Further States

OMITTED FROM SUMMARY TABLE

This section contains states observed by a single group OR STATES POORLY ESTABLISHED that thus need confirmation. Publications that exclude earlier claims in this section are listed under 'Other Related Papers.'

QUANTUM NUMBERS, MASSES, WIDTHS, AND BRANCHING RATIOS

X(1110) $I^G(J^{PC}) = 0^+(\text{even}\ ^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1107 ± 4	111 ± 8 ± 15	DAFTARI	87	DBC	0. $\overline{p}n \to \rho^- \pi^+ \pi^-$

f_0(1200–1600) $I^G(J^{PC}) = 0^+(0^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
1480^{+100}_{-150}	1030^{+80}_{-170}	[5] ANISOVICH	03	SPEC
1530^{+90}_{-250}	560 ± 40	[6] ANISOVICH	03	SPEC

X(1420) $I^G(J^{PC}) = 2^+(0^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1420 ± 20	160 ± 10	FILIPPI	00	OBLX	0 $\overline{n}p \to \pi^+ \pi^+ \pi^-$

X(1600) $I^G(J^{PC}) = 2^+(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1600 ± 100	400 ± 200	[7] ALBRECHT	91F	ARG	10.2 $e^+e^- \to e^+e^- 2(\pi^+\pi^-)$

X(1650) $I^G(J^{PC}) = 0^-(?^{?-})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1652 ± 7	<50	100	PROKOSHKIN 96	GAM2	32,38 $\pi p \to \omega \eta n$

X(1750) $I^G(J^{PC}) = ?^?(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1753.5 ± 1.5 ± 2.3	122.2 ± 6.2 ± 8.0	LINK	02K	FOCS	20–160 $\gamma p \to K^+ K^- p$

B($X(1750) \to \overline{K}^*(892)^0 K^0 \to K^\pm \pi^\mp K^0_S$)/B($X(1750) \to K^+ K^-$)

VALUE	CL%	DOCUMENT ID		TECN
<0.065	90	LINK	02K	FOCS

B($X(1750) \to \overline{K}^*(892)^\pm K^\mp \to K^\pm \pi^\mp K^0_S$)/B($X(1750) \to K^+ K^-$)

VALUE	CL%	DOCUMENT ID		TECN
<0.183	90	LINK	02K	FOCS

$X(1775)$ $I^G(J^{PC}) = 1^-(?^{-+})$

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

$X(1855)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1856.6±5	20 ± 5	BRIDGES	86D	SPEC	0. $\overline{p}d \to \pi\pi N$

$X(1860)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1859^{+6}_{-27}	<30	BAI	03F	BES2	$J/\psi \to \gamma p\overline{p}$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
~ 1870	~ 10	DALKAROV	97	RVUE	0.0 $\overline{p}d \to p3\pi^-2\pi^+$

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

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

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1874±43±96	385 ± 121 ± 114	CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.2	[8] CHUNG	02	E852	18.3 $\pi^- p \to \pi^+\pi^-\pi^- p$

B(a_3(1875) → ρ_3(1690)π)/B(a_3(1875) → $\rho\pi$)

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.3	[8] CHUNG	02	E852	18.3 $\pi^- p \to \pi^+ \pi^- \pi^- p$

π_2(1880) $I^G(J^{PC}) = 1^-(2^{-+})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1876±11± 67	146 ± 17 ± 62	145k	LU	05	E852	18 $\pi^- p \to \omega \pi^- \pi^0 p$
2003±88±148	306 ± 132 ± 121	69k	KUHN	04	E852	18 $\pi^- p \to \eta \pi^+ \pi^- \pi^- p$
1880±20	255 ± 45		ANISOVICH	01B		$\overline{p}p \to (a_2(1320)\eta)\pi^0$

B(π_2(1880) → a_2(1320)η) / B(π_2(1880) → f_1(1285)π)

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
22.7±7.3	69k	KUHN	04	E852	18 $\pi^- p \to \eta \pi^+ \pi^- \pi^- p$

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a_1(1930) $I^G(J^{PC}) = 1^-(1^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1930^{+30}_{-70}	155 ± 45	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

X(1935) $I^G(J^{PC}) = 1^+(1^{-?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
1935±20	215 ± 30	EVANGELISTA 79	OMEG	10,16 $\pi^- p \to \overline{p} p n$

ρ_2(1940) $I^G(J^{PC}) = 1^+(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1940±40	155 ± 40	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

ω_3(1945) $I^G(J^{PC}) = 0^-(3^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1945±20	115 ± 22	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

ω(1960) $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±25	195 ± 60	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$b_1(1960)$ $I^G(J^{PC}) = 1^+(1^{+-})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960 ± 35	230 ± 50	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho(1965)$ $I^G(J^{PC}) = 1^+(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1970 ± 30	260 ± 45	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2000 ± 30	295 ± 85	ANISOVICH	00J	SPEC	

$h_1(1965)$ $I^G(J^{PC}) = 0^-(1^{+-})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1965 ± 45	345 ± 75	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$f_1(1970)$ $I^G(J^{PC}) = 0^+(1^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
1971 ± 15	240 ± 45	ANISOVICH	00J	SPEC

$X(1970)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1970 ± 10	40 ± 20	CHLIAPNIK...	80	HBC	32 $K^+p \to 2K^0_S 2\pi X$

$X(1975)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1973 ± 15	80	30	CASO	70	HBC	11.2 $\pi^- p \to \rho 2\pi$

$\omega_2(1975)$ $I^G(J^{PC}) = 0^-(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1975 ± 20	175 ± 25	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$a_2(1990)$ $I^G(J^{PC}) = 1^-(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$2003 \pm 10 \pm 19$	$249 \pm 23 \pm 32$	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
1990^{+15}_{-30}	190 ± 50	ANISOVICH	99C	SPEC	

$\rho(2000)$ $I^G(J^{PC}) = 1^+(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2000 ± 30	295 ± 85	ANISOVICH	00J	SPEC

$f_2(2000)$ $I^G(J^{PC}) = 0^+(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2001 ± 10	312 ± 32	ANISOVICH	00J	SPEC

$X(2000)$ $I^G(J^{PC}) = 1^-(?^{?+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1964 ± 35	225 ± 50	[11] ARMSTRONG	93D	E760		$\overline{p}p \to 3\pi^0 \to 6\gamma$
~ 2100	~ 500	[11] ANTIPOV	77	CIBS	$-$	25 $\pi^- p \to p\pi^- \rho_3$
2214 ± 15	355 ± 21	[12] BALTAY	77	HBC	0	15 $\pi^- p \to \Delta^{++} 3\pi$
2080 ± 40	340 ± 80	KALELKAR	75	HBC	$+$	15 $\pi^+ p \to p\pi^+ \rho_3$

$X(2000)$ $I^G(J^{PC}) = ?^?(4^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$1998 \pm 3 \pm 5$	<15	VLADIMIRSKY	03	SPEC	$\pi^- p \to K^0_S K^0_S M M$

$\pi_2(2005)$ $I^G(J^{PC}) = 1^-(2^{-+})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$1974 \pm 14 \pm 83$	$341 \pm 61 \pm 139$	145k	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$
2005 ± 15	200 ± 40		ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\eta(2010)$ $I^G(J^{PC}) = 0^+(0^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2010^{+35}_{-60}	270 ± 60	ANISOVICH	00J	SPEC

$\pi_1(2015)$ $I^G(J^{PC}) = 1^-(1^{-+})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2013 ± 25 OUR AVERAGE						
$2014 \pm 20 \pm 16$	$230 \pm 32 \pm 73$	145k	LU	05	E852	18 $\pi^- p \to \omega\pi^-\pi^0 p$

$2001 \pm 30 \pm 92$	$333 \pm 52 \pm 49$	69k	KUHN	04	E852	18 $\pi^- p \to \eta \pi^+ \pi^- \pi^- p$

$a_0(2020)$ $I^G(J^{PC}) = 1^-(0^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2025 ± 30	330 ± 75	ANISOVICH	99C	SPEC

$X(2020)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2015 ± 3	10 ± 4	FERRER	99	RVUE	$\pi p \to p p \overline{p} \pi (\pi)$

$h_3(2025)$ $I^G(J^{PC}) = 0^-(3^{+-})$

MASS (MeV)	WIDTH (MeV)		DOCUMENT ID		TECN	COMMENT
2025 ± 20	145 ± 30	[10]	ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega \eta$, $\omega \pi^0 \pi^0$

$b_3(2025)$ $I^G(J^{PC}) = 1^+(3^{+-})$

MASS (MeV)	WIDTH (MeV)		DOCUMENT ID		TECN	COMMENT
2032 ± 12	117 ± 11	[9]	ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega \pi^0$, $\omega \eta \pi^0$, $\pi^+ \pi^-$

$\eta_2(2030)$ $I^G(J^{PC}) = 0^+(2^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
$2030 \pm 5 \pm 15$	$205 \pm 10 \pm 15$	ANISOVICH	00E	SPEC

$B(a_2 \pi)_{L=0}/B(a_2 \pi)_{L=2}$

VALUE		DOCUMENT ID		TECN
0.74 ± 0.17	[13]	ANISOVICH	00E	SPEC

$B(a_0 \pi)/B(a_2 \pi)_{L=2}$

VALUE		DOCUMENT ID		TECN
0.072 ± 0.016	[13]	ANISOVICH	00E	SPEC

$B(f_2 \eta)/B(a_2 \pi)_{L=2}$

VALUE		DOCUMENT ID		TECN
0.074 ± 0.026	[13]	ANISOVICH	00E	SPEC

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2048 ± 8	213 ± 34	ANISOVICH	00J	SPEC

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
~ 2050	~ 120	[14] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2060	~ 50	[14] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$

$\pi(2070)$ $I^G(J^{PC}) = 0^-(0^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2070 ± 35	310^{+100}_{-50}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$a_3(2070)$ $I^G(J^{PC}) = 1^-(3^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2070 ± 20	170 ± 40	ANISOVICH	99C	SPEC

$X(2075)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$2075 \pm 12 \pm 5$	**$90 \pm 35 \pm 9$**	[1] ABLIKIM	04J	BES2	$J/\psi \to K^- p\overline{\Lambda}$

[1] From a fit in the region $M_{p\overline{\Lambda}} - M_p - M_\Lambda < 150$ MeV. S-wave in the $p\overline{\Lambda}$ system preferred.

$a_2(2080)$ $I^G(J^{PC}) = 1^-(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2060 ± 20	195 ± 30	ANISOVICH	99C	SPEC
2100^{+10}_{-30}	360^{+40}_{-100}	ANISOVICH	99E	SPEC

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

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

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

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

$a_1(2095)$ $I^G(J^{PC}) = 1^-(1^{++})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$2096 \pm 17 \pm 121$	**$451 \pm 41 \pm 81$**	69k	KUHN	04	E852	18 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$

B(a_1(2095) → f_1(1285)π) / B(a_1(2095) → a_1(1260))

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
3.18±0.64	69k	KUHN	04	E852	18 $\pi^- p \to \eta \pi^+ \pi^- \pi^- p$

η(2100) $I^G(J^{PC}) = 0^+(0^{-+})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2103±50	187 ± 75	586	[15] BISELLO	89B	DM2	$J/\psi \to 4\pi\gamma$

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

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

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2110±10	330 ± 20	EVANGELISTA 79	OMEG	10,16 $\pi^- p \to \overline{p} p n$

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

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2141±12	49 ± 28	389	GREEN	86	MPSF	400 $pA \to 4KX$

ω(2145) $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2150±20	235 ± 30	ANISOVICH	01C	SPEC	0.6–1.9 $\overline{p}p \to \omega\eta$
2145±20	200 ± 25	ANISOVICH	00D	SPEC	

X(2150) $I^G(J^{PC}) = ?^?(2^{+?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2150±10	260 ± 10	ROZANSKA	80	SPRK	18 $\pi^- p \to p\overline{p}n$

a_2(2175) $I^G(J^{PC}) = 0^-(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2175±40	310^{+90}_{-45}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

η(2190) $I^G(J^{PC}) = 0^+(0^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2190±50	850 ± 100	BUGG	99	BES

$\omega_2(2195)$ $I^G(J^{PC}) = 0^-(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2195 ± 30	225 ± 40	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$\omega(2205)$ $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2205 ± 30	350 ± 90	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2210^{+79}_{-21}	203^{+437}_{-87}	EVANGELISTA	79B	OMEG	10 $\pi^- p \to K^+ K^- n$

$X(2210)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2207 ± 22	130	CASO	70	HBC	11.2 $\pi^- p$

$h_1(2215)$ $I^G(J^{PC}) = 0^-(1^{+-})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2215 ± 40	325 ± 55	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$b_1(2240)$ $I^G(J^{PC}) = 1^+(1^{+-})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2240 ± 35	320 ± 85	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho_2(2240)$ $I^G(J^{PC}) = 1^+(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2225 ± 35	335^{+100}_{-50}	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\rho_4(2240)$ $I^G(J^{PC}) = 1^+(4^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2230 ± 25	210 ± 30	[9] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\pi_2(2245)$ $I^G(J^{PC}) = 0^-(2^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2245 ± 60	320^{+100}_{-40}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\eta_2(2250)$ $I^G(J^{PC}) = 0^+(2^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2248 ± 20	280 ± 20	ANISOVICH	00I	SPEC
2267 ± 14	290 ± 50	ANISOVICH	00J	SPEC

$\pi_4(2250)$ $I^G(J^{PC}) = 1^-(4^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2250 ± 15	215 ± 25	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$\omega_4(2250)$ $I^G(J^{PC}) = 0^-(4^{--})$

MASS (MeV)	WIDTH (MeV)		DOCUMENT ID		TECN	COMMENT
2250 ± 30	150 ± 50	[10]	ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$\omega_3(2255)$ $I^G(J^{PC}) = 0^-(3^{--})$

MASS (MeV)	WIDTH (MeV)		DOCUMENT ID		TECN	COMMENT
2255 ± 15	175 ± 30	[10]	ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$X(2260)$ $I^G(J^{PC}) = 0^+(4^{+?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN	COMMENT
2260 ± 20	400 ± 100	EVANGELISTA 79	OMEG	10,16 $\pi^- p \to \overline{p}pn$

$\rho(2265)$ $I^G(J^{PC}) = 1^+(1^{--})$

MASS (MeV)	WIDTH (MeV)		DOCUMENT ID		TECN	COMMENT
2265 ± 40	325 ± 80	[9]	ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$a_1(2270)$ $I^G(J^{PC}) = 1^-(1^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2270^{+55}_{-40}	305^{+70}_{-40}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

$a_2(2270)$ $I^G(J^{PC}) = 1^-(2^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2265 ± 20	235^{+60}_{-35}	ANISOVICH	99C	SPEC
2280 ± 30	280 ± 50	ANISOVICH	99E	SPEC

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2275 ± 25	190 ± 45	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$a_4(2280)$ $I^G(J^{PC}) = 1^-(4^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2300 ± 20	230 ± 40	ANISOVICH	99C	SPEC
2260 ± 15	180 ± 20	ANISOVICH	99E	SPEC

$\eta(2280)$ $I^G(J^{PC}) = 0^+(0^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2285 ± 20	325 ± 30	ANISOVICH	00J	SPEC
2320 ± 15	230 ± 35	[16] ANISOVICH	00M	SPEC

$\rho(2280)$ $I^G(J^{PC}) = 1^+(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2280 ± 50	440 ± 110	ATKINSON	85	OMEG	20–70 $\gamma p \to p\omega\pi^+\pi^-\pi^0$

$\omega_3(2285)$ $I^G(J^{PC}) = 0^-(3^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2285 ± 60	230 ± 40	[10] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$X(2290)$ $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2290 ± 20	**275 ± 35**	[2] BUGG	04A	RVUE

[2] Partial wave analysis of the data on $p\overline{p} \to \overline{\Lambda}\Lambda$ from BARNES 00.

$f_3(2300)$ $I^G(J^{PC}) = 0^+(3^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2303 ± 15	214 ± 29	ANISOVICH	00J	SPEC

$\rho_3(2300)$ $I^G(J^{PC}) = 1^+(3^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2300^{+50}_{-80}	340 ± 50	ANISOVICH	00J	SPEC

$a_3(2310)$ $I^G(J^{PC}) = 1^-(3^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2310 ± 40	180^{+120}_{-60}	ANISOVICH	99C	SPEC

$f_1(2310)$ $I^G(J^{PC}) = 0^+(1^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2310 ± 60	255 ± 70	ANISOVICH	00J	SPEC

$\eta_4(2320)$ $I^G(J^{PC}) = 0^+(4^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2328 ± 38	240 ± 90	ANISOVICH	00J	SPEC

$f_0(2330)$ $I^G(J^{PC}) = 0^+(0^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2337 ± 14	217 ± 33	ANISOVICH	00J	SPEC
~ 2321	~ 223	HASAN	94	

$\omega(2330)$ $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2330 ± 30	435 ± 75	ATKINSON	88	OMEG	25–50 $\gamma p \to \rho^\pm \rho^0 \pi^\mp$

$a_1(2340)$ $I^G(J^{PC}) = 1^-(1^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2340 ± 40	230 ± 70	ANISOVICH	99E	SPEC

$X(2340)$ $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2340 ± 20	180 ± 60	126	[17] BALTAY	75	HBC	15 $\pi^+ p \to p 5\pi$

$\pi(2360)$ $I^G(J^{PC}) = 0^-(0^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360 ± 25	300^{+100}_{-50}	ANISOVICH	01F	SPEC	2.0 $\overline{p}p \to 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

X(2360) $I^G(J^{PC}) = ?^?(4^{+?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2360±10	430 ± 30	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

X(2440) $I^G(J^{PC}) = ?^?(5^{-?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2440±10	310 ± 20	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

X(2632) $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2632.6±1.8 OUR AVERAGE					
2635.2±3.3		[3] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D_s^+ \eta$
2631.6±2.1	< 17	[4] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D^0 K^+$

[3] From a mass difference to D_s^+ of 666.9 ± 3.3 MeV.

[4] From a mass difference to D^0 of 767.0 ± 2.0 MeV.

B(X(2632) → $D^0 K^+$)/B(X(2632) → $D_s^+ \eta$)

VALUE	DOCUMENT ID		TECN
0.14±0.06	EVDOKIMOV	04	SELX

X(2680) $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2676±27	150	CASO	70	HBC	11.2 $\pi^- p \rightarrow \rho^- \pi^+ \pi^- p$

X(2710) $I^G(J^{PC}) = ?^?(6^{+?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2710±20	170 ± 40	ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

X(2750) $I^G(J^{PC}) = ?^?(7^{-?})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2747±32	195 ± 75	DENNEY	83	LASS	10 $\pi^+ p \rightarrow K^+ K^- \pi^+ p$

X(3250) $I^G(J^{PC}) = ?^?(?^{??})$ 3-Body Decays

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3250±8±20	45 ± 18	ALEEV	93	BIS2	$X(3250) \rightarrow \Lambda\overline{p}K^+$
3265±7±20	40 ± 18	ALEEV	93	BIS2	$X(3250) \rightarrow \overline{\Lambda}pK^-$

X(3250) $I^G(J^{PC}) = ?^?(?^{??})$ 4-Body Decays

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
$3245 \pm 8 \pm 20$	25 ± 11	ALEEV	93	BIS2	$X(3250) \to \Lambda \overline{p} K^+ \pi^\pm$
$3250 \pm 9 \pm 20$	50 ± 20	ALEEV	93	BIS2	$X(3250) \to \overline{\Lambda} p K^- \pi^\mp$
$3270 \pm 8 \pm 20$	25 ± 11	ALEEV	93	BIS2	$X(3250) \to K^0_S p \overline{p} K^\pm$

FOOTNOTES for Further States

[5] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\pi^+ \pi^- \to \pi^+ \pi^-$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K^0_S K^0_S \pi^0$, $K^+ K^0_S \pi^-$ at rest, $\overline{p} n \to \pi^- \pi^- \pi^+$, $K^0_S K^- \pi^0$, $K^0_S K^0_S \pi^-$ at rest.

[6] K-matrix pole from combined analysis of $\pi^- p \to \pi^0 \pi^0 n$, $\pi^- p \to K \overline{K} n$, $\overline{p} p \to \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$ at rest.

[7] Our estimate.

[8] Using the observable fractions of 50.0% $\rho \pi$, 56.5% $f_2 \pi$, and 11.8% $\rho_3 \pi$.

[9] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

[10] From the combined analysis of ANISOVICH 00D, ANISOVICH 01C, and ANISOVICH 02B.

[11] Cannot determine spin to be 3.

[12] BALTAY 77 favors $J^P = ,3^+$.

[13] Corrected for all decay modes.

[14] See SEMENOV 99 and KLOET 96.

[15] ASTON 81B sees no peak, has 850 events in Ajinenko+Barth bins. ARESTOV 80 sees no peak.

[16] Combined fit along with data of ANISOVICH 00J.

[17] 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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