

Confinement phenomenon in gauge theories: from 2d sigma models to non-Abelian strings

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Confinement phenomenon in QCD has been of great interest to theoretical physics for more than five decades. This phenomenon can be crudely described as the absence of free quarks (or other colored particles) in the physical spectrum. Thus formulated, confinement may seem simple at first sight, but to anyone who has studied this phenomenon one thing is clear: the picture of confinement in gauge theories is far from being obvious and complete.

In order to understand confinement in QCD, there has been attempts to look at some simpler (or even solvable) models that exhibit a similar phenomenon. One may mention, for example, two-dimensional $\mathbb{C}\mathbb{P}$ sigma model, three-dimensional Polyakov confinement, four-dimensional Abelian Higgs model. However the particular mechanism of confinement in each of these scenarios seems to be unique and unlike the others.

In this talk we are going to review some of these topics. We will discuss how non-Abelian strings that emerge in supersymmetric cousins of QCD tie together some of these concepts.

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