Vienna School of Mathematics

PhD Colloquium

Adam Lindström

Decoupling a system of PDE's using perturbation theory. A key to uncoupled Dirac-Yang-Mills fields.

Abstract: We will start by describing the Dirac-Yang-Mills system on a closed 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 constitutes a generalization of Maxwells equations and describes the interaction between fermions (such as electrons or quarks) and a force field (such as the electromagnetic force or the strong force).

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 we 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 are separately well-studied in the closed Riemannian setting. We will describe how analytic perturbation theory gives an elegant characterization of this phenomenon.

June 4, 2025, 16:45-17:45

Institute of Science and Technology Austria (ISTA)
(Am Campus 1, 3400 Klosterneuburg)