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QCD mesonic screening masses and restoration of chiral symmetry at high T

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We present a strategy to study QCD non-perturbatively on the lattice at very high temperatures. This strategy exploits a non-perturbative, finite-volume, definition of the strong coupling constant to renormalize the theory. As a first application we compute the flavour non-singlet meson screening masses in a wide range of temperature, from $T \sim 1$ GeV up to ~ 160 GeV with three flavours in the chiral limit of QCD. Our results show very interesting features of the screening spectrum at very high temperatures. On the one hand the mass splitting between the vector and the pseudoscalar screening masses is clearly visible up to the electroweak scale and cannot be explained by the known NLO perturbative result. On the other hand the restoration of chiral symmetry manifests itself through the degeneracy of the pseudoscalar and the scalar channels and of the vector and the axial ones. This degeneracy pattern is the one expected by Ward identities associated with the presence of chiral symmetry.

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