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Determination of latent heat at the finite temperature phase transition of SU(3) gauge theory

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We calculate the energy gap (latent heat) and pressure gap between the hot and cold phases of the SU(3) gauge theory at the first order deconfining phase transition point.

We perform simulations around the phase transition point with the lattice size in the temporal direction $Nt=6, 8$ and 12 and extrapolate the results to the continuum limit.

The energy density and pressure are evaluated by the derivative method with non-perturbative anisotropy coefficients and by a method using the Yang-Mills gradient flow.

We find that the pressure gap vanishes at all values of Nt when the derivative method is used.

The spatial volume dependence in the latent heat is found to be small on large lattices.

Performing extrapolation to the continuum limit, we obtain

$$\Delta\epsilon/T^4 = 0.75 \pm 0.17$$

and

$$\Delta(\epsilon - 3p)/T^4 = 0.623 \pm 0.056.$$

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