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Jedrzej Z. Sniatycki* (sniatyck@ucalgary.ca), Department of Mathematics and Statistics, University of Calgary, 2500 University Drive NW, Calgary, Alberta T2N 1N4, Canada, and
Guenter Schwarz. *Regularity of constraints and reduction in the Minkowski space Yang-Mills-Dirac theory.*

We consider an extended phase space P for Yang-Mills and Dirac fields in the Minkowski space consisting of Cauchy in appropriate Sobolev spaces, which admits existence and uniqueness theorems for the evolution equations. We show that the Lie algebra $\mathfrak{gs}(P)$ of infinitesimal gauge symmetries of P is a Hilbert-Lie algebra carrying a Beppo Levi topology. The connected group $GS(P)$ of gauge symmetries of P with Lie algebra $\mathfrak{gs}(P)$ is a Hilbert-Lie group acting properly on P . We construct a closed subgroup $GS(P)_0$ of $GS(P)$ acting on P with a momentum map J_0 , such that the constraint equations of the theory are given by $J_0=0$. We show that the set of solutions of the Yang-Mills-Dirac equations is a smooth submanifold of a dense subspace of P . It is a principal fibre bundle over the reduced phase space with structure group $GS(P)_0$. (Received August 04, 2014)