rho\pi$ , 56.5%  $f_2\pi$ , and 11.8%  $\rho_3\pi$ . **$B(a_3(1875) \rightarrow \rho_3(1690)\pi)/B(a_3(1875) \rightarrow \rho\pi)$** 

| VALUE         | DOCUMENT ID           | TECN | COMMENT                                      |
|---------------|-----------------------|------|----------------------------------------------|
| $0.9 \pm 0.3$ | <sup>1</sup> CHUNG 02 | B852 | 18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$ |

<sup>1</sup>Using the observable fractions of 50.0%  $\rho\pi$ , 56.5%  $f_2\pi$ , and 11.8%  $\rho_3\pi$ .

| <b><math>h_1(1900)</math></b> $I^G(J^{PC}) = 0^-(1^{+-})$ |                         |             |           |                                    |
|-----------------------------------------------------------|-------------------------|-------------|-----------|------------------------------------|
| MASS (MeV)                                                | WIDTH (MeV)             | DOCUMENT ID | TECN      | COMMENT                            |
| $1908 \pm 6^{+8}_{-4}$                                    | $175 \pm 13^{+7}_{-16}$ | ABLIKIM     | 24CB BES3 | $J/\psi \rightarrow \phi\eta\pi^0$ |

| <b><math>a_1(1930)</math></b> $I^G(J^{PC}) = 1^-(1^{++})$ |              |             |          |                                                          |
|-----------------------------------------------------------|--------------|-------------|----------|----------------------------------------------------------|
| MASS (MeV)                                                | WIDTH (MeV)  | DOCUMENT ID | TECN     | COMMENT                                                  |
| $1930^{+30}_{-70}$                                        | $155 \pm 45$ | ANISOVICH   | 01F SPEC | $2.0 \bar{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$ |

| <b><math>X(1935)</math></b> $I^G(J^{PC}) = 1^+(1^{-?})$ |              |              |         |                                       |
|---------------------------------------------------------|--------------|--------------|---------|---------------------------------------|
| MASS (MeV)                                              | WIDTH (MeV)  | DOCUMENT ID  | TECN    | COMMENT                               |
| $1935 \pm 20$                                           | $215 \pm 30$ | EVANGELIS... | 79 OMEG | $10,16 \pi^- p \rightarrow \bar{p}pn$ |

| <b><math>\rho_2(1940)</math></b> $I^G(J^{PC}) = 1^+(2^{--})$ |              |                        |         |                                                                                 |
|--------------------------------------------------------------|--------------|------------------------|---------|---------------------------------------------------------------------------------|
| MASS (MeV)                                                   | WIDTH (MeV)  | DOCUMENT ID            | TECN    | COMMENT                                                                         |
| $1940 \pm 40$                                                | $155 \pm 40$ | <sup>1</sup> ANISOVICH | 02 SPEC | $0.6\text{--}1.9 p\bar{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

| <b><math>\omega_3(1945)</math></b> $I^G(J^{PC}) = 0^-(3^{--})$ |              |                        |          |                                                                     |
|----------------------------------------------------------------|--------------|------------------------|----------|---------------------------------------------------------------------|
| MASS (MeV)                                                     | WIDTH (MeV)  | DOCUMENT ID            | TECN     | COMMENT                                                             |
| $1945 \pm 20$                                                  | $115 \pm 22$ | <sup>1</sup> ANISOVICH | 02B SPEC | $0.6\text{--}1.9 p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

| <b><math>a_2(1950)</math></b> $I^G(J^{PC}) = 1^-(2^{++})$ |                   |                        |          |                              |
|-----------------------------------------------------------|-------------------|------------------------|----------|------------------------------|
| MASS (MeV)                                                | WIDTH (MeV)       | DOCUMENT ID            | TECN     | COMMENT                      |
| $1950^{+30}_{-70}$                                        | $180^{+30}_{-70}$ | <sup>1</sup> ANISOVICH | 01F SPEC | $1.96\text{--}2.41 \bar{p}p$ |

<sup>1</sup>From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.

| <b><math>\omega(1960)</math></b> $I^G(J^{PC}) = 0^-(1^{--})$ |              |                        |          |                                                                     |
|--------------------------------------------------------------|--------------|------------------------|----------|---------------------------------------------------------------------|
| MASS (MeV)                                                   | WIDTH (MeV)  | DOCUMENT ID            | TECN     | COMMENT                                                             |
| $1960 \pm 25$                                                | $195 \pm 60$ | <sup>1</sup> ANISOVICH | 02B SPEC | $0.6\text{--}1.9 p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

| <b><math>b_1(1960)</math></b> $I^G(J^{PC}) = 1^+(1^{+-})$ |              |                        |         |                                                                                 |
|-----------------------------------------------------------|--------------|------------------------|---------|---------------------------------------------------------------------------------|
| MASS (MeV)                                                | WIDTH (MeV)  | DOCUMENT ID            | TECN    | COMMENT                                                                         |
| $1960 \pm 35$                                             | $230 \pm 50$ | <sup>1</sup> ANISOVICH | 02 SPEC | $0.6\text{--}1.9 p\bar{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>h_1(1965)</math></b> $I^G(J^{PC}) = 0^-(1^{+-})$ |                    |                        |             |                                                             |  |
|-----------------------------------------------------------|--------------------|------------------------|-------------|-------------------------------------------------------------|--|
| <u>MASS (MeV)</u>                                         | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                              |  |
| 1965 ± 45                                                 | 345 ± 75           | <sup>1</sup> ANISOVICH | 02B SPEC    | 0.6–1.9 $p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |  |

<sup>1</sup>From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

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| <b><math>f_1(1970)</math></b> $I^G(J^{PC}) = 0^+(1^{++})$ |                    |                    |             |                |  |
|-----------------------------------------------------------|--------------------|--------------------|-------------|----------------|--|
| <u>MASS (MeV)</u>                                         | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |  |
| 1971 ± 15                                                 | 240 ± 45           | ANISOVICH          | 00J SPEC    |                |  |

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| <b><math>X(1970)</math></b> $I^G(J^{PC}) = ?^?(?^{??})$ |                    |                    |             |                                     |  |
|---------------------------------------------------------|--------------------|--------------------|-------------|-------------------------------------|--|
| <u>MASS (MeV)</u>                                       | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                      |  |
| 1970 ± 10                                               | 40 ± 20            | CHLIAPNIK...       | 80 HBC      | 32 $K^+p \rightarrow 2K_S^0 2\pi X$ |  |

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| <b><math>X(1975)</math></b> $I^G(J^{PC}) = ?^?(?^{??})$ |                    |             |                    |             |                                     |
|---------------------------------------------------------|--------------------|-------------|--------------------|-------------|-------------------------------------|
| <u>MASS (MeV)</u>                                       | <u>WIDTH (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                      |
| 1973 ± 15                                               | 80                 | 30          | CASO               | 70 HBC      | 11.2 $\pi^-p \rightarrow \rho 2\pi$ |

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| <b><math>\omega_2(1975)</math></b> $I^G(J^{PC}) = 0^-(2^{--})$ |                    |                        |             |                                                             |  |
|----------------------------------------------------------------|--------------------|------------------------|-------------|-------------------------------------------------------------|--|
| <u>MASS (MeV)</u>                                              | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                              |  |
| 1975 ± 20                                                      | 175 ± 25           | <sup>1</sup> ANISOVICH | 02B SPEC    | 0.6–1.9 $p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |  |

<sup>1</sup>From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

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| <b><math>a_2(1990)</math></b> $I^G(J^{PC}) = 1^-(2^{++})$ |                    |             |                         |             |                                            |
|-----------------------------------------------------------|--------------------|-------------|-------------------------|-------------|--------------------------------------------|
| <u>MASS (MeV)</u>                                         | <u>WIDTH (MeV)</u> | <u>EVTS</u> | <u>DOCUMENT ID</u>      | <u>TECN</u> | <u>COMMENT</u>                             |
| 2050 ± 10 ± 40                                            | 190 ± 22 ± 100     | 18k         | <sup>1</sup> SCHEGELSKY | 06 RVUE     | $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$ |
| 2003 ± 10 ± 19                                            | 249 ± 23 ± 32      |             | LU                      | 05 B852     | 18 $\pi^-p \rightarrow \omega\pi^-\pi^0 p$ |

<sup>1</sup>From analysis of L3 data at 183–209 GeV.

| <b><math>\Gamma(\gamma\gamma) \Gamma(\pi^+\pi^-\pi^0) / \Gamma(\text{total})</math></b> |             |                         |             |                                            |  |
|-----------------------------------------------------------------------------------------|-------------|-------------------------|-------------|--------------------------------------------|--|
| <u>VALUE (keV)</u>                                                                      | <u>EVTS</u> | <u>DOCUMENT ID</u>      | <u>TECN</u> | <u>COMMENT</u>                             |  |
| 0.11 ± 0.04 ± 0.05                                                                      | 18k         | <sup>1</sup> SCHEGELSKY | 06 RVUE     | $\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$ |  |

<sup>1</sup>From analysis of L3 data at 183–209 GeV.

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| <b><math>\rho(2000)</math></b> $I^G(J^{PC}) = 1^+(1^{--})$ |                    |                    |             |                               |  |
|------------------------------------------------------------|--------------------|--------------------|-------------|-------------------------------|--|
| <u>MASS (MeV)</u>                                          | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                |  |
| 2000 ± 30                                                  | 260 ± 45           | <sup>1</sup> BUGG  | 04C RVUE    | Compilation                   |  |
| ~ 1988                                                     | ~ 244              | HASAN              | 94 RVUE     | $\bar{p}p \rightarrow \pi\pi$ |  |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

| <b><math>f_2(2000)</math></b> |             | $I^G(J^{PC}) = 0^+(2^{++})$ |      |         |                               |
|-------------------------------|-------------|-----------------------------|------|---------|-------------------------------|
| MASS (MeV)                    | WIDTH (MeV) | DOCUMENT ID                 | TECN | COMMENT |                               |
| 2001 ± 10                     | 312 ± 32    | ANISOVICH                   | 00J  | SPEC    |                               |
| ~ 1996                        | ~ 134       | HASAN                       | 94   | RVUE    | $\bar{p}p \rightarrow \pi\pi$ |

| <b><math>X(2000)</math></b>                  |             | $I^G(J^{PC}) = 1^-(?^{?+})$ |      |     |                                                   |
|----------------------------------------------|-------------|-----------------------------|------|-----|---------------------------------------------------|
| MASS (MeV)                                   | WIDTH (MeV) | DOCUMENT ID                 | TECN | CHG | COMMENT                                           |
| 1964 ± 35                                    | 225 ± 50    | <sup>1</sup> ARMSTRONG 93D  | E760 |     | $\bar{p}p \rightarrow 3\pi^0 \rightarrow 6\gamma$ |
| ~ 2100                                       | ~ 500       | <sup>1</sup> ANTIPOV 77     | CIBS | —   | 25 $\pi^- p \rightarrow p\pi^- \rho_3$            |
| 2214 ± 15                                    | 355 ± 21    | <sup>2</sup> BALTAY 77      | HBC  | 0   | 15 $\pi^- p \rightarrow \Delta^{++} 3\pi$         |
| 2080 ± 40                                    | 340 ± 80    | KALELKAR 75                 | HBC  | +   | 15 $\pi^+ p \rightarrow p\pi^+ \rho_3$            |
| <sup>1</sup> Cannot determine spin to be 3.  |             |                             |      |     |                                                   |
| <sup>2</sup> BALTAY 77 favors $J^P = ,3^+$ . |             |                             |      |     |                                                   |

| <b><math>X(2000)</math></b> |             | $I^G(J^{PC}) = ?^?(4^{++})$ |      |                                       |  |
|-----------------------------|-------------|-----------------------------|------|---------------------------------------|--|
| MASS (MeV)                  | WIDTH (MeV) | DOCUMENT ID                 | TECN | COMMENT                               |  |
| 1998 ± 3 ± 5                | <15         | VLADIMIRSK...03             | SPEC | $\pi^- p \rightarrow K_S^0 K_S^0 M M$ |  |

| <b><math>X(2000)</math></b> |                        | $I^G(J^{PC}) = 0^-(1^{--})$ |           |                                    |  |
|-----------------------------|------------------------|-----------------------------|-----------|------------------------------------|--|
| MASS (MeV)                  | WIDTH (MeV)            | DOCUMENT ID                 | TECN      | COMMENT                            |  |
| 1992 ± 12 $^{+15}_{-6}$     | 132 ± 22 $^{+17}_{-4}$ | ABLIKIM                     | 24CB BES3 | $J/\psi \rightarrow \phi\eta\pi^0$ |  |

| <b><math>\eta(2010)</math></b> |             | $I^G(J^{PC}) = 0^+(0^{-+})$ |      |      |  |
|--------------------------------|-------------|-----------------------------|------|------|--|
| MASS (MeV)                     | WIDTH (MeV) | DOCUMENT ID                 | TECN |      |  |
| 2010 $^{+35}_{-60}$            | 270 ± 60    | ANISOVICH                   | 00J  | SPEC |  |

| <b><math>\pi_1(2015)</math></b> |               | $I^G(J^{PC}) = 1^-(1^{-+})$ |             |      |                                                     |
|---------------------------------|---------------|-----------------------------|-------------|------|-----------------------------------------------------|
| MASS (MeV)                      | WIDTH (MeV)   | EVTS                        | DOCUMENT ID | TECN | COMMENT                                             |
| 2014 ± 20 ± 16                  | 230 ± 32 ± 73 | 145k                        | LU          | 05   | B852 18 $\pi^- p \rightarrow \omega\pi^-\pi^0 p$    |
| 2001 ± 30 ± 92                  | 333 ± 52 ± 49 | 69k                         | KUHN        | 04   | B852 18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$ |

| <b><math>a_0(2020)</math></b> |             | $I^G(J^{PC}) = 1^-(0^{++})$ |      |      |  |
|-------------------------------|-------------|-----------------------------|------|------|--|
| MASS (MeV)                    | WIDTH (MeV) | DOCUMENT ID                 | TECN |      |  |
| 2025 ± 30                     | 330 ± 75    | ANISOVICH                   | 99C  | SPEC |  |

| <b><math>X(2020)</math></b> $I^G(J^{PC}) = ?^?(?^{??})$ |                    |                    |             |                |                                          |
|---------------------------------------------------------|--------------------|--------------------|-------------|----------------|------------------------------------------|
| <u>MASS (MeV)</u>                                       | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                          |
| 2015 ± 3                                                | 10 ± 4             | FERRER             | 99          | RVUE           | $\pi p \rightarrow p p \bar{p} \pi(\pi)$ |

| <b><math>h_3(2025)</math></b> $I^G(J^{PC}) = 0^-(3^{+-})$                                   |                    |                        |             |                |                                                                 |
|---------------------------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-----------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                                           | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                 |
| 2025 ± 20                                                                                   | 145 ± 30           | <sup>1</sup> ANISOVICH | 02B         | SPEC           | 0.6–1.9 $p \bar{p} \rightarrow \omega \eta, \omega \pi^0 \pi^0$ |
| <sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. |                    |                        |             |                |                                                                 |

| <b><math>b_3(2030)</math></b> $I^G(J^{PC}) = 1^+(3^{+-})$                                                 |                    |                        |             |                |                                                                              |
|-----------------------------------------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|------------------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                                                         | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                              |
| 2032 ± 12                                                                                                 | 117 ± 11           | <sup>1</sup> ANISOVICH | 02          | SPEC           | 0.6–1.9 $p \bar{p} \rightarrow \omega \pi^0, \omega \eta \pi^0, \pi^+ \pi^-$ |
| <sup>1</sup> From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02. |                    |                        |             |                |                                                                              |

| <b><math>a_2(2030)</math></b> $I^G(J^{PC}) = 1^-(2^{++})$                                   |                    |                        |             |                |                       |
|---------------------------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-----------------------|
| <u>MASS (MeV)</u>                                                                           | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                       |
| 2030 ± 20                                                                                   | 205 ± 30           | <sup>1</sup> ANISOVICH | 01F         | SPEC           | 1.96–2.41 $\bar{p} p$ |
| <sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. |                    |                        |             |                |                       |

| <b><math>a_3(2030)</math></b> $I^G(J^{PC}) = 1^-(3^{++})$                                   |                    |                        |             |                |                       |
|---------------------------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-----------------------|
| <u>MASS (MeV)</u>                                                                           | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                       |
| 2031 ± 12                                                                                   | 150 ± 18           | <sup>1</sup> ANISOVICH | 01F         | SPEC           | 1.96–2.41 $\bar{p} p$ |
| <sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F. |                    |                        |             |                |                       |

| <b><math>\eta_2(2030)</math></b> $I^G(J^{PC}) = 0^+(2^{-+})$ |                    |                    |             |                |  |
|--------------------------------------------------------------|--------------------|--------------------|-------------|----------------|--|
| <u>MASS (MeV)</u>                                            | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |  |
| 2030 ± 5 ± 15                                                | 205 ± 10 ± 15      | ANISOVICH          | 00E         | SPEC           |  |

| <b><math>B(a_2 \pi)_{L=0}/B(a_2 \pi)_{L=2}</math></b>    |  |                        |             |                |                      |
|----------------------------------------------------------|--|------------------------|-------------|----------------|----------------------|
| <u>VALUE</u>                                             |  | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                      |
| 0.05 ± 0.03                                              |  | <sup>1</sup> ANISOVICH | 11          | SPEC           | 0.9–1.94 $p \bar{p}$ |
| <sup>1</sup> Reanalysis of ADOMEIT 96 and ANISOVICH 00E. |  |                        |             |                |                      |

| <b><math>B(a_0 \pi)/B(a_2 \pi)_{L=2}</math></b>          |  |                        |             |                |                      |
|----------------------------------------------------------|--|------------------------|-------------|----------------|----------------------|
| <u>VALUE</u>                                             |  | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                      |
| 0.10 ± 0.08                                              |  | <sup>1</sup> ANISOVICH | 11          | SPEC           | 0.9–1.94 $p \bar{p}$ |
| <sup>1</sup> Reanalysis of ADOMEIT 96 and ANISOVICH 00E. |  |                        |             |                |                      |

**B( $f_2\eta$ )/B( $a_2\pi$ )<sub>L=2</sub>**

| VALUE                                                    | DOCUMENT ID               | TECN | COMMENT             |
|----------------------------------------------------------|---------------------------|------|---------------------|
| 0.13±0.06                                                | <sup>1</sup> ANISOVICH 11 | SPEC | 0.9–1.94 $p\bar{p}$ |
| <sup>1</sup> Reanalysis of ADOMEIT 96 and ANISOVICH 00E. |                           |      |                     |

 **$f_3(2050)$   $I^G(J^{PC}) = 0^+(3^{++})$** 

| MASS (MeV) | WIDTH (MeV) | DOCUMENT ID   | TECN | COMMENT                                   |
|------------|-------------|---------------|------|-------------------------------------------|
| 2048±8     | 213 ± 34    | ANISOVICH 00J | SPEC | 2.0 $p\bar{p} \rightarrow \eta\pi^0\pi^0$ |

 **$f_0(2060)$   $I^G(J^{PC}) = 0^+(0^{++})$** 

| MASS (MeV) | WIDTH (MeV) | DOCUMENT ID            | TECN | COMMENT                                 |
|------------|-------------|------------------------|------|-----------------------------------------|
| ~ 2050     | ~ 120       | <sup>1</sup> OAKDEN 94 | RVUE | 0.36–1.55 $\bar{p}p \rightarrow \pi\pi$ |
| ~ 2060     | ~ 50        | <sup>1</sup> OAKDEN 94 | RVUE | 0.36–1.55 $\bar{p}p \rightarrow \pi\pi$ |

<sup>1</sup> See SEMENOV 99 and KLOET 96. **$\pi(2070)$   $I^G(J^{PC}) = 1^-(0^{-+})$** 

| MASS (MeV) | WIDTH (MeV)                        | DOCUMENT ID   | TECN | COMMENT                                                  |
|------------|------------------------------------|---------------|------|----------------------------------------------------------|
| 2070±35    | 310 <sup>+100</sup> <sub>-50</sub> | ANISOVICH 01F | SPEC | 2.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$ |

 **$X(2080)$   $I^G(J^{PC}) = ??(???)$** 

| MASS (MeV) | WIDTH (MeV) | DOCUMENT ID | TECN | COMMENT                                 |
|------------|-------------|-------------|------|-----------------------------------------|
| 2080±10    | 110 ± 20    | KREYMER 80  | STRC | 13 $\pi^- d \rightarrow p\bar{p}n(n_s)$ |

 **$X(2080)$   $I^G(J^{PC}) = ??(3^{-?})$** 

| MASS (MeV) | WIDTH (MeV) | DOCUMENT ID | TECN | COMMENT                            |
|------------|-------------|-------------|------|------------------------------------|
| 2080±10    | 190 ± 15    | ROZANSKA 80 | SPRK | 18 $\pi^- p \rightarrow p\bar{p}n$ |

 **$K_1(2085)$   $I^G(J^{PC}) = ??(1^{+?})$** 

| MASS (MeV)                           | WIDTH (MeV)                         | DOCUMENT ID                 | TECN | COMMENT                                   |
|--------------------------------------|-------------------------------------|-----------------------------|------|-------------------------------------------|
| 2084 <sup>+4</sup> <sub>-2</sub> ± 9 | 58 <sup>+4</sup> <sub>-3</sub> ± 25 | <sup>1,2</sup> ABLIKIM 23BG | BES3 | $e^+e^- \rightarrow pK^-\bar{\Lambda}$    |
| 2075±12±5                            | 90 ± 35 ± 9                         | <sup>3</sup> ABLIKIM 04J    | BES2 | $J/\psi \rightarrow K^-\rho\bar{\Lambda}$ |

<sup>1</sup> The reported mass and width are the pole positions in the complex (M,  $\Gamma$ ) plane.<sup>2</sup> Signal observed with a statistical significance  $>20\sigma$  comes from 3883 candidate events. Spin parity determined to be  $J^P = 1^+$  with a statistical significance  $>5\sigma$  over  $0^-, 1^-, 2^+$  hypotheses, and in the range within 3.1–7.5  $\sigma$  with respect to  $2^-$ .<sup>3</sup> From a fit in the region  $M_{p\bar{\Lambda}} - M_{p-\Lambda} < 150$  MeV.  $S$ -wave in the  $p\bar{\Lambda}$  system preferred.A similar near-threshold enhancement in the  $p\bar{\Lambda}$  system is observed in  $B^+ \rightarrow p\bar{\Lambda}\bar{D}^0$  by CHEN 11F. **$a_1(2095)$   $I^G(J^{PC}) = 1^-(1^{++})$** 

| MASS (MeV)  | WIDTH (MeV)   | EVTS | DOCUMENT ID | TECN | COMMENT                                       |
|-------------|---------------|------|-------------|------|-----------------------------------------------|
| 2096±17±121 | 451 ± 41 ± 81 | 69k  | KUHN 04     | B852 | 18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^-p$ |

**$B(a_1(2095) \rightarrow f_1(1285)\pi) / B(a_1(2095) \rightarrow a_1(1260))$** 

| VALUE           | EVTs | DOCUMENT ID | TECN    | COMMENT                                           |
|-----------------|------|-------------|---------|---------------------------------------------------|
| $3.18 \pm 0.64$ | 69k  | KUHN        | 04 B852 | $18 \pi^- p \rightarrow \eta \pi^+ \pi^- \pi^- p$ |

 **$\eta(2100)$**   $I^G(J^{PC}) = 0^+(0^-+)$ 

| MASS (MeV)               | WIDTH (MeV)               | EVTs | DOCUMENT ID          | TECN     | COMMENT                                     |
|--------------------------|---------------------------|------|----------------------|----------|---------------------------------------------|
| $2050^{+30+75}_{-24-26}$ | $250^{+36+181}_{-30-164}$ |      | <sup>1</sup> ABLIKIM | 16N BES3 | $J/\psi \rightarrow \gamma K^+ K^- K^+ K^-$ |
| $2103 \pm 50$            | $187 \pm 75$              | 586  | <sup>2</sup> BISELLO | 89B DM2  | $J/\psi \rightarrow 4\pi\gamma$             |

<sup>1</sup> From a partial wave analysis of  $J/\psi \rightarrow \gamma \phi \phi$ , for which the primary signal is  $\eta(2225) \rightarrow \phi \phi$ , and that also finds significant signals for for  $0^-+$  phase space,  $f_0(2100)$ ,  $f_2(2010)$ ,  $f_2(2300)$ ,  $f_2(2340)$ , and a previously unseen  $0^-+$  state  $X(2500)$  ( $M = 2470^{+15+101}_{-19-23}$  MeV,  $\Gamma = 230^{+64+56}_{-35-33}$  MeV).

<sup>2</sup> ASTON 81B sees no peak, has 850 events in Ajinenko+Barth bins. ARESTOV 80 sees no peak.

 **$X(2100)$**   $I^G(J^{PC}) = ??(0^{??})$ 

| MASS (MeV)    | WIDTH (MeV)  | DOCUMENT ID | TECN     | COMMENT                           |
|---------------|--------------|-------------|----------|-----------------------------------|
| $2100 \pm 40$ | $250 \pm 40$ | ALDE        | 86D GAM4 | $100 \pi^- p \rightarrow 2\eta X$ |

 **$X(2110)$**   $I^G(J^{PC}) = 1^+(3^-?)$ 

| MASS (MeV)    | WIDTH (MeV)  | DOCUMENT ID  | TECN    | COMMENT                                 |
|---------------|--------------|--------------|---------|-----------------------------------------|
| $2110 \pm 10$ | $330 \pm 20$ | EVANGELIS... | 79 OMEG | $10,16 \pi^- p \rightarrow \bar{p} p n$ |

 **$X(2120)$**   $I^G(J^{PC}) = ??(0^{??})$ 

| MASS (MeV)                     | WIDTH (MeV)             | EVTs | DOCUMENT ID | TECN     | COMMENT                                       |
|--------------------------------|-------------------------|------|-------------|----------|-----------------------------------------------|
| $2122.4 \pm 6.7^{+4.7}_{-2.7}$ | $83 \pm 16^{+31}_{-11}$ | 647  | ABLIKIM     | 11c BES3 | $J/\psi \rightarrow \gamma \pi^+ \pi^- \eta'$ |

 **$\omega(2120)$  or  $\phi(2120)$**   $I^G(J^{PC}) = 0^-(?--)$ 

| MASS (MeV)           | WIDTH (MeV)       | DOCUMENT ID          | TECN      | COMMENT                                 |
|----------------------|-------------------|----------------------|-----------|-----------------------------------------|
| $2119 \pm 11 \pm 15$ | $69 \pm 30 \pm 5$ | <sup>1</sup> ABLIKIM | 24AA BES3 | $e^+ e^- \rightarrow \pi^+ \pi^- \pi^0$ |

<sup>1</sup> From a fit with more than  $5\sigma$  to the Born cross section line shapes of  $e^+ e^- \rightarrow \rho \pi$  and  $e^+ e^- \rightarrow \rho(1450) \pi$ .

 **$f_2(2140)$**   $I^G(J^{PC}) = 0^+(2^{++})$ 

| MASS (MeV)    | WIDTH (MeV) | EVTs | DOCUMENT ID | TECN    | COMMENT                   |
|---------------|-------------|------|-------------|---------|---------------------------|
| $2141 \pm 12$ | $49 \pm 28$ | 389  | GREEN       | 86 MPSF | $400 pA \rightarrow 4K X$ |

| <b>X(2150)</b> $I^G(J^{PC}) = ?^?(2^{+?})$ |                    |                    |             |                |                                      |
|--------------------------------------------|--------------------|--------------------|-------------|----------------|--------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                      |
| 2150 ± 10                                  | 260 ± 10           | ROZANSKA           | 80          | SPRK           | 18 $\pi^- p \rightarrow p \bar{p} n$ |

| <b>a<sub>2</sub>(2175)</b> $I^G(J^{PC}) = 1^-(2^{++})$ |                                   |                    |             |                |                                                             |
|--------------------------------------------------------|-----------------------------------|--------------------|-------------|----------------|-------------------------------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u>                | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                             |
| 2175 ± 40                                              | 310 <sup>+90</sup> <sub>-45</sub> | ANISOVICH          | 01F         | SPEC           | 2.0 $\bar{p} p \rightarrow 3\pi^0, \pi^0 \eta, \pi^0 \eta'$ |

| <b>η(2190)</b> $I^G(J^{PC}) = 0^+(0^{-+})$ |                    |                    |             |                |  |
|--------------------------------------------|--------------------|--------------------|-------------|----------------|--|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |  |
| 2190 ± 50                                  | 850 ± 100          | BUGG               | 99          | BES            |  |

| <b>ω<sub>2</sub>(2195)</b> $I^G(J^{PC}) = 0^-(2^{--})$ |                    |                        |             |                |                                                                 |
|--------------------------------------------------------|--------------------|------------------------|-------------|----------------|-----------------------------------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                 |
| 2195 ± 30                                              | 225 ± 40           | <sup>1</sup> ANISOVICH | 02B         | SPEC           | 0.6–1.9 $p \bar{p} \rightarrow \omega \eta, \omega \pi^0 \pi^0$ |

<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

| <b>X(2210)</b> $I^G(J^{PC}) = ?^?(?^{??})$ |                                    |                    |             |                |                                    |
|--------------------------------------------|------------------------------------|--------------------|-------------|----------------|------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u>                 | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                    |
| 2210 <sup>+79</sup> <sub>-21</sub>         | 203 <sup>+437</sup> <sub>-87</sub> | EVANGELIS...       | 79B         | OMEG           | 10 $\pi^- p \rightarrow K^+ K^- n$ |
| 2207 ± 22                                  | 130                                | CASO               | 70          | HBC            | 11.2 $\pi^- p$                     |

| <b>X<sub>2</sub>(2210)</b> $I^G(J^{PC}) = 0^+(2^{++})$ |                    |                    |             |                |                                                             |
|--------------------------------------------------------|--------------------|--------------------|-------------|----------------|-------------------------------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                             |
| 2210 ± 60                                              | 360 ± 120          | <sup>1</sup> KLEMP | 22          | RVUE           | $J/\psi \rightarrow \gamma \pi^0 \pi^0, \gamma K_S^0 K_S^0$ |

<sup>1</sup> Fit of the tensor partial waves from BES3 in the multipole basis. Might be a cluster of  $J^{PC} = 2^{++}$  resonances. The ratio of decay widths  $K K^- / \pi \pi$  is  $0.23 \pm 0.05$ .

| <b>h<sub>1</sub>(2215)</b> $I^G(J^{PC}) = 0^-(1^{+-})$ |                    |                        |             |                |                                                                 |
|--------------------------------------------------------|--------------------|------------------------|-------------|----------------|-----------------------------------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                 |
| 2215 ± 40                                              | 325 ± 55           | <sup>1</sup> ANISOVICH | 02B         | SPEC           | 0.6–1.9 $p \bar{p} \rightarrow \omega \eta, \omega \pi^0 \pi^0$ |

<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

| <b>ρ<sub>2</sub>(2225)</b> $I^G(J^{PC}) = 1^+(2^{--})$ |                                    |                        |             |                |                                                                              |
|--------------------------------------------------------|------------------------------------|------------------------|-------------|----------------|------------------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u>                 | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                              |
| 2225 ± 35                                              | 335 <sup>+100</sup> <sub>-50</sub> | <sup>1</sup> ANISOVICH | 02          | SPEC           | 0.6–1.9 $p \bar{p} \rightarrow \omega \pi^0, \omega \eta \pi^0, \pi^+ \pi^-$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>\rho_4(2230)</math> <math>I^G(J^{PC}) = 1^+(4^{--})</math></b> |                    |                        |             |                |                                                                         |
|-------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-------------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                       | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                         |
| 2230 ± 25                                                               | 210 ± 30           | <sup>1</sup> ANISOVICH | 02          | SPEC           | 0.6–1.9 $p\bar{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>b_1(2240)</math> <math>I^G(J^{PC}) = 1^+(1^{+-})</math></b> |                    |                        |             |                |                                                                         |
|----------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-------------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                    | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                                         |
| 2240 ± 35                                                            | 320 ± 85           | <sup>1</sup> ANISOVICH | 02          | SPEC           | 0.6–1.9 $p\bar{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$ |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>f_2(2240)</math> <math>I^G(J^{PC}) = 0^+(2^{++})</math></b>          |                    |                        |             |                |                               |
|-------------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-------------------------------|
| <u>MASS (MeV)</u>                                                             | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                               |
| 2240 ± 15                                                                     | 241 ± 30           | <sup>1</sup> ANISOVICH | 00J         | SPEC           | 1.92–2.41 $p\bar{p}$          |
| • • • We do not use the following data for averages, fits, limits, etc. • • • |                    |                        |             |                |                               |
| ~ 2226                                                                        | ~ 226              | HASAN                  | 94          | RVUE           | $p\bar{p} \rightarrow \pi\pi$ |

<sup>1</sup>From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B. See also ANISOVICH 12.

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| <b><math>b_3(2245)</math> <math>I^G(J^{PC}) = 1^+(3^{+-})</math></b> |                    |                    |             |                |  |
|----------------------------------------------------------------------|--------------------|--------------------|-------------|----------------|--|
| <u>MASS (MeV)</u>                                                    | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |  |
| 2245 ± 50                                                            | 320 ± 70           | <sup>1</sup> BUGG  | 04C         | RVUE           |  |

<sup>1</sup>From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>\eta_2(2250)</math> <math>I^G(J^{PC}) = 0^+(2^{-+})</math></b> |                    |                    |             |                |  |
|-------------------------------------------------------------------------|--------------------|--------------------|-------------|----------------|--|
| <u>MASS (MeV)</u>                                                       | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |  |
| 2248 ± 20                                                               | 280 ± 20           | ANISOVICH          | 00I         | SPEC           |  |
| 2267 ± 14                                                               | 290 ± 50           | ANISOVICH          | 00J         | SPEC           |  |

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| <b><math>\pi_4(2250)</math> <math>I^G(J^{PC}) = 1^-(4^{-+})</math></b> |                    |                    |             |                |                                                          |
|------------------------------------------------------------------------|--------------------|--------------------|-------------|----------------|----------------------------------------------------------|
| <u>MASS (MeV)</u>                                                      | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                          |
| 2250 ± 15                                                              | 215 ± 25           | ANISOVICH          | 01F         | SPEC           | 2.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$ |

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| <b><math>\omega_4(2250)</math> <math>I^G(J^{PC}) = 0^-(4^{--})</math></b> |                    |                        |             |                |                                                             |
|---------------------------------------------------------------------------|--------------------|------------------------|-------------|----------------|-------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                         | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u> |                                                             |
| 2250 ± 30                                                                 | 150 ± 50           | <sup>1</sup> ANISOVICH | 02B         | SPEC           | 0.6–1.9 $p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

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| <b><math>\omega_5(2250)</math>    <math>I^G(J^{PC}) = 0^-(5^{--})</math></b> |                    |                    |             |      |
|------------------------------------------------------------------------------|--------------------|--------------------|-------------|------|
| <u>MASS (MeV)</u>                                                            | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> |      |
| 2250 ± 70                                                                    | 320 ± 95           | <sup>1</sup> BUGG  | 04          | RVUE |

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<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

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| <b><math>\omega_3(2255)</math>    <math>I^G(J^{PC}) = 0^-(3^{--})</math></b> |                    |                        |             |                                                                  |
|------------------------------------------------------------------------------|--------------------|------------------------|-------------|------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                            | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                                   |
| 2255 ± 15                                                                    | 175 ± 30           | <sup>1</sup> ANISOVICH | 02B         | SPEC 0.6–1.9 $p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

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<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

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| <b><math>a_4(2255)</math>    <math>I^G(J^{PC}) = 1^-(4^{++})</math></b> |                                    |                        |             |                                               |
|-------------------------------------------------------------------------|------------------------------------|------------------------|-------------|-----------------------------------------------|
| <u>MASS (MeV)</u>                                                       | <u>WIDTH (MeV)</u>                 | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                |
| 2237 ± 5                                                                | 291 ± 12                           | UMAN                   | 06          | E835 5.2 $\bar{p}p \rightarrow \eta\eta\pi^0$ |
| 2255 ± 40                                                               | 330 <sup>+110</sup> <sub>−50</sub> | <sup>1</sup> ANISOVICH | 01F         | SPEC 1.96–2.41 $\bar{p}p$                     |

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<sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, and ANISOVICH 01F.

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| <b><math>a_2(2255)</math>    <math>I^G(J^{PC}) = 1^-(2^{++})</math></b> |                    |                        |             |                           |
|-------------------------------------------------------------------------|--------------------|------------------------|-------------|---------------------------|
| <u>MASS (MeV)</u>                                                       | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>            |
| 2255 ± 20                                                               | 230 ± 15           | <sup>1</sup> ANISOVICH | 01G         | SPEC 1.96–2.41 $\bar{p}p$ |

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<sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, ANISOVICH 01F, and ANISOVICH 01G.

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| <b><math>X(2260)</math>    <math>I^G(J^{PC}) = 0^+(4^{+?})</math></b> |                    |                    |             |                                            |
|-----------------------------------------------------------------------|--------------------|--------------------|-------------|--------------------------------------------|
| <u>MASS (MeV)</u>                                                     | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                             |
| 2260 ± 20                                                             | 400 ± 100          | EVANGELIS...       | 79          | OMEG 10,16 $\pi^- p \rightarrow \bar{p}pn$ |

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| <b><math>\rho(2270)</math>    <math>I^G(J^{PC}) = 1^+(1^{--})</math></b> |                    |                        |             |                                                                              |
|--------------------------------------------------------------------------|--------------------|------------------------|-------------|------------------------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                        | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                                               |
| 2265 ± 40                                                                | 325 ± 80           | <sup>1</sup> ANISOVICH | 02          | SPEC 0.6–1.9 $p\bar{p} \rightarrow \omega\pi^0, \omega\eta\pi^0, \pi^+\pi^-$ |
| 2280 ± 50                                                                | 440 ± 110          | ATKINSON               | 85          | OMEG 20–70 $\gamma p \rightarrow p\omega\pi^+\pi^-\pi^0$                     |

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<sup>1</sup> From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

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| <b><math>a_1(2270)</math>    <math>I^G(J^{PC}) = 1^-(1^{++})</math></b> |                                   |                    |             |                                                               |
|-------------------------------------------------------------------------|-----------------------------------|--------------------|-------------|---------------------------------------------------------------|
| <u>MASS (MeV)</u>                                                       | <u>WIDTH (MeV)</u>                | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                                |
| 2270 <sup>+55</sup> <sub>−40</sub>                                      | 305 <sup>+70</sup> <sub>−40</sub> | ANISOVICH          | 01F         | SPEC 2.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$ |

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**$h_3(2275)$**   $I^G(J^{PC}) = 0^-(3^{+-})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                                        |
|-------------------|--------------------|------------------------|-------------|-----------------------------------------------------------------------|
| $2275 \pm 25$     | $190 \pm 45$       | <sup>1</sup> ANISOVICH | 02B SPEC    | $0.6\text{--}1.9 \ p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

<sup>1</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. **$a_3(2275)$**   $I^G(J^{PC}) = 1^-(3^{++})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                 |
|-------------------|--------------------|------------------------|-------------|--------------------------------|
| $2275 \pm 35$     | $350^{+100}_{-50}$ | <sup>1</sup> ANISOVICH | 01G SPEC    | $1.96\text{--}2.41 \ p\bar{p}$ |

<sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99E, ANISOVICH 01F, and ANISOVICH 01G. **$\pi_2(2285)$**   $I^G(J^{PC}) = 1^-(2^{-+})$ 

| <u>MASS (MeV)</u>    | <u>WIDTH (MeV)</u>  | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                |
|----------------------|---------------------|------------------------|-------------|-------------------------------|
| $2285 \pm 20 \pm 25$ | $250 \pm 20 \pm 25$ | <sup>1</sup> ANISOVICH | 11 SPEC     | $0.9\text{--}1.94 \ p\bar{p}$ |

<sup>1</sup> Reanalysis of ADOMEIT 96 and ANISOVICH 00E. **$\omega_3(2285)$**   $I^G(J^{PC}) = 0^-(3^{--})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                                                        |
|-------------------|--------------------|------------------------|-------------|-----------------------------------------------------------------------|
| $2278 \pm 28$     | $224 \pm 50$       | <sup>1</sup> BUGG      | 04A RVUE    |                                                                       |
| $2285 \pm 60$     | $230 \pm 40$       | <sup>2</sup> ANISOVICH | 02B SPEC    | $0.6\text{--}1.9 \ p\bar{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$ |

<sup>1</sup> Partial wave analysis of the data on  $p\bar{p} \rightarrow \bar{\Lambda}\Lambda$  from BARNES 00.<sup>2</sup> From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B. **$\omega(2290)$**   $I^G(J^{PC}) = 0^-(1^{--})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|-------------------|--------------------|--------------------|-------------|----------------|
| $2290 \pm 20$     | $275 \pm 35$       | <sup>1</sup> BUGG  | 04A RVUE    |                |

<sup>1</sup> Partial wave analysis of the data on  $p\bar{p} \rightarrow \bar{\Lambda}\Lambda$  from BARNES 00. **$f_2(2295)$**   $I^G(J^{PC}) = 0^+(2^{++})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>     | <u>TECN</u> | <u>COMMENT</u>                 |
|-------------------|--------------------|------------------------|-------------|--------------------------------|
| $2293 \pm 13$     | $216 \pm 37$       | <sup>1</sup> ANISOVICH | 00J SPEC    | $1.92\text{--}2.41 \ p\bar{p}$ |

<sup>1</sup> From the combined analysis of ANISOVICH 99C, ANISOVICH 99F, ANISOVICH 99J, ANISOVICH 99K, and ANISOVICH 00B. See also ANISOVICH 12. **$f_3(2300)$**   $I^G(J^{PC}) = 0^+(3^{++})$ 

| <u>MASS (MeV)</u> | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |
|-------------------|--------------------|--------------------|-------------|----------------|
| $2334 \pm 25$     | $200 \pm 20$       | <sup>1</sup> BUGG  | 04A RVUE    |                |

<sup>1</sup>Partial wave analysis of the data on  $p\bar{p} \rightarrow \bar{\Lambda}\Lambda$  from BARNES 00.

|                               |                    |                             |             |      |  |
|-------------------------------|--------------------|-----------------------------|-------------|------|--|
| <b><math>f_1(2310)</math></b> |                    | $I^G(J^{PC}) = 0^+(1^{++})$ |             |      |  |
| <u>MASS (MeV)</u>             | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> |      |  |
| 2310±60                       | 255 ± 70           | ANISOVICH                   | 00J         | SPEC |  |

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|                                |                    |                             |             |      |  |
|--------------------------------|--------------------|-----------------------------|-------------|------|--|
| <b><math>\eta(2320)</math></b> |                    | $I^G(J^{PC}) = 0^+(0^{-+})$ |             |      |  |
| <u>MASS (MeV)</u>              | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> |      |  |
| 2320±15                        | 230 ± 35           | <sup>1</sup> ANISOVICH      | 00M         | SPEC |  |

<sup>1</sup> From the combined analysis of  $\bar{p}p \rightarrow \eta\eta\eta$  from ANISOVICH 00M and  $\bar{p}p \rightarrow \eta\pi^0\pi^0$  from ANISOVICH 00J.

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|                                  |                    |                             |             |                |                                           |
|----------------------------------|--------------------|-----------------------------|-------------|----------------|-------------------------------------------|
| <b><math>\eta_4(2330)</math></b> |                    | $I^G(J^{PC}) = 0^+(4^{-+})$ |             |                |                                           |
| <u>MASS (MeV)</u>                | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> | <u>COMMENT</u> |                                           |
| 2328±38                          | 240 ± 90           | ANISOVICH                   | 00J         | SPEC           | 2.0 $p\bar{p} \rightarrow \eta\pi^0\pi^0$ |

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|                                  |                    |                             |             |                |                                                      |
|----------------------------------|--------------------|-----------------------------|-------------|----------------|------------------------------------------------------|
| <b><math>\omega(2330)</math></b> |                    | $I^G(J^{PC}) = 0^-(1^{--})$ |             |                |                                                      |
| <u>MASS (MeV)</u>                | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> | <u>COMMENT</u> |                                                      |
| 2330±30                          | 435 ± 75           | ATKINSON                    | 88          | OMEG           | 25–50 $\gamma p \rightarrow \rho^\pm \rho^0 \pi^\mp$ |

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|                             |                    |                             |                     |             |                                     |
|-----------------------------|--------------------|-----------------------------|---------------------|-------------|-------------------------------------|
| <b><math>X(2340)</math></b> |                    | $I^G(J^{PC}) = ?^?(?^{??})$ |                     |             |                                     |
| <u>MASS (MeV)</u>           | <u>WIDTH (MeV)</u> | <u>EVS</u>                  | <u>DOCUMENT ID</u>  | <u>TECN</u> | <u>COMMENT</u>                      |
| 2340±20                     | 180 ± 60           | 126                         | <sup>1</sup> BALTAY | 75          | HBC 15 $\pi^+ p \rightarrow p 5\pi$ |

<sup>1</sup> Dominant decay into  $\rho^0 \rho^0 \pi^+$ . BALTAY 78 finds confirmation in  $2\pi^+ \pi^- 2\pi^0$  events which contain  $\rho^+ \rho^0 \pi^0$  and  $2\rho^+ \pi^-$ .

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|                               |                    |                             |             |                |                                                          |
|-------------------------------|--------------------|-----------------------------|-------------|----------------|----------------------------------------------------------|
| <b><math>\pi(2360)</math></b> |                    | $I^G(J^{PC}) = 1^-(0^{-+})$ |             |                |                                                          |
| <u>MASS (MeV)</u>             | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> | <u>COMMENT</u> |                                                          |
| 2360±25                       | $300^{+100}_{-50}$ | ANISOVICH                   | 01F         | SPEC           | 2.0 $\bar{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$ |

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|                             |                    |                             |             |                |                                    |
|-----------------------------|--------------------|-----------------------------|-------------|----------------|------------------------------------|
| <b><math>X(2360)</math></b> |                    | $I^G(J^{PC}) = ?^?(4^{+?})$ |             |                |                                    |
| <u>MASS (MeV)</u>           | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u>          | <u>TECN</u> | <u>COMMENT</u> |                                    |
| 2360±10                     | 430 ± 30           | ROZANSKA                    | 80          | SPRK           | 18 $\pi^- p \rightarrow p\bar{p}n$ |

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

|               |               |                      |      |      |                                                 |
|---------------|---------------|----------------------|------|------|-------------------------------------------------|
| 2356 ± 7 ± 15 | 304 ± 28 ± 54 | <sup>1</sup> ABLIKIM | 23AY | BES3 | $e^+e^- \rightarrow (\Lambda\bar{\Lambda})\eta$ |
|---------------|---------------|----------------------|------|------|-------------------------------------------------|

<sup>1</sup> Assuming  $J^{PC} = 1^{--}$ .

| <b>X(2440)</b> $I^G(J^{PC}) = ??(5^{-}?)$ |             | DOCUMENT ID | TECN | COMMENT                                   |
|-------------------------------------------|-------------|-------------|------|-------------------------------------------|
| MASS (MeV)                                | WIDTH (MeV) |             |      |                                           |
| 2440 ± 10                                 | 310 ± 20    | ROZANSKA    | 80   | SPRK 18 $\pi^- p \rightarrow p \bar{p} n$ |

| <b>a<sub>6</sub>(2450)</b> $I^G(J^{PC}) = 1^{--}(6^{++})$ |             | DOCUMENT ID | TECN | COMMENT                                   |
|-----------------------------------------------------------|-------------|-------------|------|-------------------------------------------|
| MASS (MeV)                                                | WIDTH (MeV) |             |      |                                           |
| 2450 ± 130                                                | 400 ± 250   | CLELAND     | 82B  | SPEC 50 $\pi p \rightarrow K_S^0 K^\pm p$ |

| <b>X(2540)</b> $I^G(J^{PC}) = 0^{+}(0^{++})$ |                                           | DOCUMENT ID | TECN | COMMENT                                     |
|----------------------------------------------|-------------------------------------------|-------------|------|---------------------------------------------|
| MASS (MeV)                                   | WIDTH (MeV)                               |             |      |                                             |
| 2539 ± 14 <sup>+38</sup> <sub>-14</sub>      | 274 <sup>+77+126</sup> <sub>-61-163</sub> | UEHARA      | 13   | BELL $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

| <b><math>\Gamma(\gamma\gamma) \times B(K\bar{K})</math></b> |  | DOCUMENT ID | TECN | COMMENT                                     |
|-------------------------------------------------------------|--|-------------|------|---------------------------------------------|
| VALUE (eV)                                                  |  |             |      |                                             |
| 40 <sup>+9+17</sup> <sub>-7-40</sub>                        |  | UEHARA      | 13   | BELL $\gamma\gamma \rightarrow K_S^0 K_S^0$ |

| <b>X(2600)</b> $I^G(J^{PC}) = ??(???)$        |                                       | DOCUMENT ID | TECN | COMMENT                                            |
|-----------------------------------------------|---------------------------------------|-------------|------|----------------------------------------------------|
| MASS (MeV)                                    | WIDTH (MeV)                           |             |      |                                                    |
| 2618.3 ± 2.0 <sup>+16.3</sup> <sub>-1.4</sub> | 195 ± 5 <sup>+26</sup> <sub>-17</sub> | ABLIKIM     | 22G  | BES3 $J/\psi \rightarrow \gamma \pi^+ \pi^- \eta'$ |

| <b><math>B(J/\psi \rightarrow \gamma X(2600)) \times B(X(2600) \rightarrow f_0(1500) \eta') \times B(f_0(1500) \rightarrow \pi^+ \pi^-)</math></b> |                      | DOCUMENT ID | TECN | COMMENT                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|------|-----------------------------------------------|
| VALUE (units 10 <sup>-5</sup> )                                                                                                                    |                      |             |      |                                               |
| 3.09 ± 0.21 <sup>+1.14</sup> <sub>-0.77</sub>                                                                                                      | <sup>1</sup> ABLIKIM | 22G         | BES3 | $J/\psi \rightarrow \gamma \pi^+ \pi^- \eta'$ |

<sup>1</sup> The  $\pi^+ \pi^-$  mass spectrum is described by a coherent sum of two Breit-Wigner resonances,  $f_0(1500)$  and a new  $X(1540)$  with mass  $1540.2 \pm 7.0^{+36.3}_{-6.1}$  MeV and width  $157 \pm 19^{+11}_{-77}$  MeV.

| <b><math>B(J/\psi \rightarrow \gamma X(2600)) \times B(X(2600) \rightarrow X(1540) \eta') \times B(X(1540) \rightarrow \pi^+ \pi^-)</math></b> |                      | DOCUMENT ID | TECN | COMMENT                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|------|-----------------------------------------------|
| VALUE (units 10 <sup>-5</sup> )                                                                                                                |                      |             |      |                                               |
| 2.69 ± 0.19 <sup>+0.38</sup> <sub>-1.21</sub>                                                                                                  | <sup>1</sup> ABLIKIM | 22G         | BES3 | $J/\psi \rightarrow \gamma \pi^+ \pi^- \eta'$ |

<sup>1</sup> The  $\pi^+ \pi^-$  mass spectrum is described by a coherent sum of two Breit-Wigner resonances,  $f_0(1500)$  and a new  $X(1540)$  with mass  $1540.2 \pm 7.0^{+36.3}_{-6.1}$  MeV and width  $157 \pm 19^{+11}_{-77}$  MeV.

| <b>K<sub>0</sub><sup>*</sup>(2600)</b> $I(J^P) = 1/2(0^+)$ |               | DOCUMENT ID       | TECN | COMMENT                                  |
|------------------------------------------------------------|---------------|-------------------|------|------------------------------------------|
| MASS (MeV)                                                 | WIDTH (MeV)   |                   |      |                                          |
| 2662 ± 59 ± 201                                            | 480 ± 47 ± 72 | <sup>1</sup> AAIJ | 23AH | LHCB $B^+ \rightarrow K^+ (K_S^0 K \pi)$ |

<sup>1</sup>From Dalitz plot analyses of  $\eta_c(1S, 2S) \rightarrow K_S^0 K^+ \pi^- + \text{c.c.}$ .

| <b>X(2632)</b> $I^G(J^{PC}) = ?^?(?^{??})$ |                    | <u>DOCUMENT ID</u>        | <u>TECN</u> | <u>COMMENT</u>                   |
|--------------------------------------------|--------------------|---------------------------|-------------|----------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |                           |             |                                  |
| $2635.2 \pm 3.3$                           |                    | <sup>1</sup> EVDOKIMOV 04 | SELX        | $X(2632) \rightarrow D_S^+ \eta$ |
| $2631.6 \pm 2.1$                           | $< 17$             | <sup>2</sup> EVDOKIMOV 04 | SELX        | $X(2632) \rightarrow D_S^0 K^+$  |

<sup>1</sup>From a mass difference to  $D_S^+$  of  $666.9 \pm 3.3$  MeV.

<sup>2</sup>From a mass difference to  $D_S^0$  of  $767.0 \pm 2.0$  MeV.

| <b>B(X(2632) <math>\rightarrow D_S^0 K^+</math>)/B(X(2632) <math>\rightarrow D_S^+ \eta</math>)</b> |  |                           | <u>DOCUMENT ID</u> | <u>TECN</u> |
|-----------------------------------------------------------------------------------------------------|--|---------------------------|--------------------|-------------|
| <u>VALUE</u>                                                                                        |  |                           |                    |             |
| $0.14 \pm 0.06$                                                                                     |  | <sup>1</sup> EVDOKIMOV 04 | SELX               |             |

<sup>1</sup>Possible interpretation of this decay pattern is discussed by YASUI 07.

| <b>X(2680)</b> $I^G(J^{PC}) = ?^?(?^{??})$ |                    | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                                  |
|--------------------------------------------|--------------------|--------------------|-------------|-------------------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |                    |             |                                                 |
| $2676 \pm 27$                              | 150                | CASO 70            | HBC         | $11.2 \pi^- p \rightarrow \rho^- \pi^+ \pi^- p$ |

| <b>X(2710)</b> $I^G(J^{PC}) = ?^?(6^{+?})$ |                    | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                       |
|--------------------------------------------|--------------------|--------------------|-------------|--------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |                    |             |                                      |
| $2710 \pm 20$                              | $170 \pm 40$       | ROZANSKA 80        | SPRK        | $18 \pi^- p \rightarrow p \bar{p} n$ |

| <b>X(2750)</b> $I^G(J^{PC}) = ?^?(7^{-?})$ |                    | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                           |
|--------------------------------------------|--------------------|--------------------|-------------|------------------------------------------|
| <u>MASS (MeV)</u>                          | <u>WIDTH (MeV)</u> |                    |             |                                          |
| $2747 \pm 32$                              | $195 \pm 75$       | DENNEY 83          | LASS        | $10 \pi^+ p \rightarrow K^+ K^- \pi^+ p$ |

| <b>f<sub>6</sub>(3100)</b> $I^G(J^{PC}) = 0^+(6^{++})$ |                    | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                       |
|--------------------------------------------------------|--------------------|--------------------|-------------|--------------------------------------|
| <u>MASS (MeV)</u>                                      | <u>WIDTH (MeV)</u> |                    |             |                                      |
| $3100 \pm 100$                                         | $700 \pm 130$      | BINON 05           | GAMS        | $33 \pi^- p \rightarrow \eta \eta n$ |

| <b>X(3250)</b> $I^G(J^{PC}) = ?^?(?^{??})$ 3-Body Decays |                    | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                            |
|----------------------------------------------------------|--------------------|--------------------|-------------|-------------------------------------------|
| <u>MASS (MeV)</u>                                        | <u>WIDTH (MeV)</u> |                    |             |                                           |
| $3250 \pm 8 \pm 20$                                      | $45 \pm 18$        | ALEEV 93           | BIS2        | $X(3250) \rightarrow \Lambda \bar{p} K^+$ |
| $3265 \pm 7 \pm 20$                                      | $40 \pm 18$        | ALEEV 93           | BIS2        | $X(3250) \rightarrow \bar{\Lambda} p K^-$ |

| <b>X(3250)</b> $I^G(J^{PC}) = ??(???)$ 4-Body Decays |                    |                    |             |                |                                                   |
|------------------------------------------------------|--------------------|--------------------|-------------|----------------|---------------------------------------------------|
| <u>MASS (MeV)</u>                                    | <u>WIDTH (MeV)</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u> |                                                   |
| $3245 \pm 8 \pm 20$                                  | $25 \pm 11$        | ALEEV              | 93          | BIS2           | $X(3250) \rightarrow \Lambda \bar{p} K^+ \pi^\pm$ |
| $3250 \pm 9 \pm 20$                                  | $50 \pm 20$        | ALEEV              | 93          | BIS2           | $X(3250) \rightarrow \bar{\Lambda} p K^- \pi^\mp$ |
| $3270 \pm 8 \pm 20$                                  | $25 \pm 11$        | ALEEV              | 93          | BIS2           | $X(3250) \rightarrow K_S^0 p \bar{p} K^\pm$       |

| <b>X(3350)</b> $I^G(J^{PC}) = ??(???)$ |                         |             |                       |             |                                                  |
|----------------------------------------|-------------------------|-------------|-----------------------|-------------|--------------------------------------------------|
| <u>MASS (MeV)</u>                      | <u>WIDTH (MeV)</u>      | <u>EVTS</u> | <u>DOCUMENT ID</u>    | <u>TECN</u> | <u>COMMENT</u>                                   |
| $3350^{+10}_{-20} \pm 20$              | $70^{+40}_{-30} \pm 40$ | $50 \pm 10$ | <sup>1</sup> GABYSHEV | 06A         | BELL $B^- \rightarrow \Lambda_c^+ \bar{p} \pi^-$ |

<sup>1</sup> A similar enhancement in the  $\Lambda_c^+ \bar{p}$  final state is also reported by BABAR collaboration in AUBERT 10H.

| <b><math>\psi(3760)</math></b> $I^G(J^{PC}) = ??(1^{--})$ |                      |      |             |                                            |  |
|-----------------------------------------------------------|----------------------|------|-------------|--------------------------------------------|--|
| <u>MASS (MeV)</u>                                         | <u>DOCUMENT ID</u>   |      | <u>TECN</u> | <u>COMMENT</u>                             |  |
| $3751.9 \pm 3.8 \pm 2.8$                                  | <sup>1</sup> ABLIKIM | 24BO | BES3        | $e^+ e^- \rightarrow \text{hadrons}$       |  |
| $\sim 3740$                                               | <sup>1</sup> ABLIKIM | 24E  | BES3        | $e^+ e^- \rightarrow \text{light hadrons}$ |  |

<sup>1</sup> Fit to cross sections for  $\sqrt{s} = 3645$  to  $3871$  MeV.

| <b><math>\psi(3780)</math></b> $I^G(J^{PC}) = ??(1^{--})$ |                      |      |             |                                            |  |
|-----------------------------------------------------------|----------------------|------|-------------|--------------------------------------------|--|
| <u>MASS (MeV)</u>                                         | <u>DOCUMENT ID</u>   |      | <u>TECN</u> | <u>COMMENT</u>                             |  |
| $3778.7 \pm 0.5 \pm 0.3$                                  | <sup>1</sup> ABLIKIM | 24BO | BES3        | $e^+ e^- \rightarrow \text{hadrons}$       |  |
| $\sim 3780$                                               | <sup>1</sup> ABLIKIM | 24E  | BES3        | $e^+ e^- \rightarrow \text{light hadrons}$ |  |

<sup>1</sup> Fit to cross sections for  $\sqrt{s} = 3645$  to  $3871$  MeV.

| <b><math>\psi(3810)</math></b> $I^G(J^{PC}) = ??(1^{--})$ |                      |      |             |                                            |  |
|-----------------------------------------------------------|----------------------|------|-------------|--------------------------------------------|--|
| <u>MASS (MeV)</u>                                         | <u>DOCUMENT ID</u>   |      | <u>TECN</u> | <u>COMMENT</u>                             |  |
| $3804.5 \pm 0.9 \pm 0.9$                                  | <sup>1</sup> ABLIKIM | 24BO | BES3        | $e^+ e^- \rightarrow \text{hadrons}$       |  |
| $\sim 3806$                                               | <sup>1</sup> ABLIKIM | 24E  | BES3        | $e^+ e^- \rightarrow \text{light hadrons}$ |  |

<sup>1</sup> Fit to cross sections for  $\sqrt{s} = 3645$  to  $3871$  MeV.

| <b><math>h_c(4000)</math></b> $I^G(J^{PC}) = 0^-(1^{+-})$ |                         |             |                    |             |                                           |
|-----------------------------------------------------------|-------------------------|-------------|--------------------|-------------|-------------------------------------------|
| <u>MASS (MeV)</u>                                         | <u>WIDTH (MeV)</u>      | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                            |
| $4000^{+17+29}_{-14-22}$                                  | $184^{+71+97}_{-45-61}$ | 1.6k        | <sup>1</sup> AAIJ  | 24AB        | LHCB $B^+ \rightarrow D^{*\pm} D^\mp K^+$ |

<sup>1</sup> From a simultaneous amplitude analysis of  $B^+ \rightarrow D^{*+} D^- K^+$ ,  $B^+ \rightarrow D^{*-} D^+ K^+$  and their c.c.

| <b><math>\chi_{c1}(4010)</math></b> $I^G(J^{PC}) = 0^+(1^{++})$ |                              |             |                    |             |                                           |
|-----------------------------------------------------------------|------------------------------|-------------|--------------------|-------------|-------------------------------------------|
| <u>MASS (MeV)</u>                                               | <u>WIDTH (MeV)</u>           | <u>EVTS</u> | <u>DOCUMENT ID</u> | <u>TECN</u> | <u>COMMENT</u>                            |
| $4012.5^{+3.6+4.1}_{-3.9-3.7}$                                  | $62.7^{+7.0+6.4}_{-6.4-6.6}$ | 1.6k        | <sup>1</sup> AAIJ  | 24AB        | LHCB $B^+ \rightarrow D^{*\pm} D^\mp K^+$ |

<sup>1</sup> From a simultaneous amplitude analysis of  $B^+ \rightarrow D^{*+} D^- K^+$ ,  $B^+ \rightarrow D^{*-} D^+ K^+$  and their c.c.

| $h_c(4300)$                    | $I^G(J^{PC}) = 0^-(1^{+-})$ |      |                   |           |                                      |  |
|--------------------------------|-----------------------------|------|-------------------|-----------|--------------------------------------|--|
| MASS (MeV)                     | WIDTH (MeV)                 | EVTs | DOCUMENT ID       | TECN      | COMMENT                              |  |
| $4307.3^{+6.4+3.3}_{-6.6-4.1}$ | $58^{+28+28}_{-16-25}$      | 1.6k | <sup>1</sup> AAIJ | 24AB LHCb | $B^+ \rightarrow D^{*\pm} D^\mp K^+$ |  |

<sup>1</sup> From a simultaneous amplitude analysis of  $B^+ \rightarrow D^{*+} D^- K^+$ ,  $B^+ \rightarrow D^{*-} D^+ K^+$  and their c.c.

| $\psi(4500)$               | $I^G(J^{PC}) = 0^-(1^{--})$ |  |                      |           |                                            |  |
|----------------------------|-----------------------------|--|----------------------|-----------|--------------------------------------------|--|
| MASS (MeV)                 | WIDTH (MeV)                 |  | DOCUMENT ID          | TECN      | COMMENT                                    |  |
| $4544.2 \pm 18.7 \pm 1.7$  | $116.1 \pm 33.5 \pm 1.7$    |  | <sup>1</sup> ABLIKIM | 24D BES3  | $e^+ e^- \rightarrow \omega \gamma J/\psi$ |  |
| $4469.1 \pm 26.2 \pm 3.6$  | $246.3 \pm 36.7 \pm 9.4$    |  | <sup>2</sup> ABLIKIM | 23X BES3  | $e^+ e^- \rightarrow D^{*0} D^{*-} \pi^+$  |  |
| $4484.7 \pm 13.3 \pm 24.1$ | $111.1 \pm 30 \pm 15.2$     |  | <sup>3</sup> ABLIKIM | 22AU BES3 | $e^+ e^- \rightarrow K^+ K^- J/\psi$       |  |

<sup>1</sup> Assuming one single Breit-Wigner resonance in  $\omega \chi_{c2}(1P)$  ( $\chi_{c2} \rightarrow \gamma J/\psi$ ). Measured  $\Gamma_{ee} \cdot B(\omega \chi_{c1}(1P)) = 1.86 \pm 0.32 \pm 0.13$  eV.

<sup>2</sup> From a cross-section measurement of  $e^+ e^- \rightarrow D^{*0} D^{*-} \pi^+$  between 4.189 and 4.951 GeV, assuming a coherent sum of 3 Breit-Wigner resonances plus a continuum amplitude.  $\Gamma(e^+ e^-) \cdot B(D^{*0} D^{*-} \pi^+) = 107\text{--}1744$  eV depending on solutions I – VIII with the same fit qualities. The two other resonances have masses (widths)  $4209.6 \pm 7.5$  ( $81.6 \pm 19.9$ ) MeV and  $4675.3 \pm 29.7$  ( $218.3 \pm 73.5$ ) MeV.

<sup>3</sup> ABLIKIM 22AU cross sections analysis of the process  $e^+ e^- \rightarrow K^+ K^- J/\psi$  at c.m. energies 4.127–4.600 GeV from  $15.6 \text{ fb}^{-1}$  of data.

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