

Probabilistic Operator Algebra Seminar

Organizer: Dan-Virgil Voiculescu

February 1 **Martijn Caspers**, TU Delft

Title: *Riesz transforms on compact quantum groups and strong solidity*

The Riesz transform is one of the most important and classical examples of a singular integral operator on the real numbers. It may be described as the operator $\nabla_j \Delta^{1/2}$ where $\nabla_j = \frac{d}{dx_j}$ is the derivative and Δ is the Laplace operator. In a more general context the Riesz transform may always be defined for any diffusion semigroup on the reals. In case the generator of the semigroup is the Laplace operator the classical Riesz transform is retrieved. In quantum probability the quantum Markov semi-groups play the role of the diffusion semi-groups and again a suitable notion of Riesz transform can be described. In this paper we show that the Riesz transform may be used to prove rigidity properties of von Neumann algebras. We focus in particular on examples from compact quantum groups. Using these tools we show that a class of quantum groups admits rigidity properties. The class has the following properties: (1) $SU_q(2)$ is contained in it. (2) The class is stable under monoidal equivalence, free products, dual quantum subgroups and wreath products with S_N^+ . The rigidity properties include the Akemann-Ostrand property and strong solidity. Part of this talk is based on joint work with Mateusz Wasilewski and Yusuke Isono.