Workshop on index theory and related areas
Radboud University

19–20 May 2022

Titles and abstracts

Alexandre Afgoustidis

Title: *Local Langlands correspondence and lowest K-types for real groups*
Abstract: Let G be a reductive group over a local field. The local Langlands conjecture describes the irreducible (smooth, complex) representations of G in terms of certain homomorphisms from the Weil group of F into the Langlands dual group of G. What is expected is that a finite 'L-packet' of representations can be attached to each such 'L-homomorphism', and that the L-packets give a partition of the smooth dual.

Now suppose G is a real reductive group. Then Langlands gave a famous description of L-packets in the 1970s. Later work of Langlands and Shelstad or Adams–Barbasch–Vogan led to a refined version of the correspondence, where each of the L-packet in turn admits a parametrization in terms of data arising from the geometry of the Langlands dual group.

Suppose we are given such a 'refined' Langlands parameter, and observe the corresponding representation of G. Is it easy to read its restriction to a maximal compact subgroup of G directly on the Langlands data? I will describe work in progress with Jeffrey Adams on the case of tempered representations.

Francesca Arici

Title: SU(2)*-symmetries and Gysin sequences for C^*-algebras*
Abstract: Motivated by the study of group symmetries, as well as by the Gysin sequence in topological K-theory, in this talk we will introduce the notion of an SU(2)-equivariant subproduct system of Hilbert spaces. We

will describe their Toeplitz and Cuntz–Pimsner algebras and provide results about their topological invariants through $K(K)$-theory. In particular, we will show that the Toeplitz algebra of the subproduct system of an irreducible SU(2) representation is equivariantly KK-equivalent to the algebra of complex numbers so that the $(K)K$-theory groups of the Cuntz–Pimsner algebra can be effectively computed using a Gysin exact sequence involving an analogue of the Euler class. Based on joint work with Jens Kaad (SDU).

Nigel Higson

Title: *On Perrot's approach to index theory*
Abstract: Ten years ago, Denis Perrot discovered a remarkable new approach to index theory. Its main features are (a) the introduction of an algebra of infinite-order differential operators, in which the heat operator $\exp(-\Delta)$ can be treated algebraically, as a power series, and (b) the construction of a trace on (a submodule of) this algebra, modeled on the noncommutative residue. Perrot showed that the index cocycle built from these ingredients may be computed explicitly, leading to a new realization of the Todd class that appears in the Atiyah–Singer index theorem. But despite them being a radical departure from anything that came before, and despite them solving long-standing problems in noncommutative geometry, Perrot's ideas have not been widely adopted, so far. I shall try to remedy that by presenting an overview of some of Perrot's work in this talk.

Bram Mesland

Title: *Howe's theta correspondence as a Rieffel induction*
Abstract: Howe's local theta correspondence relates irreducible representations of a reductive dual pair (G, H) of subgroups of a symplectic group over a local field. In joint work with M.H.Sengun (Sheffield) we have shown that various instances of Howe's correspondence can be realised as a Rieffel induction via a C^*-correspondence between the full or reduced group C^*-algebras of G and H. In this talk I will discuss our construction and its implications for K-theory and representation theory.

Teun van Nuland

Title: *TBA*
Abstract: TBA

Hessel Posthuma

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Abstract: TBA

Yanli Song

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