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abstract	We generalize the BF theory action to the case of a general Lie crossed module (âˆ‚ : H â†’ G,), where G and H are non-abelian Lie groups. Our construction requires the existence of G-invariant non-degenerate bilinear forms on the Lie algebras of G and H and we show that there are many examples of such Lie crossed modules by using the construction of crossed modules provided by short chain complexes of vector spaces. We also generalize this construction to an arbitrary chain complex of vector spaces, of finite type. We construct two gauge-invariant actions for 2-flat and fake-flat 2-connections with auxiliary fields. The first action is of the same type as the BFCG action introduced by Girelli, Pfeiffer and Popescu for a special class of Lie crossed modules, where H is abelian. The second e-print archive: http://lanl.arXiv.org/abs/1006.0903v3 JOÃƒO FARIA MARTINS AND ALEKSANDAR MIKOVIÄ† action is an extended BFCG action which contains an additional auxiliary field. However, these two actions are related by a field redefinition. We also construct a three-parameter deformation of the extended BFCG action, which we believe to be relevant for the construction of non-trivial invariants of knotted surfaces embedded in the four-sphere.	abstract	We generalize the BF theory action to the case of a general Lie crossed module (H â†’ G), where G and H are non-abelian Lie groups. Our construction requires the existence of G-invariant non-degenerate bilinear forms on the Lie algebras of G and H and we show that there are many examples of such Lie crossed modules by using the construction of crossed modules provided by short chain complexes of vector spaces. We also generalize this construction to an arbitrary chain complex of vector spaces, of finite type. We construct two gauge-invariant actions for 2-flat and fake-flat 2-connections with auxiliary fields. The first action is of the same type as the BFCG action introduced by Girelli, Pfeiffer and Popescu for a special class of Lie crossed modules, where H is abelian. The second action is an extended BFCG action which contains an additional auxiliary field. However, these two actions are related by a field redefinition. We also construct a three-parameter deformation of the extended BFCG action, which we believe to be relevant for the construction of non-trivial invariants of knotted surfaces embedded in the four-sphere.		
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