



Contribution ID: 331

Type: **not specified**

A mass preconditioning for lattice Dirac operators

Thursday, 17 June 2010 14:50 (20 minutes)

In the solution of the lattice Dirac equation with heavy quarks masses the numerical precision obtained at large time distances from the source may be significantly smaller with respect to the precision obtained at small times. This happens for each gauge configuration because typical algorithms used to perform numerical inversions require that a “global” residue is smaller than a certain value while, because of the heavy quark mass,

the time-slices at large distances from the source give a negligible contribution to this residue.

In such cases we propose to precondition the lattice Dirac operator by multiplying the quark field at different time-slices with a user tunable function $\alpha(x_0)$ and by modifying accordingly the boundary conditions in the

time direction. With a properly chosen function one can improve significantly the numerical precision of heavy

quark propagators at large time distances or, by changing the function, accelerate the inversion of lattice Dirac operators with light quark masses.

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talk

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Session Classification: Parallel 41: Algorithms and machines

Track Classification: Algorithms and machines