

Twistor-Strings + Conformal Gravity

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*Note: Based on joint work with Lionel Mason!

- Twistor-string theory has motivated loads of the recent advances in the study of $N=4$ super-Yang-Mills (SYM); for example: MHV formalism, BCFW recursion, twistor actions, Grassmannian formalism, ...
- Similar advances in the study of gravity haven't been as directly motivated by twistor-strings, due primarily to the fact that all known twistor-string theories appear to contain conformal supergravity, not Einstein's theory.
- Recent observations indicate that this might not be as big an impediment as it seems, at least at tree level...

Twistor-string theory

- Fields: $Z: \Sigma \rightarrow \mathbb{P}^1 \cong \mathbb{C}^{1|4}$, Σ a closed Riemann surface
 $Y \in \Omega^{1,0}(\Sigma) \otimes T^*\mathbb{P}^1$ dual variables
 $a \in \Omega^1(\Sigma)$ $GL(1, \mathbb{C})$ gauge field

- Worldsheet Action: $S[Z, Y, a] = \int_{\Sigma} Y_I \bar{\partial} Z^I + a Y_I Z^I + S_c$
↑ worldsheet current algebra

- Gauge Freedom: $Z^I \rightarrow e^{\alpha} Z^I$
 $Y_I \rightarrow \bar{\partial}^{\alpha} Y_I$
 $a \rightarrow a - \bar{\partial} \alpha$