

Abstract

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Self-adjoint extensions of Dirac–Coulomb operators and Dirac operators on manifolds with boundary

Joint with Jan Philip Solovej and Sabiha Tokus

Semibounded symmetric operators have a distinguished self-adjoint extension, the Friedrichs extension. Its eigenvalues are given by a variational principle that involves only the domain of the symmetric operator. Although Dirac operators are not semibounded, the Dirac operator with Coulomb potential is known to have a distinguished self-adjoint extension. Similarly, for Dirac-type operators on manifolds with boundary a distinguished self-adjoint extension is characterised by the Atiyah–Patodi–Singer boundary condition.

I will relate both of these extensions to a generalisation of the Friedrichs extension to the setting of symmetric operators satisfying a gap condition and will in particular explain how the Atiyah–Patodi–Singer boundary condition arises in this context. I will establish, in the general setting, that the eigenvalues of this extension are also given by a variational principle that involves only the domain of the symmetric operator.