

Λ BARYONS

(S = -1, I = 0)

$$\Lambda^0 = uds$$

Λ

$$I(J^P) = 0(\frac{1}{2}^+)$$

Mass $m = 1115.683 \pm 0.006$ MeV

$$(m_\Lambda - m_{\bar{\Lambda}}) / m_\Lambda = (-0.1 \pm 1.1) \times 10^{-5} \quad (S = 1.6)$$

$$\text{Mean life } \tau = (2.632 \pm 0.020) \times 10^{-10} \text{ s} \quad (S = 1.6)$$

$$c\tau = 7.89 \text{ cm}$$

Magnetic moment $\mu = -0.613 \pm 0.004 \mu_N$

Electric dipole moment $d < 1.5 \times 10^{-16} \text{ e cm}$, CL = 95%

Decay parameters

$p\pi^-$	$\alpha_- = 0.642 \pm 0.013$
"	$\phi_- = (-6.5 \pm 3.5)^\circ$
"	$\gamma_- = 0.76 [h]$
"	$\Delta_- = (8 \pm 4)^\circ [h]$
$n\pi^0$	$\alpha_0 = +0.65 \pm 0.05$
$p e^- \bar{\nu}_e$	$g_A/g_V = -0.718 \pm 0.015 [f]$

Λ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$p\pi^-$	(63.9 ± 0.5) %	101
$n\pi^0$	(35.8 ± 0.5) %	104
$n\gamma$	(1.75 ± 0.15) × 10 ⁻³	162
$p\pi^- \gamma$	[i] (8.4 ± 1.4) × 10 ⁻⁴	101
$p e^- \bar{\nu}_e$	(8.32 ± 0.14) × 10 ⁻⁴	163
$p\mu^- \bar{\nu}_\mu$	(1.57 ± 0.35) × 10 ⁻⁴	131

Λ(1405) S₀₁

$$I(J^P) = 0(\frac{1}{2}^-)$$

Mass $m = 1406 \pm 4$ MeV

Full width $\Gamma = 50.0 \pm 2.0$ MeV

Below $\bar{K}N$ threshold

Λ(1405) DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$\Sigma \pi$	100 %	152

$\Lambda(1520) D_{03}$

$$I(J^P) = 0(\frac{3}{2}^-)$$

Mass $m = 1519.5 \pm 1.0$ MeV [1]

Full width $\Gamma = 15.6 \pm 1.0$ MeV [1]

$p_{\text{beam}} = 0.39$ GeV/c $4\pi\lambda^2 = 82.8$ mb

$\Lambda(1520)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	$45 \pm 1\%$	244
$\Sigma\pi$	$42 \pm 1\%$	267
$\Lambda\pi\pi$	$10 \pm 1\%$	252
$\Sigma\pi\pi$	$0.9 \pm 0.1\%$	152
$\Lambda\gamma$	$0.8 \pm 0.2\%$	351

$\Lambda(1600) P_{01}$

$$I(J^P) = 0(\frac{1}{2}^+)$$

Mass $m = 1560$ to 1700 (≈ 1600) MeV

Full width $\Gamma = 50$ to 250 (≈ 150) MeV

$p_{\text{beam}} = 0.58$ GeV/c $4\pi\lambda^2 = 41.6$ mb

$\Lambda(1600)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	15–30 %	343
$\Sigma\pi$	10–60 %	336

$\Lambda(1670) S_{01}$

$$I(J^P) = 0(\frac{1}{2}^-)$$

Mass $m = 1660$ to 1680 (≈ 1670) MeV

Full width $\Gamma = 25$ to 50 (≈ 35) MeV

$p_{\text{beam}} = 0.74$ GeV/c $4\pi\lambda^2 = 28.5$ mb

$\Lambda(1670)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	15–25 %	414
$\Sigma\pi$	20–60 %	393
$\Lambda\eta$	15–35 %	64

$\Lambda(1690) D_{03}$

$$I(J^P) = 0(\frac{3}{2}^-)$$

Mass $m = 1685$ to 1695 (≈ 1690) MeV

Full width $\Gamma = 50$ to 70 (≈ 60) MeV

$$p_{\text{beam}} = 0.78 \text{ GeV}/c \quad 4\pi\lambda^2 = 26.1 \text{ mb}$$

$\Lambda(1690)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	20–30 %	433
$\Sigma\pi$	20–40 %	409
$\Lambda\pi\pi$	~ 25 %	415
$\Sigma\pi\pi$	~ 20 %	350

$\Lambda(1800) S_{01}$

$$I(J^P) = 0(\frac{1}{2}^-)$$

Mass $m = 1720$ to 1850 (≈ 1800) MeV

Full width $\Gamma = 200$ to 400 (≈ 300) MeV

$$p_{\text{beam}} = 1.01 \text{ GeV}/c \quad 4\pi\lambda^2 = 17.5 \text{ mb}$$

$\Lambda(1800)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	25–40 %	528
$\Sigma\pi$	seen	493
$\Sigma(1385)\pi$	seen	345
$N\bar{K}^*(892)$	seen	†

$\Lambda(1810) P_{01}$

$$I(J^P) = 0(\frac{1}{2}^+)$$

Mass $m = 1750$ to 1850 (≈ 1810) MeV

Full width $\Gamma = 50$ to 250 (≈ 150) MeV

$$p_{\text{beam}} = 1.04 \text{ GeV}/c \quad 4\pi\lambda^2 = 17.0 \text{ mb}$$

$\Lambda(1810)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	20–50 %	537
$\Sigma\pi$	10–40 %	501
$\Sigma(1385)\pi$	seen	356
$N\bar{K}^*(892)$	30–60 %	†

$\Lambda(1820) F_{05}$

$$I(J^P) = 0(\frac{5}{2}^+)$$

Mass $m = 1815$ to 1825 (≈ 1820) MeV

Full width $\Gamma = 70$ to 90 (≈ 80) MeV

$$p_{\text{beam}} = 1.06 \text{ GeV}/c \quad 4\pi\lambda^2 = 16.5 \text{ mb}$$

$\Lambda(1820)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	55–65 %	545
$\Sigma\pi$	8–14 %	508
$\Sigma(1385)\pi$	5–10 %	362

$\Lambda(1830) D_{05}$

$$I(J^P) = 0(\frac{5}{2}^-)$$

Mass $m = 1810$ to 1830 (≈ 1830) MeV

Full width $\Gamma = 60$ to 110 (≈ 95) MeV

$$p_{\text{beam}} = 1.08 \text{ GeV}/c \quad 4\pi\lambda^2 = 16.0 \text{ mb}$$

$\Lambda(1830)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	3–10 %	553
$\Sigma\pi$	35–75 %	515
$\Sigma(1385)\pi$	>15 %	371

$\Lambda(1890) P_{03}$

$$I(J^P) = 0(\frac{3}{2}^+)$$

Mass $m = 1850$ to 1910 (≈ 1890) MeV

Full width $\Gamma = 60$ to 200 (≈ 100) MeV

$$p_{\text{beam}} = 1.21 \text{ GeV}/c \quad 4\pi\lambda^2 = 13.6 \text{ mb}$$

$\Lambda(1890)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	20–35 %	599
$\Sigma\pi$	3–10 %	559
$\Sigma(1385)\pi$	seen	420
$N\bar{K}^*(892)$	seen	233

$\Lambda(2100) G_{07}$

$$I(J^P) = 0(\frac{7}{2}^-)$$

Mass $m = 2090$ to 2110 (≈ 2100) MeV

Full width $\Gamma = 100$ to 250 (≈ 200) MeV

$$p_{\text{beam}} = 1.68 \text{ GeV}/c \quad 4\pi\lambda^2 = 8.68 \text{ mb}$$

$\Lambda(2100)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	25–35 %	751
$\Sigma\pi$	~ 5 %	704
$\Lambda\eta$	< 3 %	617
ΞK	< 3 %	483
$\Lambda\omega$	< 8 %	443
$N\bar{K}^*(892)$	10–20 %	514

$\Lambda(2110) F_{05}$

$$I(J^P) = 0(\frac{5}{2}^+)$$

Mass $m = 2090$ to 2140 (≈ 2110) MeV

Full width $\Gamma = 150$ to 250 (≈ 200) MeV

$$p_{\text{beam}} = 1.70 \text{ GeV}/c \quad 4\pi\lambda^2 = 8.53 \text{ mb}$$

$\Lambda(2110)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	5–25 %	757
$\Sigma\pi$	10–40 %	711
$\Lambda\omega$	seen	455
$\Sigma(1385)\pi$	seen	589
$N\bar{K}^*(892)$	10–60 %	524

$\Lambda(2350) H_{09}$

$$I(J^P) = 0(\frac{9}{2}^+)$$

Mass $m = 2340$ to 2370 (≈ 2350) MeV

Full width $\Gamma = 100$ to 250 (≈ 150) MeV

$$p_{\text{beam}} = 2.29 \text{ GeV}/c \quad 4\pi\lambda^2 = 5.85 \text{ mb}$$

$\Lambda(2350)$ DECAY MODES	Fraction (Γ_i/Γ)	p (MeV/c)
$N\bar{K}$	~ 12 %	915
$\Sigma\pi$	~ 10 %	867