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The Mass of the Baryon Junction: a lattice computation in $2+1$ dimensions

We present a systematic study of baryonic flux tubes in $\mathrm{SU}(3)$ Yang–Mills theory in $(2+1)$ dimensions. A recent next-to-leading–order derivation within the Effective String Theory framework has, for the first time, made explicit the corrections proportional to the baryon–junction mass M, up to order $1/R^2$ (where R is the length of the confining strings), opening the possibility of its non-perturbative determination. Through high-precision simulations of the three-point Polyakov-loop correlator, we measure the baryon–junction mass. By isolating the predicted $1/R^2$ term in the open-string channel, we obtain the value $\frac{M}{\sqrt{\sigma}} = 0.1355(36)$, similar to the phenomenological value which is used to describe hadrons. In addition, studying the high temperature behaviour of the baryon, we present a new test of the Svetitsky–Yaffe conjecture for the $\mathrm{SU}(3)$) theory in three dimensions. Focusing on the high-temperature regime just below the deconfinement transition, we compare our lattice results for Polyakov-loop correlators with the quantitative predictions obtained by applying conformal perturbation theory to the three-state Potts model in two dimensions, and find excellent agreement.

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