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Heavy and dense QCD from an effective lattice theory

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A three-dimensional effective lattice theory of Polyakov loops can be constructed by integrating over the spatial links in combined strong coupling and hopping parameter expansions. The effective theory is valid for sufficiently heavy quarks and coarse to intermediate lattice spacings. In its domain of validity, the sign problem is weak enough to enable simulations at finite baryon chemical potential and allows for a description of the onset transition as well as cold nuclear matter directly from QCD. We summarize recent results and test the analytic effective couplings against improved numerically determined versions. We also compare complex Langevin and Monte Carlo simulations of the effective theory.

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