

Vorlesungsreihe: Divergent integrals, sums and traces; an analytic point of view.

We shall present regularisation techniques used in number theory, physics and operator algebra to make sense of divergent integrals, divergent discrete sums, and divergent traces. These rely on pseudodifferential calculus techniques, which provide a convenient analytical framework for a unified presentation.

We shall discuss underlying canonical objects, namely canonical integrals, canonical discrete sums and canonical traces, which are the building blocks from which one builds the corresponding regularised integrals, discrete sums and traces and hence lie at the heart of renormalisation techniques used in physics, number theory and geometry. We shall show how the noncommutative residue measures anomalies/defects arising from the use of regularised integrals, sums and traces which do not have the usual properties one expects from an integral, a sum or a trace.