Selected topics of lattice gauge theory

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https://moodle.uni-wuppertal.de/course/view.php?id=18653

1. Lattice artifacts and the dispersion relation

In the last exercise sheet you have calculated the lattice dispersion relation in a real, free, scalar field theory on a $N_s \times N_t = 8 \times 8$ lattice with the mass parameter $m = 0.4$. Now, you will use the same code to study the lattice artifacts by varying the size of the lattice and the mass parameter.

a) Repeat your calculation on a $N_s \times N_t = 16 \times 8$ lattice. Compare your results. How do they differ? What is the same?

b) Make another calculation, now on a $N_s \times N_t = 16 \times 16$ lattice with $m = 0.2$. Compare, again, your results with the original calculation.

c) Try to make one or two informative plots that highlight the differences and similarities

d) What could you do to recover the continuum, infinite volume dispersion relation $E^2 = m^2 + p^2$ from your lattice calculations?