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The Hidden Symmetries of Yang-Mills theory on Loop Spaces

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Even though the integral form of the equations of classical electrodynamics is well known, the same does not hold for non-abelian gauge theories. In 2012, L. A. Ferreira and G. Luchini, based on concepts in loop spaces and on a generalization of the non-abelian Stokes theorem, presented an integral form of the classical Yang-Mills equations and used it to solve the long-standing problem of constructing non-abelian electric and magnetic conserved charges, for any field configurations, that are invariant under general gauge transformations. (1,2) In this poster, we present a novel symmetry of non-abelian gauge theories. It corresponds to an infinite symmetry group of the integral Yang-Mills equations, where the group elements are holonomies of connections on loop space. It differs from the usual holonomy group in the sense that its product law defines a composition of connections on every loop, and not a composition of loops. (3) In addition, the integral Yang-Mills equations are equivalent to a zero curvature condition for a connection on loop space, and that group constitutes the group of gauge transformations of those flat connections.

Palavras-chave: Symmetry. Gauge. Yang-Mills.

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