A proposal for the transition period

State-of-the-art for $N_f = 2 + 1$ QCD

- what does it mean?
  — HVP to 0.5% ?
  — g_A etc. to 2% ?
  — m_b to 0.5% ?
  will take quite a while. Excited states, continuum limit, infinite volume limit, physical point, renormalization.

  Note in particular: we typically do 1 to few-hundred global fits. Hard to tell what is controlled what not.
  E.g. charm mass computation, B*Bpi coupling,
  no term $m_\pi^2 a^2$ in the fit.
  Reasonable with present accuracy! But how much controlled?

- alternative: ask completely well defined question(s), doable now.
  not fashionable — but scientific.
  Do that to the best state of the art, or better redefine the state of the art

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One such question (~ doable now)

- Continuum limit at the symmetric point
  — HVP
  — g_A etc.
  — test relativistic heavy quarks (twisted or not)
  — test different actions in the valence sector

Carlos: **cost estimation exercise:** push as close as possible to CL with current code/technology

[thx S Schaefer]

1. work @ CLSsym $m_u = m_d = m_s$, smallish 2.5 fm box ($m_\pi L$~5)
2. simulate largest (?) attainable lattice L/a=96 ⇒ a~0.025 fm (⇒ am_b~0.4)
3. use autocorrelation estimate $\tau_{\rm exp} \approx 14 t_0/a^2$ ⇒ 50000 MDU needed
4. scale up with volume from known J500 cost ⇒ **need ≈ 500 MCh**

this looks very tough without better code performance (GPUs? ...?) and/or compromise on statistics

- new code as soon as (when) available
- In the mean time:
  coordinated effort: e.g. 150M Mainz (g-2), 150M Reg. (hadron struct.), 150M ALPHA (heavy quarks)
  + N projects on different (valence) actions.

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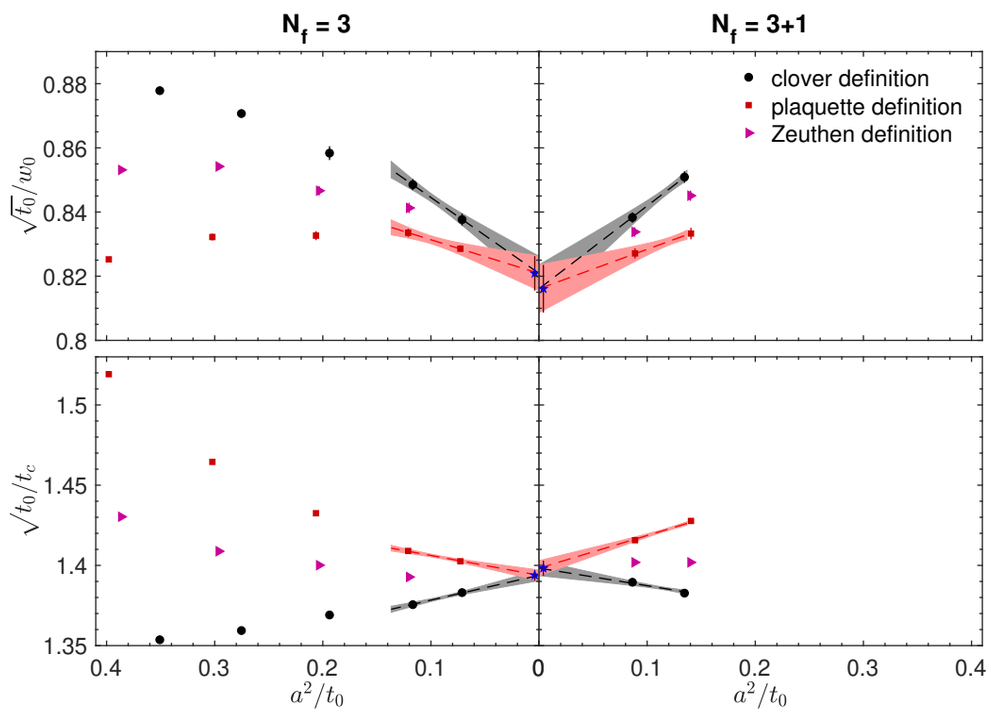
Second question (with large synergy)

- What is the effect of the charm at the symmetric point?
  — HVP
  — g_A etc.
  — heavy quarks

- Tomasz:



- This test should be done for (almost) all observables computed in CLS
  This is a scientific, evidence based instead of rumour based, way of estimating the effect of the charm

- Wuppertal would probably be happy to share configs, but CLS could help to push forward: coordinated effort

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Second question (with large synergy)

- What is the effect of the charm at the symmetric point
- This test should be done for (almost) all observables computed in CLS
  This is a scientific, evidence based instead of rumour based, way of estimating the effect of the charm
- common sense: effect(phys. point) < effect(symm. point)
- If done properly and the effect is negligible,
- the 2+1 result should offensively be declared as a 2+1+1 result (technically 2+1+1 simulations are being done, …)

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Additionally of course there will be other polishing work

- E.g. symmetric line by Regensburg
- …

Discussion!