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The Aoki phase revisited

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Continuing with the work exposed in the last lattice conference [Phys.Rev.D79:014509,2009, PoS(LAT2009)068], and in order to distinguish between the two different scenarios proposed by us and Sharpe [Phys.Rev.D79:054503,2009], we present data of simulations of QCD with two flavours of dynamical Wilson fermions, inside the Aoki phase and without an external source $\bar{\psi}\gamma_5\tau_3\psi$. Two different algorithms, MFA and the hybrid montecarlo, were used, and a consistency check was performed. During the simulations we measured, using the P.D.F. (probability distribution function) formalism, the second moment of the relevant order parameters of the Aoki phase, namely $\langle (i\bar{\psi}\gamma_5\psi)^2 \rangle$ and $\langle (i\bar{\psi}\gamma_5\tau_3\psi)^2 \rangle$. These numerical results allow us to improve our understanding of the Aoki phase.

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Talk

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