

Reflection Positivity: Representation Theory meets Quantum Field Theory

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Reflection positivity or Osterwalder-Schrader quantization has its origin in the work of Osterwalder and Schrader, 1973/1975, on constructive quantum field theory. its goal is to build a bridge from euclidean quantum theory to relativistic quantum field theory by analytical continuation to imaginary time. This is often described as multiplying time by $\sqrt{-1}$ or Wick rotation.

Interpreting the physical system as a unitary representation of the corresponding symmetry group this can be seen as transforming a representation from one Lie group to a unitary representation of a dual Lie group, e.g. from the euclidean motion group to the Poincaré group.

In this talk we discuss recent developments, starting with the basic concept of reflection positive Hilbert spaces and reflection positive one-parameter groups. We also discuss the connection to representation theory, reflection positive kernels and functions, and to stochastic processes indexed by a Lie group emphasizing Markov processes and measures on path spaces for topological groups.

This is an ongoing project with K-H Neeb, FAU. It also includes other collaborators as P. Jorgensen and S. Merigon.