

Lattice study of color confinement mechanism in Coulomb gauge

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Abstract: We study the Coulomb gauge confinement scenario using a quenched SU(3) lattice gauge simulation with partial-length Polyakov line correlators. We show that the Coulomb heavy-quark potential presents linearly rising behavior at large distances. The linearity of the Coulomb heavy-quark potential persists even in the deconfinement phase. We also study the QCD color interactions between static two heavy quarks at zero temperature: in addition to the standard singlet $q\bar{q}$ potentials, we calculate octet $q\bar{q}$ potentials, symmetric and antisymmetric qq potentials. We find that the repulsive channels have the complex dependence on the distance and the string tensions between the singlet and antisymmetric potentials are described in terms of the Casimir factor.