

# $\Sigma(1580) D_{13}$

$$I(J^P) = 1(\frac{3}{2}^-) \text{ Status: } *$$

## OMITTED FROM SUMMARY TABLE

Seen in the isospin-1  $\bar{K}N$  cross section at BNL (LI 73, CARROLL 76) and in a partial-wave analysis of  $K^- p \rightarrow \Lambda\pi^0$  for c.m. energies 1560–1600 MeV by LITCHFIELD 74. LITCHFIELD 74 finds  $J^P = 3/2^-$ . Not seen by ENGLER 78 or by CAMERON 78C (with larger statistics in  $K_L^0 p \rightarrow \Lambda\pi^+$  and  $\Sigma^0\pi^+$ ).

Neither OLMSTED 04 (in  $K^- p \rightarrow \Lambda\pi^0$ ) nor PRAKHOV 04 (in  $K^- p \rightarrow \Lambda\pi^0\pi^0$ ) see any evidence for this state.

### $\Sigma(1580)$ MASS

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b><math>\approx 1580</math> OUR ESTIMATE</b>			
1583±4	1 CARROLL 76	DPWA	Isospin-1 total $\sigma$
1582±4	2 LITCHFIELD 74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

### $\Sigma(1580)$ WIDTH

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
15	1 CARROLL 76	DPWA	Isospin-1 total $\sigma$
11±4	2 LITCHFIELD 74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

### $\Sigma(1580)$ DECAY MODES

Mode
$\Gamma_1 \quad N\bar{K}$
$\Gamma_2 \quad \Lambda\pi$
$\Gamma_3 \quad \Sigma\pi$

### $\Sigma(1580)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on  $\Lambda$  and  $\Sigma$  Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$	$\Gamma_1/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
+0.03±0.01	2 LITCHFIELD 74	DPWA	$\bar{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1580) \rightarrow \Lambda\pi$	$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$		
<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
not seen	CAMERON 78C	HBC	$K_L^0 p \rightarrow \Lambda\pi^+$
not seen	ENGLER 78	HBC	$K_L^0 p \rightarrow \Lambda\pi^+$
+0.10±0.02	2 LITCHFIELD 74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

$(\Gamma_i \Gamma_f)^{1/2} / \Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1580) \rightarrow \Sigma\pi$				$(\Gamma_1 \Gamma_3)^{1/2} / \Gamma$
VALUE	DOCUMENT ID	TECN	COMMENT	
not seen	CAMERON	78C	HBC	$K_L^0 p \rightarrow \Sigma^0 \pi^+$
not seen	ENGLER	78	HBC	$K_L^0 p \rightarrow \Sigma^0 \pi^+$
$+0.03 \pm 0.04$	<sup>2</sup> LITCHFIELD	74	DPWA	$\bar{K}N$ multichannel

### $\Sigma(1580)$ FOOTNOTES

<sup>1</sup> CARROLL 76 sees a total-cross-section bump with  $(J+1/2) \Gamma_{\text{el}} / \Gamma_{\text{total}} = 0.06$ .

<sup>2</sup> The main effect observed by LITCHFIELD 74 is in the  $\Lambda\pi$  final state; the  $\bar{K}N$  and  $\Sigma\pi$  couplings are estimated from a multichannel fit including total-cross-section data of LI 73.

### $\Sigma(1580)$ REFERENCES

OLMSTED	04	PL B588 29	J. Olmsted <i>et al.</i>	(BNL Crystal Ball Collab.)
PRAKHOV	04	PR C69 042202R	S. Prakhov <i>et al.</i>	(BNL Crystal Ball Collab.)
CAMERON	78C	NP B132 189	W. Cameron <i>et al.</i>	(BGNA, EDIN, GLAS+) I
ENGLER	78	PR D18 3061	A. Engler <i>et al.</i>	(CMU, ANL)
CARROLL	76	PRL 37 806	A.S. Carroll <i>et al.</i>	(BNL) I
LITCHFIELD	74	PL 51B 509	P.J. Litchfield	(CERN) IJP
LI	73	Purdue Conf. 283	K.K. Li	(BNL) I