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Novel first-order phase transition and critical points on SU(3) Yang-Mills theory on $T^2 \times R^2$

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We investigate the thermodynamics and phase structure of SU(3) Yang-Mills theory on $T^2 \times R^2$ with anisotropic spatial volumes in Euclidean spacetime in lattice numerical simulations and an effective model. In lattice simulations, the energy-momentum tensor defined through the gradient flow is used for the analysis of the stress tensor on the lattice. It is found that a clear pressure anisotropy is observed only at a significantly shorter spatial extent compared with the free scalar theory. We then study the thermodynamics obtained on the lattice in an effective model that incorporates two Polyakov loops along two compactified directions as dynamical variables. The model is constructed to reproduce thermodynamics measured on the lattice. The model analysis indicates the existence of a novel first-order phase transition and critical points as its endpoints. We argue that the interplay of the Polyakov loops induces the first-order transition.

References:
M. Kitazawa, S. Mogliacci, I. Kolbe and W.A. Horowitz, Phys. Rev. D 99 (2019) 094507.
D. Suenaga and M. Kitazawa, Phys. Rev. D 107 (2023) 074502.
D. Fujii, A. Iwanaka, M. Kitazawa and D. Suenaga, arXiv:2404.07899 [hep-ph].

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