

# Excited mesons from $N_f = 2$ dynamical Clover Wilson lattices

Christian Hagen, Tommy Burch and Andreas Schäfer

Universität Regensburg

07/25/2006

# Outline

- 1 Simulation details
- 2 The method
- 3 Results
- 4 Outlook

# Simulation details

Dynamical gauge configurations with  $N_f = 2$  Clover Wilson Fermions:

$\beta$	$L^3 \times T$	a[fm]	La[fm]
1.80	$12^3 \times 24$	0.2150(22)	2.580(26)
1.95	$16^3 \times 32$	0.1555(17)	2.489(27)
2.10	$24^3 \times 48$	0.1076(13)	2.583(31)

CP-PACS-Collaboration: Phys.Rev.D60:114508,1999  
Phys.Rev.D65:054505,2002; D67:059901(E),2003

Chroma software from USQCD

Nucl.Phys.Proc.Suppl. 140 (2005) 832

2-3 partions of our small QCDOC, 128 CPU each

# The method

Similar approach as we did for quenched lattices:

- Generate several spatially different quark sources  
(here we considered  $L, n, w, p_x, p_y, p_z$ )
- Construct many different interpolators and calculate CC-matrix
- Use variational method to obtain ground and excited states
  - Can remove ghosts in partially quenched results
  - Couplings to excited states ( $\rightarrow$  poster of C. Ehmman)

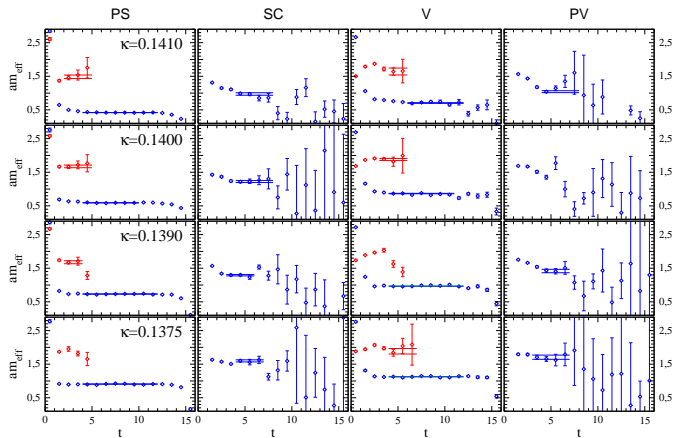
Phys.Rev.D73:017502,2006 (Ghostbuster)

Phys.Rev.D73:094505,2006 (Mesons)

Phys.Rev.D74:014504,2006 (Baryons)

# Preliminary results

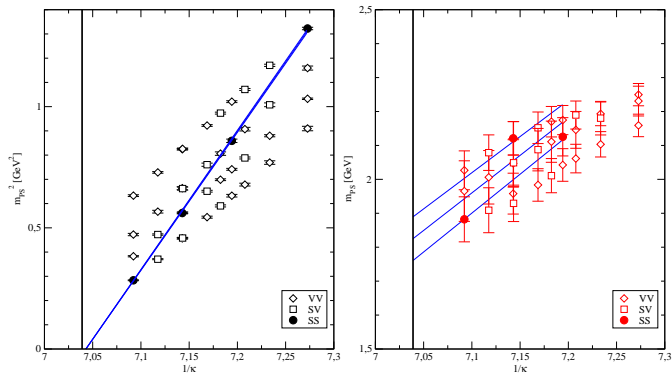
## Effective masses



# Preliminary results

## Pseudoscalar

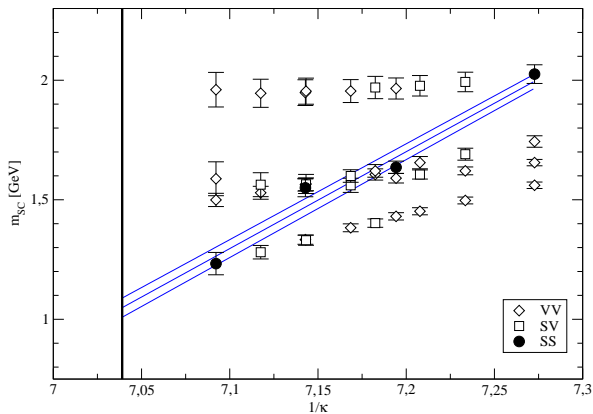
Operators:  $L\gamma_5 L$ ,  $L\gamma_4\gamma_5 L$ ,  $m\gamma_5 n$ ,  $m\gamma_4\gamma_5 n$



# Preliminary results

## Scalar

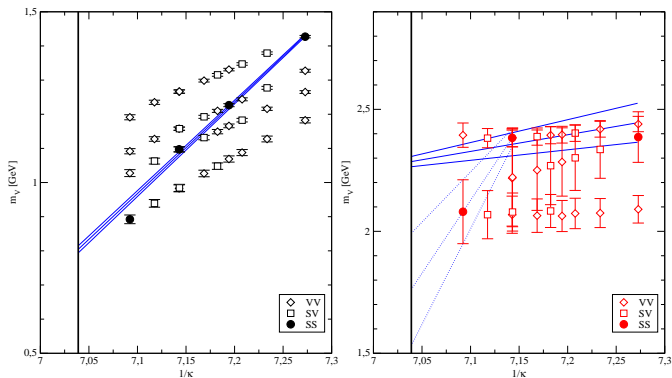
Operators:  $m_{\gamma_i p_i}, p_i p_i$



# Preliminary results

## Vector

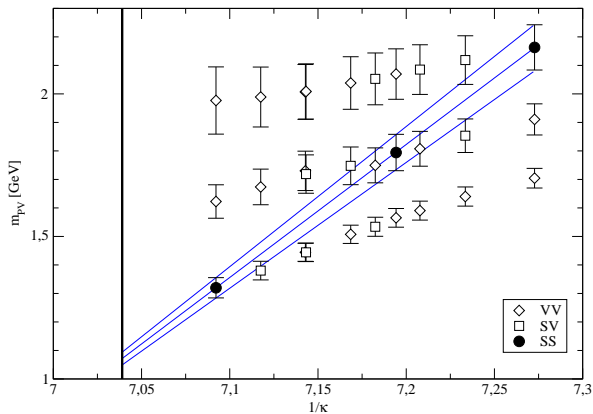
Operators:  $L\gamma_i L$ ,  $L\gamma_i L$



# Preliminary results

## Pseudovector

Operators:  $L\gamma\gamma_5L$



# Other findings

- L,n is better than n,w  
→ n and w are too alike???
- Width of our gaussians depends on sea quark mass

# Future plans

- Switch to other smearings (in progress)
- Increase statistics (in progress)
- If possible, look at couplings to excited states
- Also run the  $12^3 \times 24$  and  $24^3 \times 48$  lattice  
( $\rightarrow$  continuum extrapolation)