In this article, the author suggests for the first time that $\mathcal{N} = 8$ supergravity proposed in the so-called "new twistor string theories" [1] is not Einstein supergravity but rather $\mathcal{N} = 8$ chiral supergravity. This is shown by an explicit calculation of a three-graviton amplitude for the choice of helicities $(+ - -)$. The $(+ + -)$-helicity amplitude has been calculated in [1], showing an agreement with Einstein supergravity, however, the $(+ - -)$-helicity amplitude turns out to vanish. Based on this result, it is argued that new twistor string theories may be related to a chiral version of $\mathcal{N} = 8$ supergravity or to a self-dual $\mathcal{N} = 8$ supergravity formulated on a chiral superspace by Siegel [2].

References

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