Outline

- Using unrooted staggered fermions to simulate 2+2, 2+1+1 and 1+1+1+1 flavors: Is it practical?
- Staggered-Wilson fermions---Adams version
- Staggered-Wilson fermions---Hoelbling-like versions
- Constraining low energy coefficients in ChPT using Weingarten mass inequalities (flash talk?)

Partially Quenched Wilson ChPT

- $SU(2)_L \times SU(2)_R \rightarrow SU(2+N_V|N_V)_L \times SU(2+N_V|N_V)_R$
- Construct L_χ including a^2 effects [SS & Singleton; Bar, Rupak & Shoresh; Aoki]

$$\mathcal{L}_0 = \frac{f^2}{4}\langle \partial_\mu \Sigma \partial_\mu \Sigma^\dagger \rangle - \frac{f^2}{4} 2B_0 \langle M^\dagger \Sigma + \Sigma^\dagger M \rangle$$
$$- \hat{a}^2 W_6' \langle \Sigma + \Sigma^\dagger \rangle^2 - \hat{a}^2 W_7' \langle (\Sigma - \Sigma^\dagger)^2 \rangle - \hat{a}^2 W_8' \langle \Sigma^2 + (\Sigma^\dagger)^2 \rangle$$

$\Sigma \in SU(2+N_V|N_V)$

Supertrace

- Phase structure (Aoki vs. first-order) determined by

$$c_2 = -8\hat{a}^2 (2W_6' + W_8')$$

- Can one constrain the signs of the low-energy coefficients (LECs)?

Can signs of LECs be predicted?

- General issue in effective field theories
- Sometimes can use causality [Pham & Truong, A. Adams et al.]
  - Doesn't apply here
- Hermiticity argument from ε-regime study in WChPT implies $W_8' < 0$ [Akemann, Damgaard, Splittorff & Verbaarschot]
  - Important question: Is this argument correct?
- Another recent method is to use QCD mass inequalities to constrain LECs [Bar, Golterman & Shamir]
- In [Hansen & SS, arxiv:1111.2404] we derived $W_8' < 0$, by calculating a PQ pion mass in ChPT and comparing to constraint from Weingarten-like mass inequalities