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

$I(J^P) = 1(\frac{3}{2}^-)$  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 $K^- p \to \Lambda \pi^0$ 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 $K^0_L p \to \Lambda \pi^+$ 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 $\sigma$ |
| 1582±4 | [2] LITCHFIELD | 74 | DPWA | $K^- p \to \Lambda \pi^0$ |

## $\Sigma(1580)$ WIDTH

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

## $\Sigma(1580)$ DECAY MODES

| | Mode |
|---|---|
| $\Gamma_1$ | $N\overline{K}$ |
| $\Gamma_2$ | $\Lambda\pi$ |
| $\Gamma_3$ | $\Sigma\pi$ |

## $\Sigma(1580)$ BRANCHING RATIOS

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

### $\Gamma(N\overline{K})/\Gamma_{\text{total}}$ $\hspace{4cm}$ $\Gamma_1/\Gamma$

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

### $(\Gamma_i\Gamma_f)^{\frac{1}{2}}/\Gamma_{\text{total}}$ in $N\overline{K} \to \Sigma(1580) \to \Lambda\pi$ $\hspace{2cm}$ $(\Gamma_1\Gamma_2)^{\frac{1}{2}}/\Gamma$

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

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

| VALUE | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|
| not seen | CAMERON | 78C | HBC | $K^0_L p \to \Sigma^0\pi^+$ |
| not seen | ENGLER | 78 | HBC | $K^0_L p \to \Sigma^0\pi^+$ |
| $+0.03\pm0.04$ | [2] LITCHFIELD | 74 | DPWA | $\overline{K}N$ 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 $\overline{K}N$ 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 |