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## **Critical behaviors of the $O(4)$ and $Z(2)$ symmetries in the QCD phase diagram**

In this work we have studied the QCD phase structure and critical dynamics related to the 3-d  $O(4)$  and  $Z(2)$  symmetry universality classes in the two-flavor quark-meson low energy effective theory within the functional renormalization group approach. We have employed the expansion of Chebyshev polynomials to solve the flow equation for the order-parameter potential. The chiral phase transition line of  $O(4)$  symmetry in the chiral limit, and the  $Z(2)$  line of critical end points related to the explicit chiral symmetry breaking are depicted in the phase diagram. Various critical exponents related to the order parameter, chiral susceptibilities and correlation lengths have been calculated for the 3-d  $O(4)$  and  $Z(2)$  universality classes in the phase diagram, respectively. Furthermore, we take the moment dependent of vertices into consider. We compute the meson anomalous dimensions in this new truncation scheme.

Reference:

Yong-ruì Chen, Rui Wen, and Wei-jie Fu. arXiv:2101.08484

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