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A Novel symmetry of Yang-Mills theories in a 4D Minkowski space

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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 (1,2), 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. In this poster, we show that the charges generate a novel symmetry of non-abelian gauge theories. They define transformations on the matter (quark) fields as well as on certain special Wilson line operators. The symmetry is quite similar to the Generalized Global Symmetries (3), where the charge operator satisfies the fusion rules and is a topological operator. However, the distinction arises in the action on primary fields, which is local. Additionally, although the charge operator constitutes a monodromy in the two-loop space and entails an infinite number of conserved charges, the theory is not integrable. In fact, the charges are not directly related to energy and momentum quantities and are not in involution.

Palavras-chave: Symmetry; Charges; Yang-Mills.

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