

LATFOR Initiative, Computers

Karl Jansen



- **Organisation: Lattice Forum (LATFOR)**



- Initiative of German Lattice Physicists
with associated countries Austria and Switzerland
- Coordination of physics programme
- Common usage of Software and raw data → Datagrid
- Requirement of Supercomputer resources

<http://www-zeuthen.desy.de/latfor>

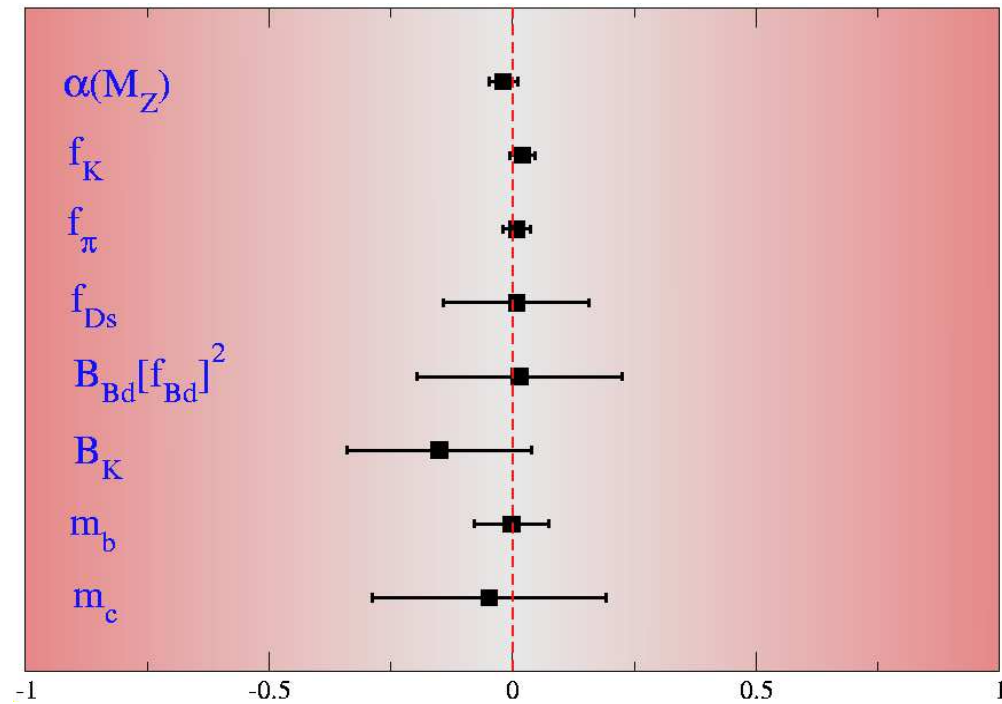
coordination at NIC/DESY Zeuthen



Major reasearch areas within LATFOR

- ab initio calculations of QCD with *dynamical quarks*
 - Hadron spectrum and structure functions
 - fundamental parameters of QCD
 - Flavour-, B-physics
- matter under extreme conditions
 - QCD thermodynamics
 - QCD at non-vanishing baryon density
- Non-QCD physics
 - Electroweak standard model
 - Supersymmetry
- Conceptual developments
 - exact chiral symmetry on the lattice
 - Twisted mass lattice fermions
 - algorithm development
- Grid developments (ILDG)
 - semantic based access to world-wide lattice data

Impact of Lattice Gauge Theory Results in Particle Data Booklet



$$(O_{\text{Latt}} - O_{\text{Exp}}) / O_{\text{Exp}}$$

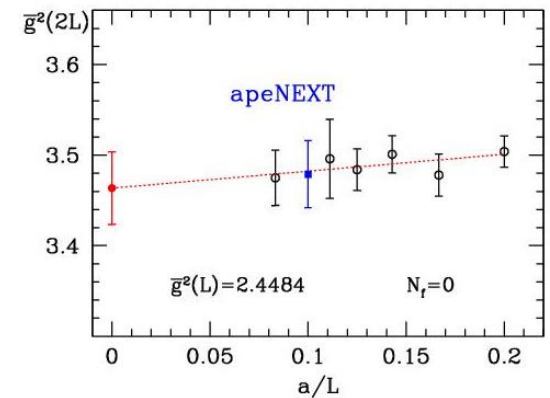
Rechenzeitbedarf im LATFOR

- Mittelfristig (2006/2007)
 - 25 sustained Teraflops
 - 100 Terabyte an Archivspeicher
- Langfristig (2010)
 - 250-500 Teraflops sustained auf Leadership Systemen
 - 50-100 Teraflops auf High-End Produktionssystemen
 - europaweit ca. 1 Petaflops sustained

- LATFOR Computer Resources
 - apeNEXT: DESY 3 TFlops
 - National Supercomputer Centers:
 - FZ Jülich 10TFlops, IBM Regatta, BGL
plans of upgrade to O(100) Teraflops
 - HLRN (Berlin, Hannover) 7TFlops IBM Regatta
 - HLRS (Stuttgart) 1.4TFlops NEC/CRAY
 - LRZ (München) 2TFlops Hitachi
upgrade to 30 teraflops (2006), will go to 69 teraflops (2007)
 - ⇐ typically O(15%) available for LGT
 - ⇐ often poor O(15-20%) efficiency
- University of Wuppertal: cluster with 1024 Opteron processors
- University of Bielefeld: 5 TFlops apeNEXT
- Smaller clusters at e.g. HU, Münster, DESY
- small QCDOC at Regensburg

apeNEXT

- ❑ **Prototype Installation:** → 1+1 racks at INFN+DESY = 1.6 Tflops
- ❑ **Status:**
 - prototypes are assembled
 - larger systems have begun to be installed
 - Physics codes running in production
 - 10 TFlops will come to INFN
(2 racks for CNRS at Rome)
 - 3 TFlops at DESY, 5 TFlops at Bielefeld
 - C-compiler under development



Shifting the Berlin Wall

New variant of standard HMC algorithm

→ substantial acceleration of simulations

