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Confinement/deconfinement transition temperature from the Polyakov loop potential and gauge-invariant gluon mass

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In this talk we give an analytical derivation for the existence of the confinement/deconfinement phase transition at finite temperature in Yang-Mills theory. Moreover, we give a numerical estimate on the transition temperature T_d in the form of the ratio to a gauge-invariant gluon mass $M(T)$ measured on the lattice. For this purpose, we use the functional renormalization-group equation of the Wetterich type to obtain the effective potential of the Polyakov loop average in the Yang-Mills theory. This result enables us to understand the reason why the phase transition from deconfinement to confinement occurs at a certain temperature and what is the mechanism for confinement at finite temperature.

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