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Gaussian approximation within an extended linear sigma model

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The effective models of QCD are important tools for exploring the phase diagram of strongly interacting matter. They are particularly useful in the higher chemical potential regime, where the expected critical endpoint may be found, but which is inaccessible to lattice QCD due to the famous sign problem. These models are usually calculated in a mean-field approximation, which provides a well-understood physical picture. Recently, however, there has been a growing interest in going beyond this approximation within the effective model calculations. In the same vein, we have implemented a Gaussian approximation in a 2+1 flavor, vector and axial vector meson extended Polyakov linear sigma model to study the beyond mean-field effects on the phase structure, thermodynamics, and some aspects of meson phenomenology.

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