Temperature dependence of the chiral condensate in the Schwinger model with Matrix Product States

H. Saito[1], M. C. Banuls[2], K. Cichy[1,3], I. Cirac[2], K. Jansen[1]

[1] NIC, DESY Zeuthen, Platanenallee 6, 15738 Zeuthen, Germany
[2] Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, 85748 Garching, Germany
[3] Adam Mickiewicz University, Faculty of Physics, Umultowska 85, 61-614 Poznan, Poland

Abstract: We investigate chiral symmetry restoration in the 1-flavour Schwinger model. The Schwinger model is 1+1 dimensional QED, having interesting aspects in common with quantum chromodynamics, namely confinement and chiral symmetry making it thus interesting from a point of view of particle physics. Also, chiral symmetry of this model is expected to be restored at high temperature. To investigate these properties, we employ the tensor network (TN) technique, focusing on Matrix Product States (MPS) to perform calculations in the discretized Schwinger model. We obtain the temperature dependence of the chiral condensate in infinite volume and in the continuum limit. Finally, we compare the result with analytic calculations by Sachs and Wipf.