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Effective Polyakov Loop Models for QCD-like Theories at Finite Density

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We study the heavy quark limit of QCD-like theories by using a three-dimensional Polyakov theory. This theory can be derived from the full QCD-like theory by a combined strong coupling and hopping expansion. In particular we investigate the cold and dense regime of the phase diagram where we expect to find the Silverblaze property realized as Bose-Einstein-condensation of diquarks or a first order liquid-gas transition depending on the gauge group of the theory. We find evidence for the Silverblaze property when the quark chemical potential μ reaches half the diquark mass. For even higher μ we find a rise of the Polyakov loop as well as the quark number density.

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