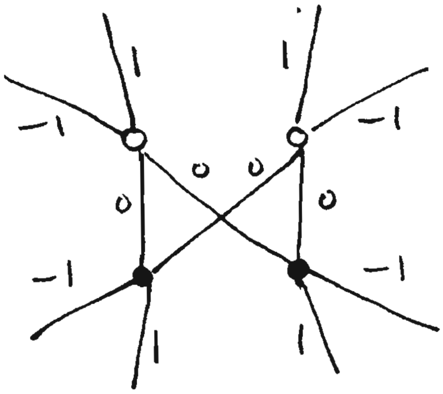

These are the objects which are glued together to make twistor diagrams for higher-order amplitudes, i.e. correspond to the combination of the *off-shell* Feynman propagators in Feynman diagrams. One takes various possible periods of these integrals to obtain the amplitudes that arise when the external legs are specified to correspond to *free* in- or out-fields in the various possible channels. Thus I suggest that *these* are the objects that should correspond to the pieces of manifold that are in some sense glued together to build up higher-order Singer pictures. It seems to me therefore that a Singer picture should turn out to specify not an amplitude, but some functional (perhaps not very well defined) whose various *periods* would give the amplitudes in the various different possible channels. Note that inhomogeneity (the "k") and logarithmic propagators were essential in defining these "off-shell" diagrams. I suggest that corresponding [non-obvious] structures would have to be appear in any theory of manifolds which makes sense of the Singer pictures.

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Andrew Hodges

the machinery of $\mathcal{D}$-modules is needed. The twistor transform is then interpretted as a relation between two different types of direct image modules.

Many thanks to RJB.

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References:

[RJB & MGE] The Penrose Transform: its interaction with representation theory.

[RJB] Local Cohomology, elementary states and evaluation, TN #22.

[MGE] The twistor realization of discrete series TN #22

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A generalised Kerr–Robinson theorem

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Abstract. The Kerr and Robinson theorems in four-dimensional spacetime together provide the general null solution of Maxwell's equations. Robinson's theorem reduces the problem to that of obtaining certain null foliations. The Kerr theorem shows how to represent such foliations in terms of analytic varieties in complex projective 3-space. In this paper we generalise these results to spinor fields of higher valence in spacetimes of arbitrary even dimension. We first review the theory of spinors and twistors for these higher dimensions. We define the appropriate generalisations of Maxwell's equations, and null solutions thereof. It is then proved that the Kerr and Robinson theorems generalise to all even dimensions. We discuss various applications, examples and further generalisations. The generalised Robinson theorem can be seen to extend to curved spaces which admit such null foliations. In the case of Euclidean reality conditions, the generalised Kerr theorem determines all complex structures compatible with the flat metric in terms of freely specified complex analytic varieties in twistor space. Interpretations of the generalised Kerr theorem are also provided for Lorentzian and ultrahyperbolic signatures.

Abstract

The Geroch group and non-Hausdorff twistor spaces

N.M.J. Woodhouse & L.J. Mason

By reducing the Ward correspondence, we show that there is a correspondence between stationary axisymmetric solutions of the vacuum Einstein equations and a class of holomorphic vector bundles over a reduced twistor space, which is a compact one-dimensional, but non-Hausdorff, complex manifold. We show that the solutions generated by Ward's ansätze correspond to bundles which have a simple behaviour on the 'real axis' in the reduced space. We identify the Geroch group (Kinnersley and Chitre's 'group K') with a subgroup of the loop group of GL(2,ℂ) and we describe its orbits. We also identify some of the subgroups which preserve asymptotic flatness.

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