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Dual Formulation of the S-Matrix of Super-Yang-Mills (and perhaps of Gravity)

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In the past few years, new techniques for the evaluation of scattering amplitudes in gauge theory and gravity have been introduced. The new forms of the amplitudes have hinted properties that are not manifest in their Feynman diagram presentation. For maximally supersymmetric Yang-Mills a unified description has been found in what seems to provide a dual formulation of the S-matrix. The dual formulation of scattering amplitudes is defined on a mathematical space called the Grassmannian. Quite surprisingly, local space-time physics is encoded in the topology of the Grassmannian. In this talk, I will summarize what is known about the Grassmannian theory and discuss the prospects for a Grassmannian theory of N=8 supergravity.