Characterization of Yang–Mills–Higgs Equations

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Abstract

Let $C \to M$ be the bundle of connections of a principal G-bundle $P \to M$ over a pseudo-Riemannian manifold (M, g) of signature (n^+, n^-) and let $E \to M$ be the associated bundle with P under a linear representation of G on a finite-dimensional vector space. We characterize the $O(n^+, n^-) \times G$-invariant quadratic Lagrangians on the interaction bundle $C \times_M E$. In particular, for a simple Lie group the Yang-Mills and Yang-Mills-Higgs Lagrangians are characterized, up to an scalar factor, to be the only $O(n^+, n^-) \times G$-invariant quadratic Lagrangians. Some examples will be shown.