

Strange Baryon spectrum

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ETM Collaboration



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Introduction

- Lattice Setup
- isospin Breaking
- Results from other collaborations
- Chiral extrapolation

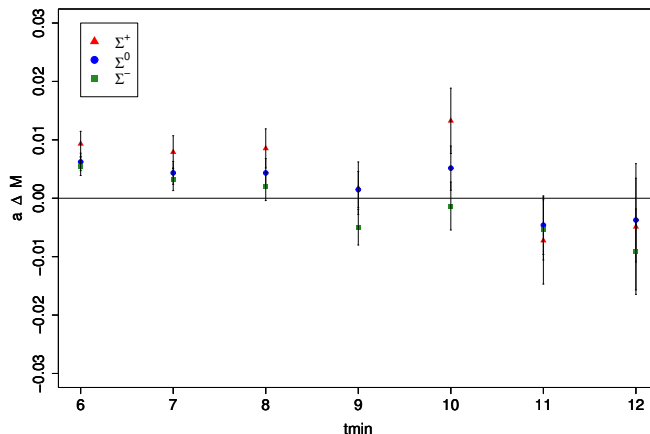
- Partially quenched study : strange quark simulated using an OS quark with a mass $+\mu$
- Smearing : Gaussian + APE
- Source randomly choosen in the whole lattice
- strange mass tuned at each lattice spacing to reproduce the physical kaon after extrapolation in μ_{light}

-	$\beta = 3.8$	$\beta = 3.9$	$\beta = 4.05$
μ_s^{bare}	0.0208(15)(48)	Our value : 0.0217 new one : 0.0213(8)(22)	0.0166(18)(29)

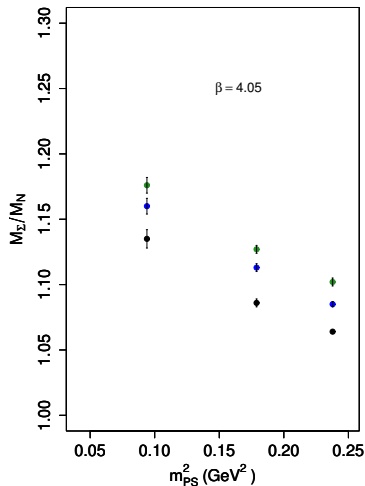
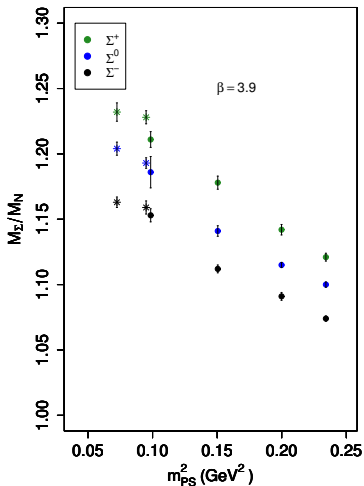
Mass extraction

Let $m(tmin, tmax)$ the fit of $m_{eff}(t)$ on $[tmin, tmax]$

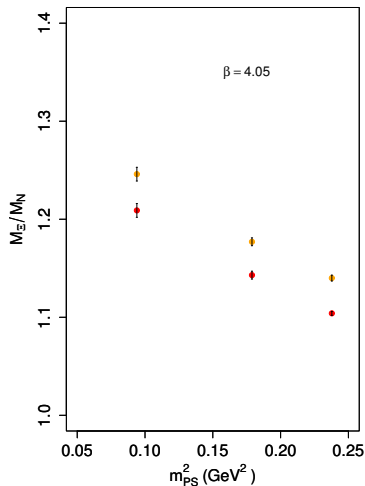
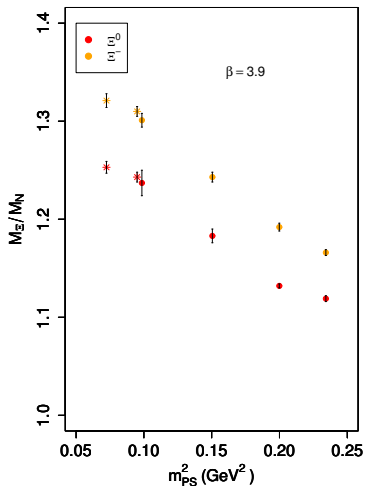
$$\Delta m(tmin, tmax) = m(tmin + 1, tmax) - m(tmin, tmax)$$



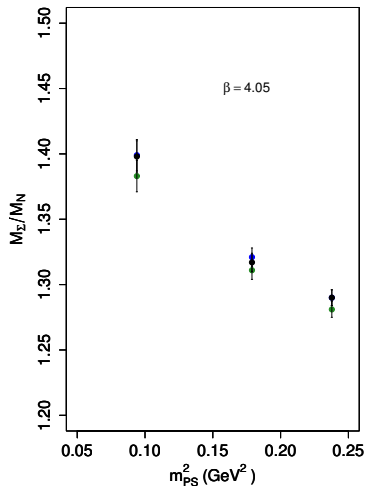
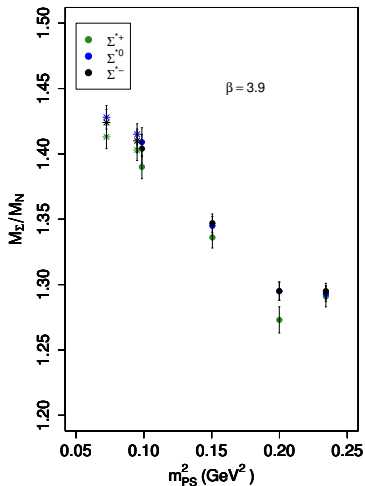
isospin breaking Σ



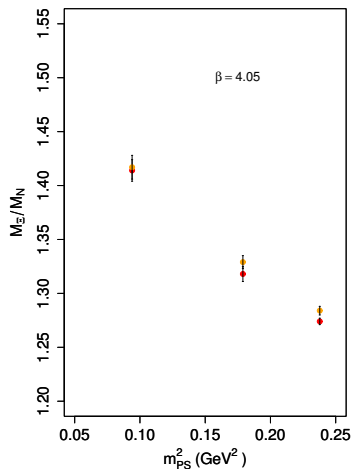
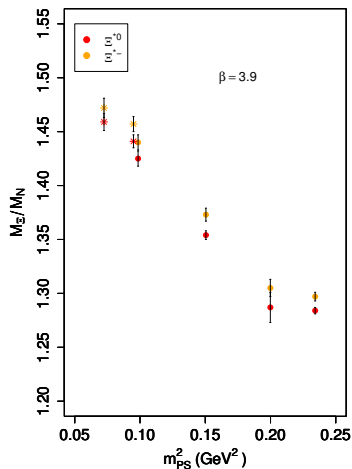
Isospin breaking Ξ



Isospin breaking Σ^*

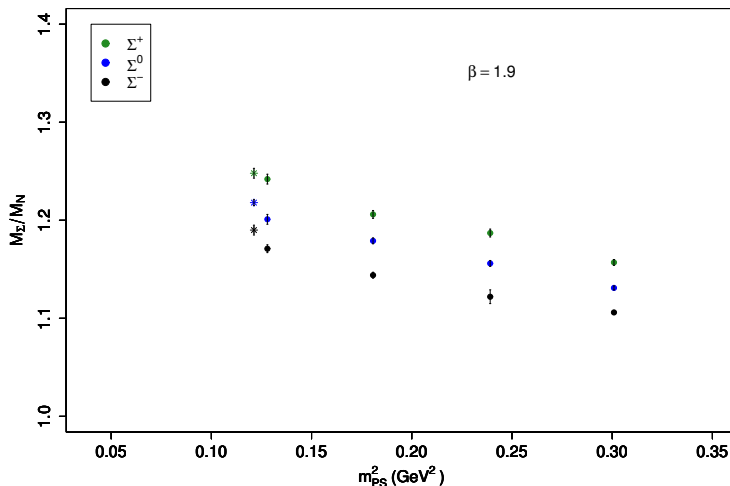


Isospin breaking Ξ^*

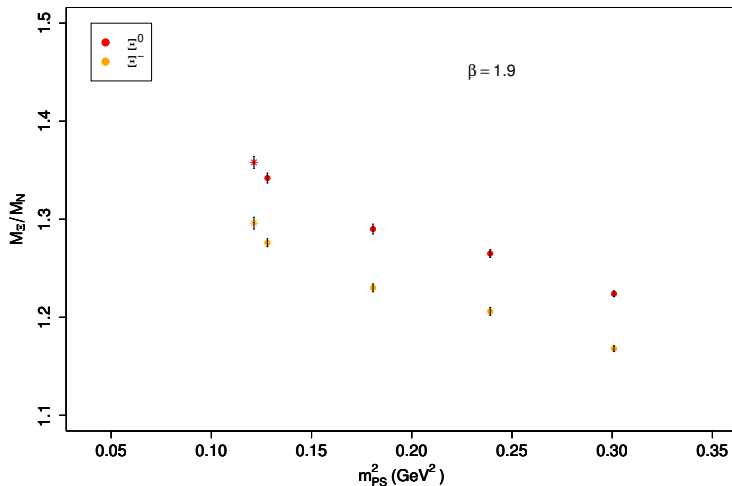


Comparison with $N_F = 2 + 1 + 1$

Mixed action setup

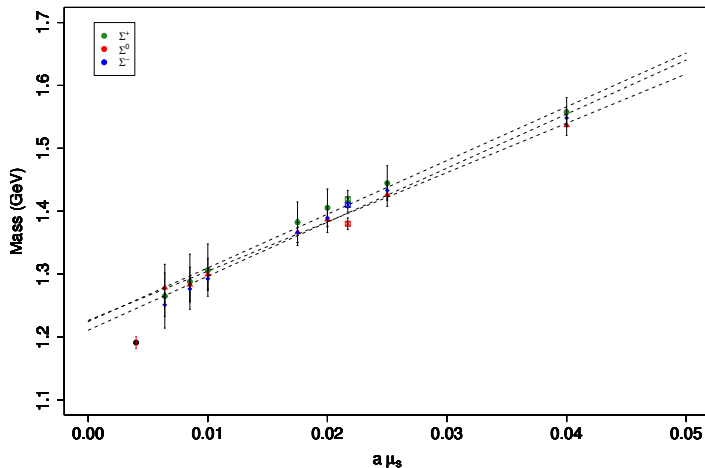


Comparison with $N_F = 2 + 1 + 1$

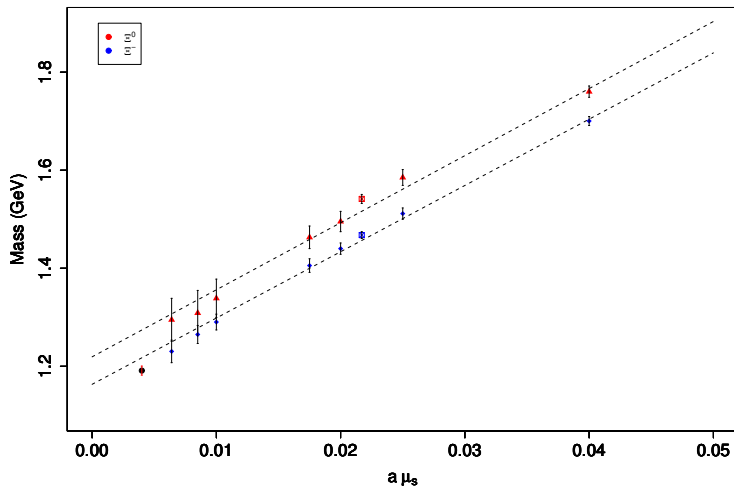


Isospin breaking Σ

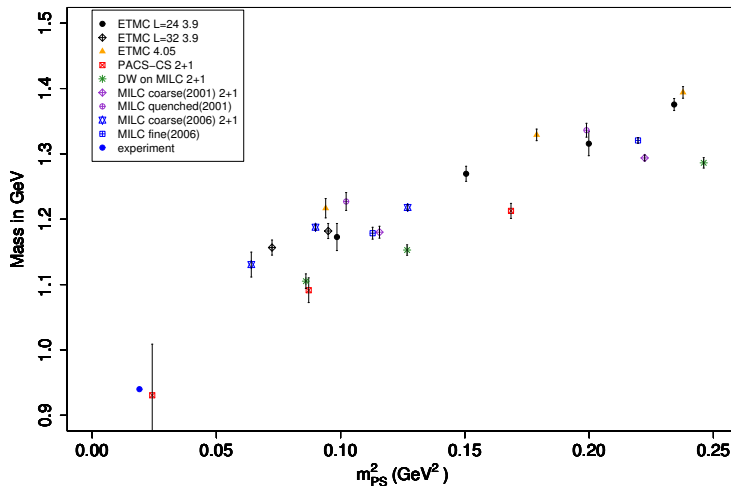
$\mu_{\text{light}} = 0.004$ and $L = 24$



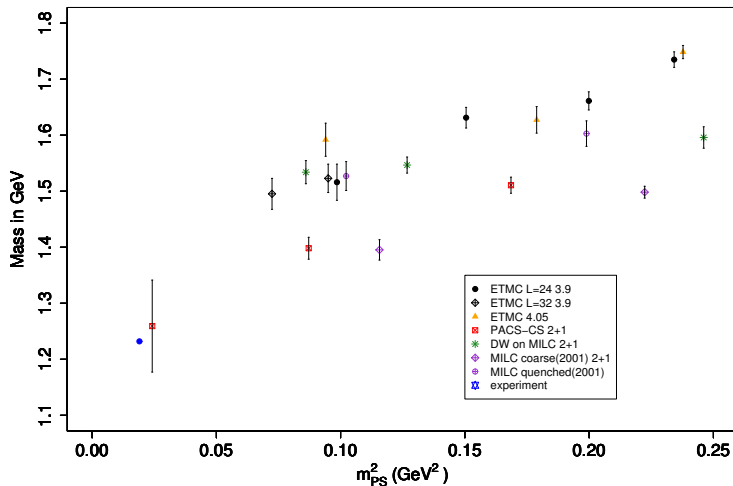
Isospin breaking Ξ



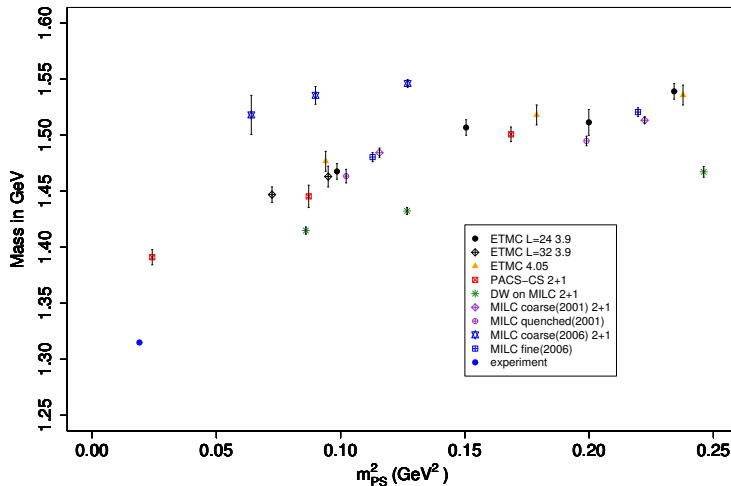
Comparison Nucleon



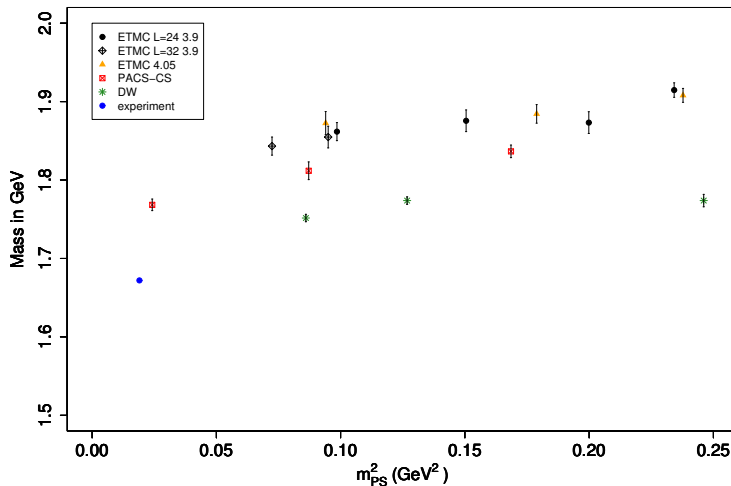
Comparison Δ



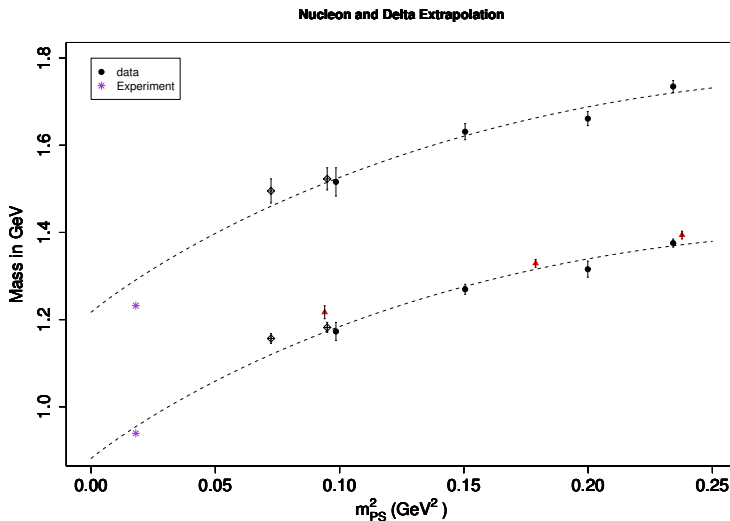
Comparison Ξ



Comparison Ω



Xfit Nucleon and Δ

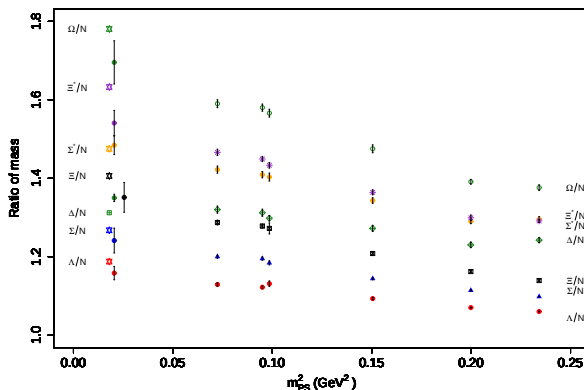


Xfit using ratio

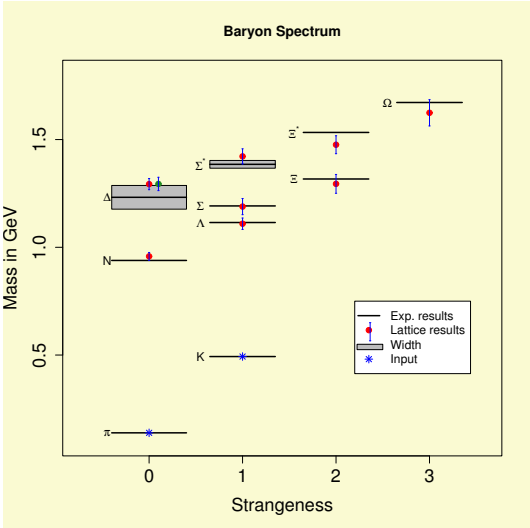
3 fits :

- 3.9 only, linear in m_π^2
- 4.05 only, linear in m_π^2
- combined fit, linear in m_π^2 and a term of $O(a^2)$

→ use to determine the central value and the error on it for each states.



Xfit using ratio



Conclusion

- Isospin breaking in the Octet, not in the Decuplet
- Isospin splitting does not depend of m_{PS} and seem to decrease with the lattice spacing
- Chiral extrapolation using ratio in good agreement with experiment