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Towards the phase diagram of QCD and its critical endpoint

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I report on technical advancements which are geared towards locating the conjectured critical endpoint of QCD using the functional renormalization group. Its use allows to access directly the high-density region, as this approach does not suffer from the sign problem of lattice QCD. In our first-principles setup, one can systematically identify and include all relevant physical degrees of freedom, which is a current work in progress. I discuss both quantitative results in the vacuum as well as the extension to the phase diagram up to intermediate densities, including arbitrary-order meson interactions and full momentum dependences. Furthermore, I discuss an analysis of the systematic error of such an fRG calculation of QCD. Finally, for calculations at even higher densities, I discuss future extensions of our setup, such as other potentially relevant composite particles.

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