CP-PACS and JLQCD Full QCD experience

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■ CP-PACS two-flavor run (1997-1999)

- RG-improved glue + clover quark (tadpole c_{SW})
- spatial size $L \approx 2.4\ fm \quad (12^3 \times 24 - 24^3 \times 48)$
- seq quark mass $m_\pi / m_\rho \approx 0.8 - 0.6$
- lattice spacing $a^{-1} \approx 1.0 - 2.0\ GeV$
- statistics $7000 - 4000\ traj. \approx 100\ indep.\ configs$
- total CPU time for config. generation *236 CP-PACS days*

0.6Tflops peak/0.2Tflops sustained

◆ FLOP estimates

$$\#FLOP's = C \cdot \left[\frac{\#conf}{1000}\right] \cdot \left[\frac{m\pi / m\rho}{0.6}\right]^{-6} \cdot \left[\frac{L}{3\,fm}\right]^{5} \cdot \left[\frac{1/a}{2GeV}\right]^{7} \ Tflops \cdot year$$

$$C \approx 2.8$$

assumptions(empirical):

- inversion $N_{inv} \approx const / m_q a$
- step size $\delta\tau \approx const \cdot m_q \cdot \frac{a}{L}$ (*least known*)
- auto-correlation $\tau_{\rm int} \approx const / m_q a$

■ JLQCD two-flavor run (2000-2001)

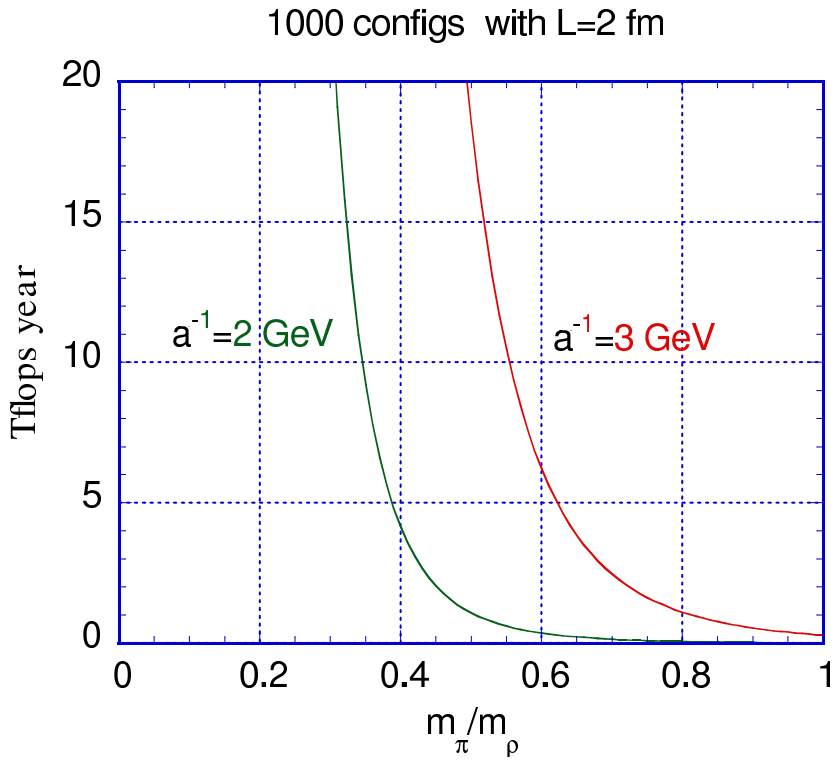
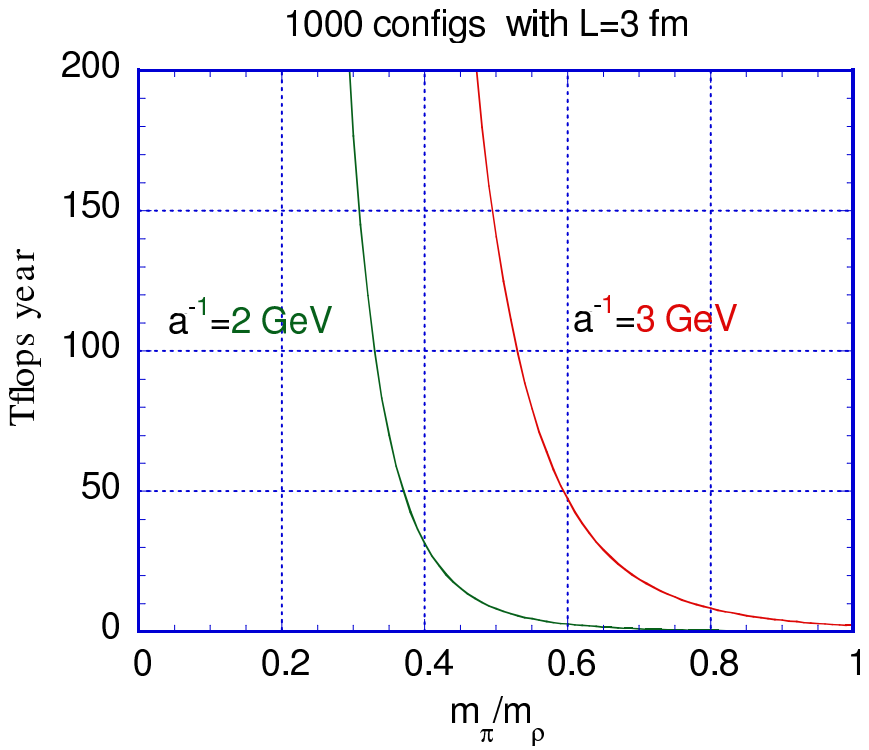
- plaquette glue + clover quark (NP c_{SW})
- spatial size $L \approx 1.2 - 2.0\ fm \quad (12^3 \times 48 - 20^3 \times 48)$
- seq quark mass $m_\pi / m_\rho \approx 0.8 - 0.6$
- lattice spacing $a^{-1} \approx 2.0\ GeV$
- statistics $6000\ traj. \approx 100\ indep.\ configs$
- total CPU time for config. generation *75 SR8000 days*

1.2Tflops peak/0.4Tflops sustained

◆ FLOP estimates

- very similar characteristics
- numerically also similar $C_{CP-PACS} \approx C_{JLQCD}$

Tflops years estimate for $N_f = 2$ Full QCD

$$\#FLOP's = 2.8 \cdot \left[\frac{\#conf}{1000}\right] \cdot \left[\frac{m\pi / m\rho}{0.6}\right]^{-6} \cdot \left[\frac{L}{3fm}\right]^{5} \cdot \left[\frac{1/a}{2GeV}\right]^{7} Tflops \cdot year$$

Improved gauge and clover quark actions + HMC algorithm