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Amplitudes from first principles

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n 2004 it has been shown that scattering amplitudes can be expressed by glueing together simple three-point on-shell amplitudes. These so-called BCFW-recursion relations can for instance be used to proof the explicit form of the n-gluon scattering amplitude as conjectured by Parke and Taylor. Moreover, the basic building blocks, the three-point on-shell amplitudes, are, apart from a coupling constant, fixed by Poincaré invariance. However, the BCFW-recursion relations are limited to tree diagrams. We would like to show how, by a combination of the Feynman-tree theorem with BCFW recursion relations, general scattering amplitudes can be fixed from first principles, that is, Poincare invariance, unitarity and gauge invariance.

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