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Volume reduction through perturbative Wilson loops

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We derive the perturbative expansion of Wilson loops to order g^4 in a $SU(N)$ lattice gauge theory with twisted boundary conditions. Our expressions show that the thermodynamic limit is attained at infinite N for any number of lattice sites and allow to quantify the deviations from volume independence at finite large N as a function of the twist. The effect of adjoint Wilson fermions will be briefly described.

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