

$\Sigma(1690)$ Bumps

$$I(J^P) = 1(?^?) \quad \text{Status: } **$$

OMITTED FROM SUMMARY TABLE

See the note preceding the $\Sigma(1670)$ Listings. Seen in production experiments only, mainly in $\Lambda\pi$. **$\Sigma(1690)$ MASS
(PRODUCTION EXPERIMENTS)**

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
≈ 1690 OUR ESTIMATE						
1698 ± 20	70	¹ GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
1707 ± 20	40	² GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
1698 ± 20	15	ADERHOLZ	69	HBC	+	$\pi^+ p$ 8 GeV/c
1682 ± 2	46	BLUMENFELD	69	HBC	+	$K_L^0 p$
1700 ± 20		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
1694 ± 24	60	³ PRIMER	68	HBC	+	$K^- p$ 4.6–5 GeV/c
1700 ± 6		⁴ SIMS	68	HBC	–	$K^- N \rightarrow \Lambda\pi\pi$
1715 ± 12	30	COLLEY	67	HBC	+	$K^- p$ 6 GeV/c

 **$\Sigma(1690)$ WIDTH
(PRODUCTION EXPERIMENTS)**

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
240 ± 60	70	¹ GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
130^{+100}_{-60}	40	² GODDARD	79	HBC	+	$\pi^+ p$ 10.3 GeV/c
142 ± 40	15	ADERHOLZ	69	HBC	+	$\pi^+ p$ 8 GeV/c
25 ± 10	46	BLUMENFELD	69	HBC	+	$K_L^0 p$
130 ± 25		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
105 ± 35	60	³ PRIMER	68	HBC	+	$K^- p$ 4.6–5 GeV/c
62 ± 14		⁴ SIMS	68	HBC	–	$K^- N \rightarrow \Lambda\pi\pi$
100 ± 35	30	COLLEY	67	HBC	+	$K^- p$ 6 GeV/c

 **$\Sigma(1690)$ DECAY MODES
(PRODUCTION EXPERIMENTS)**

Mode
Γ_1 $N\bar{K}$
Γ_2 $\Lambda\pi$
Γ_3 $\Sigma\pi$
Γ_4 $\Sigma(1385)\pi$
Γ_5 $\Lambda\pi\pi$ (including $\Sigma(1385)\pi$)

$\Sigma(1690)$ BRANCHING RATIOS (PRODUCTION EXPERIMENTS)

$\Gamma(N\bar{K})/\Gamma(\Lambda\pi)$							Γ_1/Γ_2
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c	
<0.2		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c	
0.4 ± 0.25	18	COLLEY	67	HBC	+	6/30 events	

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$							Γ_3/Γ_2
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c	
<0.4	90	MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c	
0.3 ± 0.3		COLLEY	67	HBC	+	4/30 events	

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi)$							Γ_4/Γ_2
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
<0.5		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c	

$\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))/\Gamma(\Lambda\pi)$							Γ_5/Γ_2
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
2.0 ± 0.6		BLUMENFELD	69	HBC	+	31/15 events	
0.5 ± 0.25		COLLEY	67	HBC	+	15/30 events	

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))$							Γ_4/Γ_5
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
large		SIMS	68	HBC	-	$K^- N \rightarrow \Lambda\pi\pi$	
small		COLLEY	67	HBC	+	$K^- p$ 6 GeV/c	

$\Sigma(1690)$ FOOTNOTES (PRODUCTION EXPERIMENTS)

- ¹ From $\pi^+ p \rightarrow (\Lambda\pi^+)K^+$. $J > 1/2$ is not required by the data.
- ² From $\pi^+ p \rightarrow (\Lambda\pi^+)(K\pi)^+$. $J > 1/2$ is indicated, but large background precludes a definite conclusion.
- ³ See the $\Sigma(1670)$ Listings. AGUILAR-BENITEZ 70B with three times the data of PRIMER 68 find no evidence for the $\Sigma(1690)$.
- ⁴ This analysis, which is difficult and requires several assumptions and shows no unambiguous $\Sigma(1690)$ signal, suggests $J^P = 5/2^+$. Such a state would lead all previously known Y^* trajectories.

$\Sigma(1690)$ REFERENCES (PRODUCTION EXPERIMENTS)

GODDARD	79	PR D19 1350	M.C. Goddard <i>et al.</i>	(TNTO, BNL) IJ
AGUILAR-...	70B	PRL 25 58	M. Aguilar-Benitez <i>et al.</i>	(BNL, SYRA)
ADERHOLZ	69	NP B11 259	M. Aderholz <i>et al.</i>	(AACH3, BERL, CERN+) I
BLUMENFELD	69	PL 29B 58	B.J. Blumenfeld, G.R. Kalbfleisch	(BNL) I
MOTT	69	PR 177 1966	J. Mott <i>et al.</i>	(NWES, ANL) I
Also		PRL 18 266	M. Derrick <i>et al.</i>	(ANL, NWES) I
PRIMER	68	PRL 20 610	M. Primer <i>et al.</i>	(SYRA, BNL) I
SIMS	68	PRL 21 1413	W.H. Sims <i>et al.</i>	(FSU, TUFTS, BRAN) I
COLLEY	67	PL 24B 489	D.C. Colley	(BIRM, GLAS, LOIC, MUNI, OXF+) I