MAFIA - the seminar you can't refuse

Approximation of Dirac operators with δ-shell potentials: Explicit conditions, counterexamples and semi-local potentials

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Fakulta jaderná a fyzikálně inženýrská ČVUT
Trojanova 13, 12000 Praha

Abstract: In this talk we study the approximation of Dirac operators with electrostatic and Lorentz-scalar δ-shell potentials supported on the boundary of a C^2 domain. The seminar talk focuses on three different aspects of this topic. In the first part we provide an explicit condition in terms of the interaction strengths such that these operators can be approximated by Dirac operators with strongly localized potentials in the norm-resolvent sense, where we observe a well-known non-linear renormalization in the limit. In the second part we provide counterexamples to show that if the explicit condition is not satisfied, then the norm resolvent convergence of the Dirac operators with strongly localized potentials may fail. In the third part of the talk we introduce Dirac operators with so called semi-local potentials which allow us to approximate Dirac operators with δ-shell potentials without any renormalization in the limit.
This talk is based on joint work with Jussi Behrndt and Markus Holzmann.