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Long Range Force and Y-Bosonic strings in Baryons

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The potential due to system of a three static quark ($3Q$) is studied using $SU(3)$ lattice QCD at finite T . The ($3Q$) potential is calculated in pure $SU(3)$ Yang-Mills lattice gauge theory at finite temperature with Polyakov loops operators. In this work, we focus on the relation between the parameterization ansatz of the ($3Q$) potential and the observed form of the strings in the baryon. The interesting result is that, although the gluonic pattern is a Δ -shaped, the lattice data for the potential fits well to a Y -shaped string pattern. Moreover, we found that in order to reproduce the quark anti-quark string tension, the fit ansatz of the Y -law must include a Dedekind eta function accounting for the Y -string fluctuation with modular corresponding to the minimal length of the Y -string.

Our results may promote the picture of the baryonic strings as always exhibiting a Δ field profile, however, the baryonic potential is consistent with a Y -law describing a system of fluctuating strings.

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