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(1070) $I^G(J^{PC}) = ?^?(0^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		COMMENT
1072.4 ± 0.8	$3.5^{+1.5}_{-1.0}$	GRIGOR'EV	05	$40\ \pi^- p \rightarrow K^0_S K^0_S n$

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

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

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1323 ± 8	237 ± 20	VLADIMIRSK...	06	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
1480^{+100}_{-150}	1030^{+80}_{-170}	[1] ANISOVICH	03	SPEC	
1530^{+90}_{-250}	560 ± 40	[2] 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	$0\ \overline{n} p \rightarrow \pi^+ \pi^+ \pi^-$

X(1575) $I^G(J^{PC}) = ?^?(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1576^{+49+98}_{-55-91}	$818^{+22+64}_{-23-133}$	[3] ABLIKIM	06S	BES	$J/\psi \rightarrow K^+ K^- \pi^0$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1600 ± 100	400 ± 200	[4] ALBRECHT	91F	ARG	$10.2\ e^+ e^- \rightarrow e^+ e^- 2(\pi^+ \pi^-)$

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

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

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

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

f_2(1750) $I^G(J^{PC}) = 0^+(2^{++})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1755±10	67 ± 12	870	[5] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

Γ($K\overline{K}$)

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
17±5	870	[6] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

Γ($\gamma\gamma$)

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.13±0.04	870	[6] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

Γ($\pi\pi$)

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1.3±1.0	870	[6] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

Γ($\eta\eta$)

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2.0±0.5	870	[6] SCHEGELSKY 06A	RVUE	$\gamma\gamma \to K^0_S K^0_S$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1870±40	250 ± 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±43±96	385 ± 121 ± 114	CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.8±0.2	[7] CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.9±0.3	[7] CHUNG	02	B852	18.3 $\pi^- p \rightarrow \pi^+\pi^-\pi^- p$

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	B852	18 $\pi^- p \rightarrow \omega\pi^-\pi^0 p$
2003±88±148	306 ± 132 ± 121	69k	KUHN	04	B852	18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$
1880±20	255 ± 45		ANISOVICH	01B		$\overline{p}p \rightarrow (a_2(1320)\eta)\pi^0$

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	B852	18 $\pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$

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 $\overline{p}p \rightarrow 3\pi^0$, $\pi^0\eta$, $\pi^0\eta'$

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

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

ρ_2(1940) $I^G(J^{PC}) = 1^+(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1940±40	155 ± 40	[8] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\omega_3(1945)$ $I^G(J^{PC}) = 0^-(3^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1945±20	115 ± 22	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$\omega(1960)$ $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1960±25	195 ± 60	[9] 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	[8] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
1965±45	345 ± 75	[9] 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	[9] 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)	EVTS	DOCUMENT ID		TECN	COMMENT
2050±10±40	190 ± 22 ± 100	18k	[10] SCHEGELSKY	06	RVUE	$\gamma\gamma \to \pi^+\pi^-\pi^0$
2003±10±19	249 ± 23 ± 32		LU	05	B852	18 $\pi^-p \to \omega\pi^-\pi^0 p$
1990^{+15}_{-30}	190 ± 50		ANISOVICH	99C	SPEC	

$\Gamma(\gamma\gamma)\ \Gamma(\pi^+\pi^-\pi^0)$ / Γ(total)

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
$0.11 \pm 0.04 \pm 0.05$	18k	[10] SCHEGELSKY 06	RVUE	$\gamma\gamma \rightarrow \pi^+\pi^-\pi^0$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID	TECN
2000 ± 30	260 ± 45	[8] BUGG 04C	RVUE

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

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		$\overline{p}p \rightarrow 3\pi^0 \rightarrow 6\gamma$
~ 2100	~ 500	[11] ANTIPOV 77	CIBS	$-$	$25\ \pi^- p \rightarrow p\pi^-\rho_3$
2214 ± 15	355 ± 21	[12] BALTAY 77	HBC	0	$15\ \pi^- p \rightarrow \Delta^{++} 3\pi$
2080 ± 40	340 ± 80	KALELKAR 75	HBC	$+$	$15\ \pi^+ p \rightarrow p\pi^+\rho_3$

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

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

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

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
$1974 \pm 14 \pm 83$	$341 \pm 61 \pm 139$	145k	LU 05	B852	$18\ \pi^- p \rightarrow \omega\pi^-\pi^0 p$
2005 ± 15	200 ± 40		ANISOVICH 01F	SPEC	$2.0\ \overline{p}p \rightarrow 3\pi^0, \pi^0\eta, \pi^0\eta'$

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

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
$2014 \pm 20 \pm 16$	$230 \pm 32 \pm 73$	145k	LU 05	B852	$18\ \pi^- p \rightarrow \omega\pi^-\pi^0 p$
$2001 \pm 30 \pm 92$	$333 \pm 52 \pm 49$	69k	KUHN 04	B852	$18\ \pi^- p \rightarrow \eta\pi^+\pi^-\pi^- p$

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

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	$\pi p \rightarrow p p \overline{p} \pi (\pi)$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2025±20	145 ± 30	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta$, $\omega\pi^0\pi^0$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2032±12	117 ± 11	[8] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2030±5±15	205 ± 10 ± 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	COMMENT
2048±8	213 ± 34	ANISOVICH	00J	SPEC	2.0 $p\overline{p} \rightarrow \eta\pi^0\pi^0$

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

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

$\pi(2070)$ $I^G(J^{PC}) = 1^-(0^{-+})$

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

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

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
$2075 \pm 12 \pm 5$	$90 \pm 35 \pm 9$	[15]	ABLIKIM	04J	BES2	$J/\psi \rightarrow K^- p \overline{\Lambda}$

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

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	$13\ \pi^- d \rightarrow p\overline{p}n(n_s)$

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

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

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

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
$2096 \pm 17 \pm 121$	$451 \pm 41 \pm 81$	69k	KUHN	04	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 ± 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
2103 ± 50	187 ± 75	586	[16]	BISELLO	89B	DM2	$J/\psi \rightarrow 4\pi\gamma$

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

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

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

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

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 $pA \rightarrow 4KX$

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

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

a_2(2175) $I^G(J^{PC}) = 1^-(2^{++})$

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

η(2190) $I^G(J^{PC}) = 0^+(0^{-+})$

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

ω_2(2195) $I^G(J^{PC}) = 0^-(2^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2195±30	225 ± 40	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

ω(2205) $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2205±30	350 ± 90	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta, \omega\pi^0\pi^0$

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

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

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	[9] 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	[8] 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}	[8] 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	[8] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$

$\pi_2(2245)$ $I^G(J^{PC}) = 1^-(2^{-+})$

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

$b_3(2245)$ $I^G(J^{PC}) = 1^+(3^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2245±50	320 ± 70	[8] BUGG	04C	RVUE

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

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	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \to \omega\eta$, $\omega\pi^0\pi^0$

$\omega_5(2250)$ $I^G(J^{PC}) = 0^-(5^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2250±70	320 ± 95	[9] BUGG	04	RVUE

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2255±15	175 ± 30	[9] 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	EVANGELIS...	79	OMEG	10,16 $\pi^- p \to \overline{p} p n$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2265±40	325 ± 80	[8] ANISOVICH	02	SPEC	0.6–1.9 $p\overline{p} \to \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2280±50	440 ± 110	ATKINSON	85	OMEG	20–70 $\gamma p \to p\omega\pi^+\pi^-\pi^0$

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

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	[9] 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	COMMENT
2300±20	230 ± 40	ANISOVICH	99C	SPEC	
2260±15	180 ± 20	ANISOVICH	99E	SPEC	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2237± 5	291 ± 12	[17] UMAN	06	E835	5.2 $\overline{p}p \rightarrow \eta\eta\pi^0$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2320±15	230 ± 35	[18] ANISOVICH	00M	SPEC

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2278±28	224 ± 50	[19] BUGG	04A	RVUE	
2285±60	230 ± 40	[9] ANISOVICH	02B	SPEC	0.6–1.9 $p\overline{p} \rightarrow \omega\eta$, $\omega\pi^0\pi^0$

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN
2290±20	275 ± 35	[19] BUGG	04A	RVUE

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

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2334±25	200 ± 20	[19] BUGG	04A	RVUE	
2303±15	214 ± 29	ANISOVICH	00J	SPEC	2.0 $p\overline{p} \rightarrow \eta\pi^0\pi^0$

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

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

$\eta_4(2330)$ $I^G(J^{PC}) = 0^+(4^{-+})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2328±38	240 ± 90	ANISOVICH	00J	SPEC	2.0 $p\overline{p} \rightarrow \eta\pi^0\pi^0$

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

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

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

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	[20] BALTAY	75	HBC	15 $\pi^+ p \rightarrow p5\pi$

$\pi(2360)$ $I^G(J^{PC}) = 1^-(0^{-+})$

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

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

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
2635.2±3.3		[21] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D_s^+\eta$
2631.6±2.1	< 17	[22] EVDOKIMOV	04	SELX	$X(2632) \rightarrow D^0K^+$

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

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(2690) $I(J^P) = 0(?^?)$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2688±4±3	112 ± 7 ± 36	AUBERT,BE	06E	BABR	$e^+ e^- \rightarrow D K X$

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(2860) $I(J^P) = 0(?^?)$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2856.6±1.5±5.0	47 ± 7 ± 10	[23] AUBERT,BE	06E	BABR	$e^+ e^- \rightarrow D K X$

f_6(3100) $I^G(J^{PC}) = 0^+(6^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3100±100	700 ± 130	BINON	05	GAMS	33 $\pi^- p \rightarrow \eta \eta n$

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	$X(3250) \rightarrow \overline{\Lambda} p K^-$

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

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

X(3350) $I^G(J^{PC}) = ?^?(?^{??})$

MASS (MeV)	WIDTH (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3350^{+10}_{-20}±20	70^{+40}_{-30} ± 40	50 ± 10	GABYSHEV	06A	BELL	$B^- \rightarrow \Lambda_c^+ \overline{p} \pi^-$

FOOTNOTES for Further States

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

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

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

[4] Our estimate.

[5] From analysis of L3 data at 91 and 183–209 GeV.

[6] From analysis of L3 data at 91 and 183–209 GeV and using SU(3) relations.

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

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

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

[10] From analysis of L3 data at 183–209 GeV.

[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] 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.

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

[17] Statistical error only.

[18] From the combined analysis of $\overline{p} p \rightarrow \eta\eta\eta$ from ANISOVICH 00M and $\overline{p} p \rightarrow \eta \pi^0 \pi^0$ from ANISOVICH 00J.

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

[20] 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 $2\rho^+ \pi^-$.

[21] From a mass difference to D^+_s of 666.9 ± 3.3 MeV.

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

[23] Observed in the $D^0 K^+$ and $D^+ K^0$ final states. J^P is natural.

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AZOOZ	83	PL 122B 471	F. Azooz, I. Butterworth	(LOIC, RHEL, SACL+)
BARNETT	83	PR D27 493	B. Barnett *et al.*	(JHU)
BODENKAMP	83	PL 133B 275	J. Bodenkamp *et al.*	(KARLK, KARLE, DESY)
RICHTER	83	PL 126B 284	B. Richter, L. Adiels	(BASL, KARLK, KARLE, STOH+)
AJALTOUNI	82	NP B209 301	Z. Ajaltouni *et al.*	(CERN, NEUC+)
ASTON	81B	NP B189 205	D. Aston *et al.*	(BONN, CERN, EPOL, GLAS+)
BANKS	81	PL 100B 191	A.D. Banks *et al.*	(LIVP, CERN)
CHUNG	81	PRL 46 395	S.U. Chung *et al.*	(BNL, BRAN, CINC+)
HARRIS	81	ZPHY C9 275	R.M. Harris *et al.*	(SEAT, UCB)
ARESTOV	80	IHEP 80-165	Y.I. Arestov *et al.*	(SERP)
ASTON	80D	PL 93B 517	D. Aston	(BONN, CERN, EPOL, GLAS, LANC+)
BIONTA	80	PRL 44 909	R.M. Bionta *et al.*	(BNL, CMU, FNAL+)
CARROLL	80	PRL 44 1572	A.S. Carroll *et al.*	(BNL, PRIN)
DAUM	80E	PL 90B 475	C. Daum *et al.*	(AMST, CERN, CRAC, MPIM+)
DEFOIX	80	NP B162 12	C. Defoix *et al.*	(CDEF, PISA)
HAMILTON	80	PRL 44 1179	R.P. Hamilton *et al.*	(LBL, BNL, MTHO)

HAMILTON	80B	PRL 44 1182	R.P. Hamilton *et al.*	(LBL, BNL, MTHO)
KREYMER	80	PR D22 36	A.E. Kreymer *et al.*	(IND, PURD, SLAC+)
ALBERI	79	PL 83B 247	G. Alberi *et al.*	(TRST, CERN, IFRJ)
ARMSTRONG	79	PL B85 304	T.A. Armstrong *et al.*	(DESY, GLAS)
BARTALUCCI	79	NC 49A 207	S. Bartalucci *et al.*	(DESY, FRAS)
DELCOURT	79	PL 86B 395	B. Delcourt *et al.*	(LALO)
GIBBARD	79	PRL 42 1593	B.G. Gibbard *et al.*	(CORN)
SAKAMOTO	79	NP B158 410	S. Sakamoto *et al.*	(INUS)
CARTER	78B	NP B141 467	A.A. Carter	(LOQM)
ESPOSITO	78	LNC 22 305	B. Esposito, F. Felicetti	(FRAS, NAPL, PADO+)
PAVLOPO...	78	PL 72B 415	P. Pavlopoulos *et al.*	(KARLK, KARLE, BASL+)
PETERSON	78	PR D18 3955	D. Peterson *et al.*	(CORN, HARV)
BENKHEIRI	77	PL 68B 483	P. Benkheiri *et al.*	(CERN, CDEF, EPOL+)
BRUCKNER	77	PL 67B 222	W. Bruckner *et al.*	(MPIH, HEIDP, CERN)
ABASHIAN	76	PR D13 5	A. Abashian *et al.*	(ILL, ANL, CHIC+)
BRAUN	76	PL 60B 481	H.M. Braun *et al.*	(STRB)
CHALOUPKA	76	PL 61B 487	V. Chaloupka *et al.*	(CERN, LIVP, MONS+)
ALSTON-...	75	PRL 35 1685	M. Alston-Garnjost *et al.*	(LBL, MTHO)
D'ANDLAU	75	PL 58B 223	C. d'Andlau *et al.*	(CDEF, PISA)
KALOGERO...	75	PRL 34 1047	T. Kalogeropoulos, G.S. Tzanakos	(SYRA)
CARROLL	74	PRL 32 247	A.S. Carroll *et al.*	(BNL)
THOMPSON	74	NP B69 220	G. Thompson *et al.*	(PURD)
DONALD	73	NP B61 333	R.A. Donald *et al.*	(LIVP, PARIS)
ALEXANDER	72	NP B45 29	G. Alexander *et al.*	(TELA)
ANTIPOV	72	PL 40 147	Y.M. Antipov *et al.*	(SERP)
TAKAHASHI	72	PR D6 1266	K. Takahashi *et al.*	(TOHOK, PENN, NDAM+)
BENVENUTI	71	PRL 27 283	A.C. Benvenuti *et al.*	(WISC)
SABAU	71	LNC 1 514	M. Sabeu, J.L. Uretsky	(BUCH, ANL)
BAUD	70	PL 31B 549	R. Baud *et al.*	(CERN Boson Spectrometer Collab.)
ANDERSON	69	PRL 22 1390	E.W. Anderson *et al.*	(BNL, CMU)
BOESEBECK	68	NP B4 501	K. Boesebeck *et al.*	(AACH, BERL, CERN)
HUSON	68	PL 28B 208	R. Huson *et al.*	(ORSAY, MILA, UCLA)
ALLES-...	67B	NC 50A 776	V. Alles-Borelli *et al.*	(CERN, BONN)
DANYSZ	67B	NC 51A 801	J.A. Danysz, B.R. French, V. Simak	(CERN)
CHIKOVANI	66	PL 22 233	G.E. Chikovani *et al.*	(SERP)
FOCACCI	66	PRL 17 890	M.N. Focacci *et al.*	(CERN)