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Large-N CP(N-1) sigma model on a finite interval and the renormalized string energy

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We continue the analysis started in a recent paper of the large-N two-dimensional CP(N-1)sigma model, defined on a finite space interval L with Dirichlet (or Neumann) boundary conditions. We focus our attention on the problem of the renormalized energy density E(x,Λ, L) which is found to be a sum of two terms, a constant term coming from the sum over modes, and a term proportional to the mass gap. The approach to E(x,Λ, L) ⟶ N 4πΛ 2 at large LΛ is shown, both analytically and numerically, to be exponential: no power corrections are present and in particular no L¨uscher term appears. This is consistent with the earlier result which states that the system has a unique massive phase, which interpolates smoothly between the classical weakly-coupled limit for LΛ ⟶ 0 and the "confined"phase of the standard CP(N-1) model in two dimensions for LΛ ⟶ ∞.

Presenter: KONISHI, Kenichi (PI)