Approximation of Dirac operators with delta-shell potentials in the norm resolvent sense

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In this talk the approximation of two and three-dimensional Dirac operators with delta-shell potentials supported on curves and surfaces, which may be bounded or unbounded, is discussed. It is shown under suitable conditions on the weight of the delta-interaction that a family of Dirac operators with regular, squeezed potentials converges in the norm resolvent sense to the Dirac operator with the delta-shell interaction. Special attention is paid on singular perturbations that are combinations of electrostatic and Lorentz scalar delta-shell interactions, where an explicit smallness condition on the coupling parameters is derived. Via counterexamples it is shown that this condition is sharp.

This talk is based on joint work with M. Holzmann and C. Stelzer-Landauer.