PhD Colloquium

Adam Lindström

Decoupling a system of PDE's using perturbation theory. A key to uncoupled dirac-yang-mills fields.

Abstract: I will start by describing the Dirac-Yang-Mills system on a Riemannian manifold. This is a coupled system of elliptic PDE's involving connections on and sections of vector bundles over the base manifold. It has its origins in physics where, posed on a spacetime, it describes the interaction between fermions (such as electrons) and a force field.

The Dirac-Yang-Mills system are the Euler-Lagrange equations of the Dirac-Yang-Mills action functional. However, this is unbounded in both directions, making proving existence of critical points challenging. In this talk I will therefore present a result which in many cases allows for the Dirac-Yang-Mills system to be decoupled into a pair of equations (the Yang-Mills and the Dirac equation) which are significantly easier to treat and which have been more extensively studied in the Riemannian setting. I will describe how an application of analytic perturbation theory gives an elegant characterization of precisely when this can be done.

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