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

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

OMITTED FROM SUMMARY TABLE

Seen in the isospin-1 $\overline{K}N$ 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 $K^0_L p \rightarrow \Lambda\pi^+$ and $\Sigma^0\pi^+$).

$\Sigma(1580)$ MASS

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
≈ 1580 OUR ESTIMATE				
1583±4	[1] CARROLL	76	DPWA	Isospin-1 total σ
1582±4	[2] LITCHFIELD	74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

$\Sigma(1580)$ WIDTH

VALUE (MeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
15	[1] CARROLL	76	DPWA	Isospin-1 total σ
11±4	[2] LITCHFIELD	74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

$\Sigma(1580)$ DECAY MODES

	Mode
Γ_1	$N\overline{K}$
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.

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

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
+0.03±0.01	[2] LITCHFIELD	74	DPWA	$\overline{K}N$ multichannel

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \rightarrow \Sigma(1580) \rightarrow \Lambda\pi$ — $(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
not seen	CAMERON	78C	HBC	$K^0_L p \rightarrow \Lambda\pi^+$
not seen	ENGLER	78	HBC	$K^0_L p \rightarrow \Lambda\pi^+$
+0.10±0.02	[2] LITCHFIELD	74	DPWA	$K^- p \rightarrow \Lambda\pi^0$

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{total}$ in $N\overline{K} \to \Sigma(1580) \to \Sigma\pi$ $\qquad (\Gamma_1\Gamma_3)^{1/2}/\Gamma$

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
not seen	CAMERON	78C	HBC	$K^0_L p \to \Sigma^0 \pi^+$
not seen	ENGLER	78	HBC	$K^0_L p \to \Sigma^0 \pi^+$
$+0.03 \pm 0.04$	[2] LITCHFIELD	74	DPWA	$\overline{K}N$ multichannel

Σ(1580) FOOTNOTES

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

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

Σ(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