Announcement

Seminar on Deformation Quantization

27. 1. 2023 at 2pm CET (two talks of 45min each)

Seminarroom SE 30

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Deformations of Araki-Woods algebras

Starting from the familiar Weyl algebra on a Bose Fock space over a Hilbert space $\mathcal{H}$, we introduce a family of von Neumann algebras $\mathcal{L}_T(H)$ that can be thought of as deformations of the von Neumann algebra generated by Weyl operators $W(h)$, $h \in H$. Here $H \subset \mathcal{H}$ is a real (standard) subspace of $\mathcal{H}$, and T a "twist" (or deformation), namely a selfadjoint operator on $\mathcal{H} \otimes \mathcal{H}$ satisyfing a positivity condition.

These algebras are called twisted Araki-Woods algebras. They naturally arise in representations of Wick algebras and provide a general framework in which many special cases such as the algebras underlying free Bose fields (on Bose Fock space), free Fermi fields (on Fermi Fock space), integrable QFT models (on S-symmetric Fock space), but also free group factors (on full Fock space) can be discussed in a unified manner.

We will explain the modular theory of these algebras which is closely linked to T being braided and crossing-symmetric, and consider the dependence of $\mathcal{L}_T(H)$ on the twist T (which is quite discontinuous) and the standard subspace H. This naturally leads to inclusions $\mathcal{L}_T(K) \subset \mathcal{L}_T(H)$ and applications in QFT.

No deep background in QFT or von Neumann algebras is assumed, only a working knowledge of Hilbert spaces and functional analysis.

Invited by Stefan Waldmann