$\Sigma(1480)$ Bumps

$I(J^P) = 1(?^?)$ Status: ∗

OMITTED FROM SUMMARY TABLE

These are peaks seen in $\Lambda\pi$ and $\Sigma\pi$ spectra in the reaction $\pi^+ p \rightarrow (Y\pi) K^+$ at 1.7 GeV/c. Also, the Y polarization oscillates in the same region.

MILLER 70 suggests a possible alternate explanation in terms of a reflection of $N(1675) \rightarrow \Lambda K$ decay. However, such an explanation for the $(\Sigma^+\pi^0)K^+$ channel in terms of $\Delta(1650) \rightarrow \Sigma K$ decay seems unlikely (see PAN 70). In addition such reflections would also have to account for the oscillation of the Y polarization in the 1480 MeV region.

HANSON 71, with less data than PAN 70, can neither confirm nor deny the existence of this state. MAST 75 sees no structure in this region in $K^- p \rightarrow \Lambda\pi^0$.

ENGELEN 80 performs a multichannel analysis of $K^- p \rightarrow p\overline{K}^0\pi^-$ at 4.2 GeV/c. They observe a 3.5 standard-deviation signal at 1480 MeV in $p\overline{K}^0$ which cannot be explained as a reflection of any competing channel.

PRAKHOV 04 sees no evidence for this or other light Σ resonances, aside from the $\Sigma(1385)$, in $K^- p \rightarrow \Lambda\pi^0\pi^0$.

ZYCHOR 06 finds peaks in $pp \rightarrow pK^+(\pi^\pm X^\mp)$ at $p_{\text{beam}} =$ 3.65 GeV/c.

$\Sigma(1480)$ MASS (PRODUCTION EXPERIMENTS)

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
≈ 1480 OUR ESTIMATE					
1480±15	365 ± 60	ZYCHOR	06	SPEC	$pp \rightarrow pK^+(\pi^\pm X^\mp)$
1480	120	ENGELEN	80	HBC	$K^- p \rightarrow (p\overline{K}^0)\pi^-$
1485±10		CLINE	73	MPWA	$K^- d \rightarrow (\Lambda\pi^-)p$
1479±10		PAN	70	HBC	$\pi^+ p \rightarrow (\Lambda\pi^+)K^+$
1465±15		PAN	70	HBC	$\pi^+ p \rightarrow (\Sigma\pi)K^+$

$\Sigma(1480)$ WIDTH (PRODUCTION EXPERIMENTS)

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
60±15	365 ± 60	ZYCHOR	06	SPEC	$pp \rightarrow pK^+(\pi^\pm X^\mp)$
80±20	120	ENGELEN	80	HBC	$K^- p \rightarrow (p\overline{K}^0)\pi^-$
40±20		CLINE	73	MPWA	$K^- d \rightarrow (\Lambda\pi^-)p$
31±15		PAN	70	HBC	$\pi^+ p \rightarrow (\Lambda\pi^+)K^+$
30±20		PAN	70	HBC	$\pi^+ p \rightarrow (\Sigma\pi)K^+$

$\Sigma(1480)$ DECAY MODES (PRODUCTION EXPERIMENTS)

	Mode
Γ_1	$N\overline{K}$
Γ_2	$\Lambda\pi$
Γ_3	$\Sigma\pi$

$\Sigma(1480)$ BRANCHING RATIOS (PRODUCTION EXPERIMENTS)

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$ — Γ_3/Γ_2

VALUE	*DOCUMENT ID*		*TECN*	*CHG*
0.82 ± 0.51	PAN	70	HBC	$+$

$\Gamma(N\overline{K})/\Gamma(\Lambda\pi)$ — Γ_1/Γ_2

VALUE	*DOCUMENT ID*		*TECN*	*CHG*
0.72 ± 0.50	PAN	70	HBC	$+$

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

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
small	CLINE	73	MPWA	$K^- d \rightarrow (\Lambda\pi^-) p$

$\Sigma(1480)$ REFERENCES (PRODUCTION EXPERIMENTS)

ZYCHOR	06	PRL 96 012002	I. Zychor *et al.*	(ANKE Collab.)
PRAKHOV	04	PR C69 042202R	S. Prakhov *et al.*	(BNL Crystal Ball Collab.)
ENGELEN	80	NP B167 61	J.J. Engelen *et al.*	(NIJM, AMST, CERN+)
MAST	75	PR D11 3078	T.S. Mast *et al.*	(LBL)
CLINE	73	LNC 6 205	D. Cline, R. Laumann, J. Mapp	(WISC) IJP
HANSON	71	PR D4 1296	P. Hanson, G.E. Kalmus, J. Louie	(LBL) I
MILLER	70	Duke Conf. 229	D.H. Miller	(PURD)
Hyperon Resonances, 1970				
PAN	70	PR D2 49	Y.L. Pan *et al.*	(PENN)
Also		PRL 23 808	Y.L. Pan, F.L. Forman	(PENN) I
Also		PRL 23 806	Y.L. Pan, F.L. Forman	(PENN) I