OTHER LIGHT UNFLAVORED MESONS ($S = C = B = 0$)

$e^+e^-(1100–2200)$ $I^G(J^{PC}) = ?^?(1^{--})$

OMITTED FROM SUMMARY TABLE

This entry contains nonstrange vector mesons coupled to e^+e^- (photon) between the ϕ and $J/\psi(1S)$ mass regions. See also $\omega(1420)$, $\rho(1450)$, $\omega(1600)$, $\phi(1680)$, and $\rho(1700)$.

$e^+e^-(1100–2200)$ MASSES AND WIDTHS

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

VALUE (MeV)	*DOCUMENT ID*
1100 to 2200 OUR LIMIT	

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
$1097.0^{+16.0}_{-19.0}$	BARTALUCCI	79	OSPK	$7\,\gamma p \rightarrow e^+e^-p$
$31.0^{+24.0}_{-20.0}$	BARTALUCCI	79	OSPK	$7\,\gamma p \rightarrow e^+e^-p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1266.0 ± 5.0	BARTALUCCI	79	DASP	0	$7\,\gamma p \rightarrow e^+e^-p$
110.0 ± 35.0	BARTALUCCI	79	DASP	0	$7\,\gamma p \rightarrow e^+e^-p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
~ 1830.0	PETERSON	78	SPEC	$\gamma p \rightarrow K^+K^-p$
~ 120.0	PETERSON	78	SPEC	$\gamma p \rightarrow K^+K^-p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
~ 1820	[1] SPINETTI	79	RVUE	$e^+e^- \rightarrow 4\pi^{\pm}2\gamma$
~ 30	[1] SPINETTI	79	RVUE	$e^+e^- \rightarrow 4\pi^{\pm}2\gamma$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
~ 2130	[2] ESPOSITO	78	FRAM	$e^+e^- \rightarrow K^*(892)^+ \ldots$
~ 30	[2] ESPOSITO	78	FRAM	$e^+e^- \rightarrow K^*(892)^+ \ldots$

[1] Integrated cross section of BACCI 77, BARBIELLINI 77, ESPOSITO 77.
[2] Not seen by DELCOURT 79.

$e^+e^-(1100–2200)$ REFERENCES

BARTALUCCI	79	NC 49A 207	+Basini, Bertolucci+	(DESY, FRAS)
DELCOURT	79	PL 86B 395	+Derado, Bertrand, Bisello, Bizot, Buon+	(LALO)
SPINETTI	79	Batavia Conf. 506		(FRAS)
ESPOSITO	78	LNC 22 305	+Felicetti	(FRAS, NAPL, PADO, ROMA)
PETERSON	78	PR D18 3955	+Dixon, Ehrlich, Galik, Larson	(CORN, HARV)
BACCI	77	PL 68B 393	+DeZorzi, Penso, Stella, Baldini+	(ROMA, FRAS)
BARBIELLINI	77	PL 68B 397	+Barletta+	(FRAS, NAPL, PISA, SANI)
ESPOSITO	77	PL 68B 389	+Felicetti, Marini+	(FRAS, NAPL, PADO, ROMA)

OTHER RELATED PAPERS

BACCI	76	PL 64B 356	+Bidoli, Penso, Stella, Baldini+	(ROMA, FRAS)
BACCI	75	PL 58B 481	+Bidoli, Penso, Stella+	(ROMA, FRAS)

$\overline{N}N(1100–3600)$

OMITTED FROM SUMMARY TABLE

This entry contains various high mass, nonstrange structures coupled to the baryon-antibaryon system, as well as quasi-nuclear bound states below threshold.

$\overline{N}N$(1100–3600) MASSES AND WIDTHS

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

VALUE (MeV)	DOCUMENT ID
1100 to 3600 OUR LIMIT	

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

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1167 ±7	[2] CHIBA	91	CNTR		$\overline{p}d \rightarrow \gamma X$
1191.0±9.9	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$
1210 ±5.0	[2,3,4,5] RICHTER	83	CNTR	0	Stopped $\overline{p}$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1325 ±5	[2] CHIBA	91	CNTR		$\overline{p}d \rightarrow \gamma X$
1329.2±7.6	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1390.9±6.3	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$
1395	[2,4,5,6] PAVLOPO...	78	CNTR		Stopped $\overline{p}$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
~ 1410	BETTINI	66	DBC	0	0. $\overline{p}N \rightarrow 5\pi$
~ 100	BETTINI	66	DBC	0	0. $\overline{p}N \rightarrow 5\pi$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1468± 6	[7] BRIDGES	86B	DBC	0	0. $\overline{p}N \rightarrow 2\pi^- \pi^+ \pi^0$
88±18	[7] BRIDGES	86B	DBC	0	0. $\overline{p}N \rightarrow 2\pi^- \pi^+ \pi^0$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1512 ± 7	[2] CHIBA	91	CNTR		$\overline{p}d \rightarrow \gamma X$
1523.8± 3.6	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$
1522 ± 7	[7] BRIDGES	86B	DBC	0	0. $\overline{p}N \rightarrow 2\pi^- \pi^+$
59 ±12	[7] BRIDGES	86B	DBC	0	0. $\overline{p}N \rightarrow 2\pi^- \pi^+$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1577.8± 3.4	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$
1594 ± 9	[7] BRIDGES	86B	DBC	–	0. $\overline{p}N \rightarrow 2\pi^- \pi^+ \pi^0$
81 ±12	[7] BRIDGES	86B	DBC	–	0. $\overline{p}N \rightarrow 2\pi^- \pi^+ \pi^0$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1633.6±4.1	[2] CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma X$
$1637.1^{+5.6}_{-7.3}$	ADIELS	84	CNTR		$\overline{p}$He

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1638±3.0	[2,3,4,5] RICHTER	83	CNTR	0	Stopped $\overline{p}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
$1644.0^{+5.6}_{-7.3}$	ADIELS	84 CNTR	$\overline{p}$He

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
1646	2,4,5,6	PAVLOPO...	78	CNTR	Stopped $\overline{p}$

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
$1687.1^{+5.0}_{-4.3}$		ADIELS	84	CNTR	$\overline{p}$He
1684	2,4,5,6	PAVLOPO...	78	CNTR	Stopped $\overline{p}$

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
1693±2	2	CHIBA	91	CNTR		$\overline{p}d \rightarrow \gamma$X
1694±2.0	2,3,4,5	RICHTER	83	CNTR	0	Stopped $\overline{p}$

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
1713.0±2.6	2	CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma$X

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
1731.0±1.5	2	CHIBA	87	CNTR	0	0. $\overline{p}p \rightarrow \gamma$X

VALUE (MeV)		DOCUMENT ID		TECN	CHG	COMMENT
1771±1.0	2,4,5,8	RICHTER	83	CNTR	0	Stopped $\overline{p}$

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

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1873±2.5	BRIDGES	86D	SPEC	0	0. $\overline{p}d \rightarrow \pi\pi N$
< 5	BRIDGES	86D	SPEC	0	0. $\overline{p}d \rightarrow \pi\pi N$

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
1897.0±17.0	9	ABASHIAN	76	STRC	8 $\pi^- p \rightarrow p3\pi$
110.0±82.0	9	ABASHIAN	76	STRC	8 $\pi^- p \rightarrow p3\pi$
1897 ± 1		KALOGERO...	75	DBC	$\overline{p}n$ annihilation near threshold
25 ± 6		KALOGERO...	75	DBC	$\overline{p}n$ annihilation near threshold

VALUE (MeV)		DOCUMENT ID		TECN	COMMENT
~1920.0	10	EVANGELISTA	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p}p$
~ 190.0		EVANGELISTA	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p}p$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
$1937.3^{+1.3}_{-0.7}$		11 FRANKLIN	87	SPEC		0.586 $\overline{p}p$
< 3.0		11 FRANKLIN	87	SPEC		0.586 $\overline{p}p$
1930.0± 2.0		12 ASTON	80D	OMEG		$\gamma p \rightarrow p\overline{p}$X
12.0± 7.0		12 ASTON	80D	OMEG		$\gamma p \rightarrow p\overline{p}$X
1940.0± 1.0	36	DAUM	80E	CNTR	0	93 $pp \rightarrow \overline{p}p$X
~ 6.0		DAUM	80E	CNTR		93 $pp \rightarrow \overline{p}p$X
1949 ±10		13 DEFOIX	80	HBC	0	$\overline{p}p \rightarrow 5\pi$
80 ±20		13 DEFOIX	80	HBC	0	$\overline{p}p \rightarrow 5\pi$
1939.0± 2.0		14 HAMILTON	80B	CNTR	0	S channel $\overline{p}p$
22.0± 6.0		14 HAMILTON	80B	CNTR	0	S channel $\overline{p}p$
1935.5± 1.0		SAKAMOTO	79	HBC	0	0.37–0.73 $\overline{p}p$
2.8± 1.4		SAKAMOTO	79	HBC	0	0.37–0.73 $\overline{p}p$
1939.0± 3.0		BRUCKNER	77	SPEC	0	0.4–0.85 $\overline{p}p$
< 4.0		BRUCKNER	77	SPEC	0	0.4–0.85 $\overline{p}p$
1935.9± 1.0		15 CHALOUPKA	76	HBC	0	$\overline{p}p$ total,elastic
$8.8^{+4.3}_{-3.2}$		16 CHALOUPKA	76	HBC	0	$\overline{p}p$ total,elastic
1942 ± 5		17 D'ANDLAU	75	HBC	0	0.175–0.750 $\overline{p}p$

57.5± 5	[18] D'ANDLAU	75	HBC	0	0.175–0.750 $\overline{p}p$
$1934.4^{+2.6}_{-1.4}$	[19] KALOGERO...	75	DBC	–	$\overline{p}N$ annihilation
11^{+11}_{-4}	[20] KALOGERO...	75	DBC	–	$\overline{p}N$ annihilation
1932 ± 2	[15] CARROLL	74	CNTR		S channel $\overline{p}p \rightarrow d$
9^{+4}_{-3}	[16] CARROLL	74	CNTR		S channel $\overline{p}p \rightarrow d$
1968	[21] BENVENUTI	71	HBC	0	0.1–0.8 $\overline{p}p$
35	[21] BENVENUTI	71	HBC	0	0.1–0.8 $\overline{p}p$
1940 ± 8	CLINE	70	HBC	0	0.25–0.74 $\overline{p}p$
49 ± 9	CLINE	70	HBC	0	0.25–0.74 $\overline{p}p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1949±10	[22] DEFOIX	80	HBC	0	0.0–1.2 $\overline{p}p \rightarrow 5\pi$
80±20	[22] DEFOIX	80	HBC	0	0.0–1.2 $\overline{p}p \rightarrow 5\pi$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2022.0± 6.0	[23] AZOOZ	83	HYBR	+	6 $\overline{p}p \rightarrow p\overline{n}3\pi$
14.0±13.0	[23] AZOOZ	83	HYBR	+	6 $\overline{p}p \rightarrow p\overline{n}3\pi$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2023.0± 5.0	BODENKAMP	83	SPEC	0	$\gamma p \rightarrow \overline{p}pp$
27.0±12.0	BODENKAMP	83	SPEC	0	$\gamma p \rightarrow \overline{p}pp$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2026.0± 5.0	[23] AZOOZ	83	HYBR	–	4 $\overline{p}p \rightarrow \overline{p}n3\pi$
20.0±11.0	[23] AZOOZ	83	HYBR	–	4 $\overline{p}p \rightarrow \overline{p}n3\pi$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2080±10	[24] KREYMER	80	STRC	0	13 $\pi^- d \rightarrow p\overline{p}n(n)$
110±20	[24] KREYMER	80	STRC	0	13 $\pi^- d \rightarrow p\overline{p}n(n)$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2090.0±20.0	[25] KREYMER	80	STRC	13 $\pi^- d \rightarrow np\overline{p}\pi^- p$
170.0±50.0	[25] KREYMER	80	STRC	13 $\pi^- d \rightarrow np\overline{p}\pi^- p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
~ 2110.0	[26] EVANGELISTA	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p}p$
~ 330.0	[26] EVANGELISTA	79	OMEG	10,16 $\pi^- p \rightarrow \overline{p}p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2110.0±10.0	[27] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$
190.0±10.0	[27] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2141	[28] DONALD	73	HBC	0	$\overline{p}p$ S channel
14	[28] DONALD	73	HBC	0	$\overline{p}p$ S channel

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2180.0±10.0	[29] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$
270.0±10.0	[29] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p\overline{p}n$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
2207±13	[30] ALLES-...	67B	HBC	0	5.7 $\overline{p}p$
62±52	[30] ALLES-...	67B	HBC	0	5.7 $\overline{p}p$

VALUE (MeV)	*DOCUMENT ID*	*TECN*	*COMMENT*
$2210.0^{+79.0}_{-21.0}$	EVANGELISTA 79B	OMEG	10 $\pi^- p \rightarrow K^+ K^- n$
~ 203.0	EVANGELISTA 79B	OMEG	10 $\pi^- p \rightarrow K^+ K^- n$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
2231.9 ±0.1	[1] BARNES	94	SPEC	0–46 $\overline{p}p \rightarrow \overline{\Lambda}\Lambda$
0.59±0.25	[1] BARNES	94	SPEC	0–46 $\overline{p}p \rightarrow \overline{\Lambda}\Lambda$
~ 2229.2	CARBONELL	93	RVUE	$\overline{p}p \rightarrow \Lambda\overline{\Lambda}$
~ 1.8	CARBONELL	93	RVUE	$\overline{p}p \rightarrow \Lambda\overline{\Lambda}$

[1] Supersedes CARBONELL 93.

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
~ 2260.0	[31] EVANGELISTA 79	OMEG	10,16 $\pi^- p \rightarrow \overline{p} p$
~ 440.0	[31] EVANGELISTA 79	OMEG	10,16 $\pi^- p \rightarrow \overline{p} p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2307.0± 6.0	ALPER	80	CNTR	0	62 $\pi^- p \rightarrow K^+ K^- n$
245.0±20.0	ALPER	80	CNTR	0	62 $\pi^- p \rightarrow K^+ K^- n$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2380.0±10.0	[32] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$
380.0±20.0	[32] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2450.0±10.0	[33] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$
280.0±20.0	[33] ROZANSKA	80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2480.0±30.0	[34] CARTER	77	CNTR	0	0.7–2.4 $\overline{p} p \rightarrow \pi\pi$
210.0±25.0	[34] CARTER	77	CNTR	0	0.7–2.4 $\overline{p} p \rightarrow \pi\pi$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
~ 2500.0	[35] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p} p \rightarrow K^- K^+$
~ 150.0	[35] CARTER	78B	CNTR	0	0.7–2.4 $\overline{p} p \rightarrow K^- K^+$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2710.0±20.0	ROZANSKA 80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$
170.0±40.0	ROZANSKA 80	SPRK	18 $\pi^- p \rightarrow p \overline{p} n$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2850.0±5.0	[36] BRAUN	76	DBC	–	5.5 $\overline{p} d \rightarrow N \overline{N} \pi$
< 39	[36] BRAUN	76	DBC	–	5.5 $\overline{p} d \rightarrow N \overline{N} \pi$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
3370±10	[37] ALEXANDER	72	HBC	0	6.94 $\overline{p} p$
150±40	[37] ALEXANDER	72	HBC	0	6.94 $\overline{p} p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
3600±20	[37] ALEXANDER	72	HBC	0	6.94 $\overline{p} p$
140±20	[37] ALEXANDER	72	HBC	0	6.94 $\overline{p} p$

[2] Not seen by GRAF 91.
[3] Not seen by CHIBA 88, ANGELOPOULOS 86, ADIELS 86.
[4] They looked for radiative transitions to bound $p\overline{p}$ states, mono-energetic γ rays detected.
[5] Observed widths consistent with experimental resolution.
[6] Not seen by ADIELS 86.
[7] From analysis of difference of π^- and π^+ spectra.
[8] Not seen by CHIBA 88, ANGELOPOULOS 86.
[9] Produced backwards.
[10] $I(J^P) = 1(1^-)$ from a mass dependent partial-wave analysis taking solution A.
[11] From reanalysis of data from JASTRZEMBSKI 81.
[12] Not seen by BUSENITZ 89.
[13] From energy dependence of 5π cross section. $I^G = 1^-$ from observation of $\omega\rho$ decay. $P = +$ and $J > 1$. $a_2(1320)\pi\pi$ also seen.
[14] $I = 0$ favored, $J = 0$ or 1, seen in total $\overline{p}p$ total cross section. Primarily from annihilation reactions. Not seen in $\overline{p}d$ total and annihilation cross sections.
[15] Narrow bump seen in total $\overline{p}p$, $\overline{p}d$ cross sections. Isospin uncertain. Not seen in $\overline{p}p$ charge exchange by ALSTON-GARNJOST 75, CHALOUPKA 76. Integrated cross section three times larger than BRUCKNER 77.
[16] Narrow bump seen in total $\overline{p}p$, $\overline{p}d$ cross sections. Isospin uncertain. Not seen in $\overline{p}p$ charge exchange by ALSTON-GARNJOST 75, CHALOUPKA 76. Integrated cross section three times larger than BRUCKNER 77. Not seen by CLOUGH 84.
[17] From energy dependence of far backward elastic scattering. Some indication of additional structure.
[18] From energy dependence of far backward elastic scattering. Some indication of additional structure.
[19] Not seen by ALBERI 79 with comparable statistics.

[20] Not seen by ALBERI 79 with comparable statistics.
[21] Seen as a bump in the $\overline{p}p \rightarrow K^0_S K^0_L$ cross section with $J^{PC} = 1^{--}$.
[22] Isospin 1 favored.
[23] Not seen by BIONTA 80, CARROLL 80, HAMILTON 80, BANKS 81, CHUNG 81, BARNETT 83.
[24] Neutron spectator. See also $np\overline{p}\pi^-(p)$ channel following.
[25] Proton spectator. See also $p\overline{p}n(n)$ channel above.
[26] $I(J^P) = 1(3^-)$ from a mass dependent partial-wave analysis taking solution A.
[27] $I(J^P) = 1(3^-)$ from amplitude analysis assuming one-pion exchange.
[28] Seen in final state $\omega\pi^+\pi^-$.
[29] $I(J^P) = 0(2^+)$ from amplitude analysis assuming one-pion exchange.
[30] ALLES-BORELLI 67B see neutral mode only $\pi^+\pi^-\pi^0$.
[31] $I(J^P) = 0(4^+)$ from a mass dependent partial-wave analysis taking solution A.
[32] $I(J^P) = 0(4^+)$ from amplitude analysis assuming one-pion exchange.
[33] $I(J^P) = 1(5^-)$ from amplitude analysis assuming one-pion exchange.
[34] $I(J^P) = 1(5^-)$ from amplitude analysis of $\overline{p}p \rightarrow \pi\pi$.
[35] I=0,1 $J^P = 5^-$ from Barrelet-zero analysis.
[36] Decays to $\overline{N}N$ and $\overline{N}N\pi$. Not seen by BARNETT 83.
[37] Decays to $4\pi^+ 4\pi^-$.

$\overline{N}N$(1100–3600) REFERENCES

BARNES	94	PL B331 203	+Birien+ (PS185 Collab.)
CARBONELL	93	PL B306 407	+Protasov, Dalkarov (ISNG, LEBD)
CHIBA	91	PR D44 1933	+Fujitani+ (FUKI, KEK, SANG, OSAK, TMU)
GRAF	91	PR D44 1945	+Fero, Gee+(UCI, PENN, NMSU, KARLK, KARLE, ATHU)
BUSENITZ	89	PR D40 1	+Olszewski, Callahan+ (ILL, FNAL)
CHIBA	88	PL B202 447	+Doi (FUKI, INUS, KEK, SANG, OSAK, TMU)
CHIBA	87	PR D36 3321	+Doi+ (FUKI, INUS, KEK, SANG, OSAK, TMU)
DAFTARI	87	PRL 58 859	+Gray, Kalogeropoulos, Roy (SYRA)
FRANKLIN	87	PL B184 81	
ADIELS	86	PL B182 405	+Backenstoss+ (STOH, BASL, LASL, THES, CERN)
ANGELOPO...	86	PL B178 441	Angelopoulos+(ATHU, UCI, KARLK, KARLE, NMSU, PENN)
BRIDGES	86B	PRL 56 215	+Daftari, Kalogeropoulos, Debbe+ (SYRA, CASE)
BRIDGES	86D	PL B180 313	+Brown, Daftari+ (SYRA, BNL, CASE, UMD, COLU)
ADIELS	84	PL 138B 235	+ (BASL, KARLK, KARLE, STOH, STRB, THES)
CLOUGH	84	PL 146B 299	+Beard, Bugg+ (SURR, LOQM, ANIK, TRST, GEVA)
AZOOZ	83	PL 122B 471	+Butterworth (LOIC, RHEL, SACL, SLAC, TOHOK+)
BARNETT	83	PR D27 493	+Blockus, Burka, Chien, Christian+ (JHU)
BODENKAMP	83	PL 133B 275	+Fries, Behrend, Fenner+ (KARLK, KARLE, DESY)
RICHTER	83	PL 126B 284	+Adiels (BASL, KARLK, KARLE, STOH, STRB, THES)
BANKS	81	PL 100B 191	+Booth, Campbell, Armstrong+ (LIVP, CERN)
CHUNG	81	PRL 46 395	+Bensinger+ (BNL, BRAN, CINC, FSU, MASD)
JASTRZEM...	81	PR D23 2784	Jastrzembski, Mandelkern+ (TEMP, UCI, UNM)
ALPER	80	PL 94B 422	+Becker+ (AMST, CERN, CRAC, MPIM, OXF+)
ASTON	80D	PL 93B 517	(BONN, CERN, EPOL, GLAS, LANC, MCHS, ORSAY+)
BIONTA	80	PRL 44 909	+Carroll, Edelstein+ (BNL, CMU, FNAL, MASD)
CARROLL	80	PRL 44 1572	+Chiang, Johnson, Cester, Webb+ (BNL, PRIN)
DAUM	80E	PL 90B 475	+Hertzberger+ (AMST, CERN, CRAC, MPIM, OXF+)
DEFOIX	80	NP B162 12	+Dobrzynski, Angelini, Bigi+ (CDEF, PISA)
HAMILTON	80	PRL 44 1179	+Pun, Tripp, Lazarus+ (LBL, BNL, MTHO)
HAMILTON	80B	PRL 44 1182	+Pun, Tripp, Lazarus+ (LBL, BNL, MTHO)
KREYMER	80	PR D22 36	+Baggett, Fieguth+ (IND, PURD, SLAC, VAND)
ROZANSKA	80	NP B162 505	+Blum, Dietl, Grayer, Lorenz+ (MPIM, CERN)
ALBERI	79	PL 83B 247	+Alvear, Castelli, Poropat+ (TRST, CERN, IFRJ)
EVANGELISTA	79	NP B153 253	+ (BARI, BONN, CERN, DARE, GLAS, LIVP+)
EVANGELISTA	79B	NP B154 381	+ (BARI, BONN, CERN, DARE, GLAS, LIVP+)
SAKAMOTO	79	NP B158 410	+Hashimoto, Sai, Yamamoto+ (INUS)
CARTER	78B	NP B141 467	(LOQM)
PAVLOPO...	78	PL 72B 415	Pavlopoulos+(KARLK, KARLE, BASL, CERN, STOH, STRB)
BRUCKNER	77	PL 67B 222	+Granz, Ingham, Kilian+ (MPIH, HEIDP, CERN)
CARTER	77	PL 67B 117	+Coupland, Eisenhandler, Astbury+ (LOQM, RHEL) JP
ABASHIAN	76	PR D13 5	+Watson, Gelfand, Buttram+ (ILL, ANL, CHIC, ISU)
BRAUN	76	PL 60B 481	+Brick, Fridman, Gerber, Juillot, Maurer+ (STRB)
CHALOUPKA	76	PL 61B 487	+ (CERN, LIVP, MONS, PADO, ROMA, TRST)
ALSTON-...	75	PRL 35 1685	Alston-Garnjost, Kenney, Pollard, Ross, Tripp+(LBL, MTHO)
D'ANDLAU	75	PL 58B 223	+Cohen-Ganouna, Laloum, Lutz, Petri (CDEF, PISA)
KALOGERO...	75	PRL 34 1047	Kalogeropoulos, Tzanakos (SYRA)
CARROLL	74	PRL 32 247	+Chiang, Kycia, Li, Mazur, Michael+ (BNL)
DONALD	73	NP B61 333	+Edwards, Gibbins, Briand, Duboc+ (LIVP, PARIS)
ALEXANDER	72	NP B45 29	+Bar-Nir, Benary, Dagan+ (TELA)
BENVENUTI	71	PRL 27 283	+Cline, Rutz, Reeder, Scherer (WISC)
CLINE	70	Preprint	+English, Reeder (WISC)
ALLES-...	67B	NC 50A 776	Alles-Borelli, French, Frisk+ (CERN, BONN) G
BETTINI	66	NC 42A 695	+Cresti, Limentani, Bertanza, Bigi+ (PADO, PISA)

OTHER RELATED PAPERS

TANIMORI	90	PR D41 744	+Ishimoto+ (KEK, INUS, KYOT, TOHOK, HIRO)
LIU	87	PRL 58 2288	+Kiu, Li (STON)
ARMSTRONG	86C	PL B175 383	+Chu, Clement, Elinon+ (BNL, HOUS, PENN, RICE)
BRIDGES	86	PRL 56 211	+Brown+ (BLSU, BNL, CASE, COLU, UMD, SYRA)
BRIDGES	86C	PRL 57 1534	+Daftari, Kalogeropoulos+ (SYRA) JP
DOVER	86	PRL 57 1207	+ (BNL) JP
ANGELOPO...	85	PL 159B 210	Angelopoulos+ (ATHU, UCI, UNM, PENN, TEMP)
BODENKAMP	85	NP B255 717	+Fries, Behrend, Hesse+ (KARLK, KARLE, DESY)
AZOOZ	84	NP B244 277	+Butterworth (LOIC, RHEL, SACL, SLAC, TOHOK+)

$X(1900–3600)$

OMITTED FROM SUMMARY TABLE
MINIREVIEW GOES HERE

$X(1900–3600)$ MASSES AND WIDTHS

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

VALUE (MeV)	DOCUMENT ID
1900 to 3600 OUR LIMIT	

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1870.0±40.0	[1] ALDE	86D	GAM4	0	100 $\pi^- p \rightarrow 2\eta X$
250.0±30.0	[1] ALDE	86D	GAM4	0	100 $\pi^- p \rightarrow 2\eta X$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1898±18	100	THOMPSON	74	HBC	+	13 $\pi^+ p \rightarrow 2\rho X$
108^{+41}_{-27}	100	THOMPSON	74	HBC	+	13 $\pi^+ p \rightarrow 2\rho X$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1900± 40	100	BOESEBECK	68	HBC	+	8 $\pi^+ p \rightarrow \pi^+ \pi^0 X$
216±105	100	BOESEBECK	68	HBC	+	8 $\pi^+ p \rightarrow \pi^+ \pi^0 X$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
1926±12	ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
370±70	ABATZIS	94	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
1901±13	ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$
312±61	ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1929±14	FOCACCI	66	MMS	−	3–12 $\pi^- p$
22± 2	FOCACCI	66	MMS	−	3–12 $\pi^- p$

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1973.0±15.0	30	CASO	70	HBC	−	11.2 $\pi^- p \rightarrow \rho 2\pi$
80.0	30	CASO	70	HBC	−	11.2 $\pi^- p \rightarrow \rho 2\pi$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2070	50	TAKAHASHI	72	HBC	8 $\pi^- p \rightarrow N2\pi$
160	50	TAKAHASHI	72	HBC	8 $\pi^- p \rightarrow N2\pi$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2103 ±50	586	[2] BISELLO	89B	DM2		$J/\psi \rightarrow 4\pi\gamma$
187 ±75	586	[2] BISELLO	89B	DM2		$J/\psi \rightarrow 4\pi\gamma$
2100.0±40.0		[3] ALDE	86D	GAM4	0	100 $\pi^- p \rightarrow 2\eta X$
250.0±40.0		[3] ALDE	86D	GAM4	0	100 $\pi^- p \rightarrow 2\eta X$

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2141.0±12.0	389	GREEN	86	MPSF	400 $pA \rightarrow 4KX$
49.0±28.0	389	GREEN	86	MPSF	400 $pA \rightarrow 4KX$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2190.0±10.0	CLAYTON	67	HBC	±	2.5 $\overline{p}p \rightarrow a_2, \omega$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2195±15	FOCACCI	66	MMS	−	3–12 $\pi^- p$
39±14	FOCACCI	66	MMS	−	3–12 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2207.0±22.0	[4] CASO	70	HBC	−	11.2 $\pi^- p$
130.0	[4] CASO	70	HBC	−	11.2 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2300.0±100.0	ATKINSON	84F	OMEG	±0	20–70 $\gamma p \rightarrow \rho f$
~ 250.0	ATKINSON	84F	OMEG	±0	20–70 $\gamma p \rightarrow \rho f$

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

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2340±20	126	[5] BALTAY	75	HBC	+	15 $\pi^+ p \rightarrow p5\pi$
180±60	126	[5] BALTAY	75	HBC	+	15 $\pi^+ p \rightarrow p5\pi$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2382±24	FOCACCI	66	MMS	−	3–12 $\pi^- p$
62± 6	FOCACCI	66	MMS	−	3–12 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2500.0±32.0	ANDERSON	69	MMS	−	16 $\pi^- p$ backward
87.0	ANDERSON	69	MMS	−	16 $\pi^- p$ backward

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2620±20	550	BAUD	69	MMS	−	8–10 $\pi^- p$
85±30	550	BAUD	69	MMS	−	8–10 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2676.0±27.0	[4] CASO	70	HBC	−	11.2 $\pi^- p$
150.0	[4] CASO	70	HBC	−	11.2 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2747±32	DENNEY	83	LASS	10 $\pi^+ N$
195±75	DENNEY	83	LASS	10 $\pi^+ N$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2800±20	640	BAUD	69	MMS	−	8–10 $\pi^- p$
46±10	640	BAUD	69	MMS	−	8–10 $\pi^- p$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2820±10	15	[6] SABAU	71	HBC	+	8 $\pi^+ p$
50±10	15	[6] SABAU	71	HBC	+	8 $\pi^+ p$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
2880±20	230	BAUD	69	MMS	−	8–10 $\pi^- p$
< 15	230	BAUD	69	MMS	−	8–10 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
3025.0±20.0	BAUD	70	MMS	−	10.5–13 $\pi^- p$
~ 25.0	BAUD	70	MMS	−	10.5–13 $\pi^- p$

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
3075.0±20.0	BAUD	70	MMS	−	10.5–13 $\pi^- p$
~ 25.0	BAUD	70	MMS	−	10.5–13 $\pi^- p$

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
3145.0±20.0	BAUD	70	MMS	–	10.5–15 π^- p
< 10.0	BAUD	70	MMS	–	10.5–15 π^- p

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
3475.0±20.0	BAUD	70	MMS	–	14–15.5 π^- p
~ 30.0	BAUD	70	MMS	–	14–15.5 π^- p

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
3535.0±20.0	BAUD	70	MMS	–	14–15.5 π^- p
~ 30.0	BAUD	70	MMS	–	14–15.5 π^- p

[1] Seen in $J = 2$ wave in one of the two ambiguous solutions.
[2] ASTON 81B sees no peak, has 850 events in Ajinenko+Barth bins. ARESTOV 80 sees no peak.
[3] Seen in $J = 0$ wave in one of the two ambiguous solutions.
[4] Seen in $\rho^- \pi^+ \pi^-$ (ω and η antiselected in 4π system).
[5] 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 $2\rho^+ \pi^-$.
[6] Seen in $(K\overline{K}\pi\pi)$ mass distribution.

X(1900–3600) REFERENCES

ABATZIS	94	PL B324 509	+Antinori, Barberis+ (ATHU, BARI, BIRM, CERN, JINR) JP
ARMSTRONG	89E	PL B228 536	+Benayoun (ATHU, BARI, BIRM, CERN, CDEF, CURIN+)
BISELLO	89B	PR D39 701	Busetto+ (DM2 Collab.)
ATKINSON	88	ZPHY C38 535	+Axon+ (BONN, CERN, GLAS, LANC, MCHS, CURIN)
ALDE	86D	NP B269 485	+Binon, Bricman+ (BELG, LAPP, SERP, CERN)
GREEN	86	PRL 56 1639	+Lai+ (FNAL, ARIZ, FSU, NDAM, TUFTS, VAND+)
ATKINSON	84F	NP B239 1	+ (BONN, CERN, GLAS, LANC, MCHS, IPNP+)
DENNEY	83	PR D28 2726	+Cranley, Firestone, Chapman+ (IOWA, MICH) J
ASTON	81B	NP B189 205	+ (BONN, CERN, EPOL, GLAS, LANC, MCHS+)
ARESTOV	80	IHEP 80-165	+Bogoljubski+ (SERP)
CHLIAPNIK...	80	ZPHY C3 285	Chliapnikov, Gerdyukov+ (SERP, BRUX, MONS)
BALTAY	78	PR D17 52	+Cautis, Cohen, Csorna, Kalelkar+ (COLU, BING)
BALTAY	75	PRL 35 891	+Cautis, Cohen, Kalelkar, Pisello+ (COLU, BING)
THOMPSON	74	NP B69 220	+Gaidos, McIlwain, Miller, Mulera+ (PURD)
TAKAHASHI	72	PR D6 1266	+Barish+ (TOHOK, PENN, NDAM, ANL)
SABAU	71	LNC 1 514	+Uretsky (BUCH, ANL)
BAUD	70	PL 31B 549	+Benz+ (CERN Boson Spectrometer Collab.)
CASO	70	LNC 3 707	+Conte, Tomasini+ (GENO, HAMB, MILA, SACL)
ANDERSON	69	PRL 22 1390	+Collins+ (BNL, CMU)
BAUD	69	PL 30B 129	+Benz+ (CERN Boson Spectrometer Collab.)
BOESEBECK	68	NP B4 501	+Deutschmann+ (AACH, BERL, CERN)
CLAYTON	67	Heidelberg Conf. 57	+Mason, Muirhead, Filippas+ (LIVP, ATHU)
FOCACCI	66	PRL 17 890	+Kienzle, Levrat, Maglich, Martin (CERN)

OTHER RELATED PAPERS

ANTIPOV	72	PL 40 147	+Kienzle, Landsberg+ (SERP)
CHIKOVANI	66	PL 22 233	+Kienzle, Maglich+ (SERP)