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Abelian Insights on Kinematic Algebras

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Certain non-abelian gauge theories obey so-called BCJ duality, whereby their colour algebra is accompanied by a second algebra involving kinematic degrees of freedom, and which in turn allows amplitudes in such theories to be double-copied to gravity. For special theories in particular gauges, the kinematic algebra can be ascertained exactly, and corresponds to an (infinitely dimensional) Lie algebra. A more complicated mathematical structure is expected in general, such that the nature of kinematic algebras remains deeply mysterious. Open questions include: when are kinematic algebras Lie algebras, and are previous known cases in fact related? Are kinematic algebras gauge-dependent in general? Can we build new theories involving exact kinematic algebras? In this talk, I will shed light on these questions by considering building blocks already present in simpler abelian gauge theories.

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