

$\Sigma(1580) D_{13}$

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

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 $\Sigma^0 \pi^+$).

$\Sigma(1580)$ MASS

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

$\Sigma(1580)$ DECAY MODES

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

$\Sigma(1580)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_1/Γ
VALUE				
+0.03 \pm 0.01	² LITCHFIELD	74	DPWA $\bar{K}N$ multichannel	

$(\Gamma_i \Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(1580) \rightarrow \Lambda\pi$	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	$(\Gamma_1 \Gamma_2)^{1/2}/\Gamma$
VALUE				
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 \pm 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	$K_L^0 p \rightarrow \Sigma^0 \pi^+$	
$+0.03 \pm 0.04$	² LITCHFIELD	74 DPWA	$\bar{K}N$ multichannel	

$\Sigma(1580)$ FOOTNOTES

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

² 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

CAMERON	78C	NP B132 189	+Capiluppi+	(BGNA, EDIN, GLAS, PISA, RHEL) I
ENGLER	78	PR D18 3061	+Keyes, Kraemer, Tanaka, Cho+	(CMU, ANL)
CARROLL	76	PRL 37 806	+Chiang, Kycia, Li, Mazur, Michael+	(BNL) I
LITCHFIELD	74	PL 51B 509		(CERN) IJP
LI	73	Purdue Conf. 283		(BNL) I