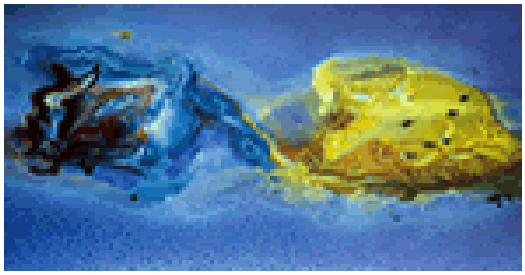

Contribution ID: **70** Type: **Invited talk**

Baryon masses and σ terms in $\mathrm{SU(3)\ BChPT \times 1/N_c}$

Thursday, August 2, 2018 2:30 PM (30 minutes)

Chiral perturbation theory (ChPT) and the $1/N_c$ expansion provide systematic frameworks in investigating the strong interactions at low energy. A combined framework of both approaches has been developed and applied for baryons with three light-quark-flavors. The small scale expansion of the combined approach is identified as the ξ-expansion, in which the power counting of $1/N_c$ and chiral expansions are linked as $calO(p) =$
$calO(1/N_c) =$
$calO(\xi)$. Experimentally observed baryon masses as well as the lattice QCD baryon masses are analyzed to $calO(\xi^3)$ in the combined framework, with explicit inclution of the decuplet intermediate-baryon states. The connection between the deviation of the Gell-Mann-Okubo relation and the σ term associated with the scalar density $\bar{u}u + \bar{d}d - 2\bar{s}s$ is identified. In particular, the deviation from the mass combination $\hat{m}\frac{\partial}{\partial\hat{m}}m_N = \frac{\hat{m}}{m_s-\hat{m}}\left(m_\Sigma + m_\Xi - 2m_N\right)$ which gives rise to the so called σ-term puzzle is studied in the ξ-expansion. The application of this present framework allows one to identify the large higher order non-analytic inquark masses contributions to that mass combination. The final result on the nucleon $\sigma_{\pi N}$ obtained by combined fits to experimental and lattice QCD baryon masses, will be presented.

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Session Classification: Light quarks

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