

**$\Sigma(1690)$  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>
<b><math>\approx 1690</math> OUR ESTIMATE</b>					
$1698 \pm 20$	70	<sup>1</sup> GODDARD 79	HBC	+	$\pi^+ p$ 10.3 GeV/c
$1707 \pm 20$	40	<sup>2</sup> GODDARD 79	HBC	+	$\pi^+ p$ 10.3 GeV/c
$1698 \pm 20$	15	ADERHOLZ 69	HBC	+	$\pi^+ p$ 8 GeV/c
$1682 \pm 2$	46	BLUMENFELD 69	HBC	+	$K_L^0 p$
$1700 \pm 20$		MOTT 69	HBC	+	$K^- p$ 5.5 GeV/c
$1694 \pm 24$	60	<sup>3</sup> PRIMER 68	HBC	+	$K^- p$ 4.6–5 GeV/c
$1700 \pm 6$		<sup>4</sup> SIMS 68	HBC	–	$K^- N \rightarrow \Lambda\pi\pi$
$1715 \pm 12$	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>
$240 \pm 60$	70	<sup>1</sup> GODDARD 79	HBC	+	$\pi^+ p$ 10.3 GeV/c
$130^{+100}_{-60}$	40	<sup>2</sup> GODDARD 79	HBC	+	$\pi^+ p$ 10.3 GeV/c
$142 \pm 40$	15	ADERHOLZ 69	HBC	+	$\pi^+ p$ 8 GeV/c
$25 \pm 10$	46	BLUMENFELD 69	HBC	+	$K_L^0 p$
$130 \pm 25$		MOTT 69	HBC	+	$K^- p$ 5.5 GeV/c
$105 \pm 35$	60	<sup>3</sup> PRIMER 68	HBC	+	$K^- p$ 4.6–5 GeV/c
$62 \pm 14$		<sup>4</sup> SIMS 68	HBC	–	$K^- N \rightarrow \Lambda\pi\pi$
$100 \pm 35$	30	COLLEY 67	HBC	+	$K^- p$ 6 GeV/c

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

Mode	
$\Gamma_1$	$N\bar{K}$
$\Gamma_2$	$\Lambda\pi$
$\Gamma_3$	$\Sigma\pi$
$\Gamma_4$	$\Sigma(1385)\pi$
$\Gamma_5$	$\Lambda\pi\pi$ (including $\Sigma(1385)\pi$ )

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

$\Gamma(N\bar{K})/\Gamma(\Lambda\pi)$							$\Gamma_1/\Gamma_2$
<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	
$0.4 \pm 0.25$	18	COLLEY	67	HBC	+	6/30 events	

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$							$\Gamma_3/\Gamma_2$
<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	
$0.3 \pm 0.3$		COLLEY	67	HBC	+	4/30 events	

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi)$							$\Gamma_4/\Gamma_2$
<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	

$\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))/\Gamma(\Lambda\pi)$							$\Gamma_5/\Gamma_2$
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>		
$2.0 \pm 0.6$		BLUMENFELD	69	HBC	+	31/15 events	
$0.5 \pm 0.25$		COLLEY	67	HBC	+	15/30 events	

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))$							$\Gamma_4/\Gamma_5$
<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)

- <sup>1</sup> From  $\pi^+ p \rightarrow (\Lambda\pi^+)K^+$ .  $J > 1/2$  is not required by the data.
- <sup>2</sup> From  $\pi^+ p \rightarrow (\Lambda\pi^+)(K\pi)^+$ .  $J > 1/2$  is indicated, but large background precludes a definite conclusion.
- <sup>3</sup> See the  $\Sigma(1670)$  Listings. AGUILAR-BENITEZ 70B with three times the data of PRIMER 68 find no evidence for the  $\Sigma(1690)$ .
- <sup>4</sup> 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