$X(1950)$

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

OMITTED FROM SUMMARY TABLE
Needs confirmation.

X(1950) MASS

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
1952±14 OUR AVERAGE					
1964±35	ARMSTRONG	93D	SPEC		$\overline{p}p \to 3\pi^0 \to 6\gamma$
1950±15	ASTON	91	LASS	0	$11\ K^- p \to \Lambda K \overline{K} \pi\pi$

X(1950) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
238±35 OUR AVERAGE					
225±50	ARMSTRONG	93D	SPEC		$\overline{p}p \to 3\pi^0 \to 6\gamma$
250±50	ASTON	91	LASS	0	$11\ K^- p \to \Lambda K \overline{K} \pi\pi$

X(1950) DECAY MODES

	Mode
Γ_1	$K^*(892)\overline{K}^*(892)$
Γ_2	$\pi^0\pi^0$

X(1950) BRANCHING RATIOS

$\Gamma(K^*(892)\overline{K}^*(892))/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ASTON	91	LASS	0	$11\ K^- p \to \Lambda K \overline{K} \pi\pi$

$\Gamma(\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
seen	ARMSTRONG	93D	SPEC	$\overline{p}p \to 3\pi^0 \to 6\gamma$

X(1950) REFERENCES

ARMSTRONG 93D PL B307 399 +Bettoni+ (FNAL, FERR, GENO, UCI, NWES+)
ASTON 91 NP B21 5 (suppl) +Awaji+ (LASS Collab.)

OTHER RELATED PAPERS

BIENZ 90 SLAC 369 (LASS Collab.)
ALBRECHT 88N PL B212 528 + (ARGUS Collab.)
ALBRECHT 87Q PL B198 255 +Binder+ (ARGUS Collab.)
ARMSTRONG 87C ZPHY C34 33 +Bloodworth+ (CERN, BIRM, BARI, ATHU, CURIN+)

$f_2(2010)$

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

See also the mini-review under non-$q\overline{q}$ candidates. (See the index for the page number.)

f_2(2010) MASS

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2011 $^{+62}_{-76}$	[1] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1980 ± 20	[2] BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
2050.0$^{+90.0}_{-50.0}$	ETKIN	85	MPS	$22\ \pi^- p \to 2\phi n$
2120.0$^{+20.0}_{-120.0}$	LINDENBAUM	84	RVUE	
2160.0± 50.0	ETKIN	82	MPS	$22\ \pi^- p \to 2\phi n$

[1] Includes data of ETKIN 85. The percentage of the resonance going into $\phi\phi$ 2^{++} S_2, D_2, and D_0 is 98^{+1}_{-3}, 0^{+1}_{-0}, and 2^{+2}_{-1}, respectively.
[2] Statistically very weak, only 1.4 s.d.

f_2(2010) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
202 $^{+67}_{-62}$	[3] ETKIN	88	MPS	$22\ \pi^- p \to \phi\phi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
145 ± 50	[4] BOLONKIN	88	SPEC	$40\ \pi^- p \to K^0_S K^0_S n$
200.0$^{+160.0}_{-50.0}$	ETKIN	85	MPS	$22\ \pi^- p \to 2\phi n$
300.0$^{+150.0}_{-50.0}$	LINDENBAUM	84	RVUE	
310.0± 70.0	ETKIN	82	MPS	$22\ \pi^- p \to 2\phi n$

[3] Includes data of ETKIN 85.
[4] Statistically very weak, only 1.4 s.d.

f_2(2010) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\phi\phi$	seen

f_2(2010) REFERENCES

BOLONKIN 88 NP B309 426 +Bloshenko, Gorin+ (ITEP, SERP)
ETKIN 88 PL B201 568 +Foley, Lindenbaum+ (BNL, CUNY)
ETKIN 85 PL 165B 217 +Foley, Longacre, Lindenbaum+ (BNL, CUNY)
LINDENBAUM 84 CNPP 13 285 (CUNY)
ETKIN 82 PRL 49 1620 +Foley, Longacre, Lindenbaum+ (BNL, CUNY)
Also 83 Brighton Conf. 351 Lindenbaum (BNL, CUNY)

OTHER RELATED PAPERS

ARMSTRONG 89B PL B221 221 +Benayoun+(CERN, CDEF, BIRM, BARI, ATHU, CURIN+)
GREEN 86 PRL 56 1639 +Lai+ (FNAL, ARIZ, FSU, NDAM, TUFTS, VAND+)
BOOTH 84 NP B242 51 +Ballance, Carroll, Donald+ (LIVP, GLAS, CERN)

$a_4(2040)$

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

OMITTED FROM SUMMARY TABLE
Seen in partial-wave analysis of the $K\overline{K}$ and $\pi^+\pi^-\pi^0$ systems. Needs confirmation.

a_4(2040) MASS

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
2037 ±26 OUR AVERAGE					
2040.0±30.0	[1] CLELAND	82B	SPEC	±	$50\ \pi p \to K^0_S K^\pm p$
2030.0±50.0	[2] CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1903.0±10.0	[3] BALDI	78	SPEC	−	$10\ \pi^- p \to p K^0_S K^-$

[1] From an amplitude analysis.
[2] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded.
[3] From a fit to the Y^0_8 moment. Limited by phase space.

a_4(2040) WIDTH

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
427 ±120 OUR AVERAGE					
380.0±150.0	[4] CLELAND	82B	SPEC	±	$50\ \pi p \to K^0_S K^\pm p$
510.0±200.0	[5] CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
166.0± 43.0	[6] BALDI	78	SPEC	−	$10\ \pi^- p \to p K^0_S K^-$

[4] From an amplitude analysis.
[5] $J^P = 4^+$ is favored, though $J^P = 2^+$ cannot be excluded.
[6] From a fit to the Y^0_8 moment. Limited by phase space.

a_4(2040) DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\overline{K}$	seen
Γ_2	$\pi^+\pi^-\pi^0$	seen

a_4(2040) BRANCHING RATIOS

$\Gamma(K\overline{K})/\Gamma_{\text{total}}$ Γ_1/Γ

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	BALDI	78	SPEC	±	$10\ \pi^- p \to K^0_S K^- p$

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$ Γ_2/Γ

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	CORDEN	78C	OMEG	0	$15\ \pi^- p \to 3\pi n$

a_4(2040) REFERENCES

CLELAND 82B NP B208 228 +Delfosse, Dorsaz, Gloor (DURH, GEVA, LAUS, PITT)
BALDI 78 PL 74B 413 +Bohringer, Dorsaz, Hungerbuhler+ (GEVA) JP
CORDEN 78C NP B136 77 +Dowell, Garvey+ (BIRM, RHEL, TELA, LOWC) JP

OTHER RELATED PAPERS

DELFOSSE 81 NP B183 349 +Guisan, Martin, Muhlemann, Weill+ (GEVA, LAUS)