It is well-known that four-dimensional self-dual Yang-Mills theory can be described by a variation of topological gauge theory, known as the Kähler-Chern-Simons theory or the Donaldson-Nair-Schiff theory [1, 2]. An analysis in the twistor space has also led to a similar Chern-Simons-type description of the self-dual Yang-Mills theory [3]. Recently, extensions of these results to higher-spin Yang-Mills theories are proposed [4]. The proposal is in part in relation to recent developments for the computation of Yang-Mills scattering amplitudes in the twistor space. In similar lines of developments, actions for higher-spin self-dual gravities are reported [5] and twistor-space constructions of higher-spin self-dual Yang-Mills theories are considered [6].

This article under review is one of the contributions to these recent studies of higher-spin gauge theories, focusing on the computation of MHV (maximally-helicity-violating) amplitudes. The authors argue that integrable properties of the self-dual Yang-Mills theory can lead to the construction of full higher-spin Yang-Mills theory (at least classically), deriving its tree-level MHV amplitudes. These results may be useful for future studies of higher-spin gauge theories at quantum level. Note that, apart from the computation of the MHV amplitudes, a recent article [7] also reports closely related results on twistor-space formulation of higher-spin self-dual Yang-Mills theory.

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