



Leibniz  
Universität  
Hannover

Oberseminar Analysis und Theoretische Physik

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# The Index Problem of Dirac-Schrödinger Operators in Open Space

We investigate a Dirac-Schrödinger operator on odd dimensional euclidean space with a self-adjoint potential. Classically, the potential is matrix-valued, asymptotically homogeneous of order 0, and invertible at infinity. In this case, the corresponding Dirac-Schrödinger operator is Fredholm and its index is given by the Callias Theorem. The main goal of this talk is to present a new generalisation of this index theorem to potentials in infinite dimensional Hilbert space. It turns out that even a more general trace formula holds, which also allows to suspend invertibility at infinity. However, the Dirac-Schrödinger operator is no longer Fredholm, and the Fredholm index needs to be replaced by the so called Witten index (coined by Gesztesy and Simon). In contrast to the Fredholm index, it is known that the Witten index may attain any real number, with the caveat that examples so far are abstract. We show that the generalised Callias Theorem allows to produce examples of concrete Dirac-Schrödinger operators with any real number as Witten index.

**Dienstag, 16.1.2024, 15:00 Uhr, Raum c311  
Hauptgebäude der Leibniz Universität**

Dazu laden herzlich ein:

Prof. Dr. Wolfram Bauer, Prof. Dr. Joachim Escher, Prof. Dr. Johannes Lankeit,  
Prof. Dr. Elmar Schrohe, Prof. Dr. Alexander Strohmaier, Dr. Alden Waters,  
Prof. Dr. Christoph Walker