ABSTRACTS OF THE TALKS

Arnaud Brothier
Subfactors, Hecke pairs, and approximation properties

Abstract. We consider subfactor planar algebras that are constructed with a group acting on a bipartite graph. There is a Hecke pair of countable discrete groups associated with this construction. We show that if this Hecke pair satisfies a given approximation property, then the subfactor planar algebra satisfies it as well. We exhibit an infinite family of subfactor planar algebras with non-integer index that are non-amenable, have the Haagerup property, and have the complete metric approximation property.

Ionuţ Chifan
II_1 factors with non-isomorphic ultrapowers

Abstract. In this talk I will show that there exists uncountably many separable II_1 factors whose ultrapowers (with respect to arbitrary free ultrafilters) are non-isomorphic. In fact it will be shown that the families of non-isomorphic II_1 factors introduced by Dusa McDuff in the late sixties are such examples. This entails the existence of a continuum of non-elementarily equivalent II_1 factors, thus settling a well-known open problem in the continous model theory of operator algebras. This is based on a joint work with Rémi Boutonnet and Adrian Ioana.

Ben Hayes
1-bounded entropy and regularity problems in von Neumann algebras

Abstract. We introduce and investigate the singular subspace of an inclusion of a tracial von Neumann algebra N into another tracial von Neumann algebra M. The singular subspace is a canonical N-N subbimodule of $L^2(M)$ containing the normalizer, the quasi-normalizer (introduced by Izumi-Longo-Popa), the one-sided quasi-normalizer (introudced by Fang-Gao-Smith), and the wq-normalizer (introduced by Galatan-Popa). By abstracting Voiculescu's original proof of absence of Cartan subalgebras, we show that the von Neumann algebra generated by the singular subspace of a diffuse, hyperfinite subalgebra of $L(F_2)$ is not $L(F_2)$. We rely on the notion of being strongly 1-bounded, due to Jung, and the 1-bounded entropy, a quantity which measures "how" strongly 1-bounded an algebra is. Our methods are robust enough to repeat this process by transfinite induction and we use this to prove some conjectures made by Galatan-Popa in their study of smooth cohomology of II_1-factors. We also present applications to nonisomoprhism problems for Free-Araki woods factors, as well as crossed products by Free Bogoliubov automorphisms in the spirit of Houdayer-Shlyakhtenko. Lastly, we relate a question of Jesse Peterson to the structure of the orthocomplement bimodule of maximal amenable subalgebras in interpolated free group factors.

Daniel Hoff
Von Neumann's Problem and Extensions of Non-Amenable Equivalence Relations

Abstract. In 2007, Gaboriau and Lyons showed that any nonamenable group Γ has a free ergodic pmp action $\Gamma \curvearrowright X$ whose orbit equivalence relation $\mathcal{R}(\Gamma \curvearrowright X)$ contains $\mathcal{R}(\mathbb{F}_2 \curvearrowright X)$ for some free ergodic pmp action of $\mathbb{F}_2$. This talk will focus on joint work with Lewis Bowen and Adrian Ioana in which we extend this result, showing that given any ergodic nonamenable pmp equivalence relation $\mathcal{R}$, the Bernoulli extension $\tilde{\mathcal{R}}$ over a nonatomic base space must contain $\mathcal{R}(\mathbb{F}_2 \curvearrowright \tilde{X})$ for some free ergodic pmp action of $\mathbb{F}_2$. We further prove that any such $\mathcal{R}$ admits uncountably many extensions which are pairwise not stably von Neumann equivalent (in particular, pairwise not orbit equivalent). From this we deduce that any nonamenable unimodular lcsc group G has uncountably many free ergodic pmp actions which are pairwise not von Neumann equivalent.

Matthew Kennedy
C*-simplicity for discrete groups

Abstract. I will discuss joint work with Breuillard, Kalantar and Ozawa on reduced C*-algebras of discrete groups. I will also mention more recent work that provides an intrinsic characterization of groups with the property that these algebras are simple.

Zhengwei Liu
Skein theory for subfactors

Abstract. We provide two different skein theories to construct subfactors with small and large indices respectively, and we construct a new family of subfactors whose indices approach infinity. The idea of the "universal skein theory" is to simplify the construction of subfactors by the knowledge of the Temperley-Lieb-Jones algebra. When the index is small, we can construct subfactors by solving some simple equations. When the index is large, this method in no longer efficient. Instead, we suggest a different type of skein theory motivated by the Yang-Baxter equation and construct a new family of subfactors.

Martino Lupini
The noncommutative Poulsen simplex

Abstract. The Poulsen simplex is the unique metrizable Choquet simplex with dense extreme boundary. I will explain how one can define a noncommutative analog of such an object in the context of operator systems.

Brent Nelson
An example of factoriality under non-tracial finite free Fisher information assumptions

Abstract. Suppose M is a von Neumann algebra equipped with a faithful normal state φ generated by a finite set $G = G^*$, $|G| \geq 3$. We show that if G consists of eigenvectors of the modular operator Δ_φ and have finite free Fisher information, then the centralizer M^φ is a II_1 factor and M is a factor of type depending on the eigenvalues of G. We use methods of Connes and Shlyakhtenko to establish the existence of diffuse elements in M^φ, followed by a contraction resolvent argument of Dabrowski to obtain the factoriality.

Narutaka Ozawa
A functional analysis proof of Gromov's polynomial growth theorem

Abstract. The celebrated theorem of Gromov asserts that any finitely generated group having polynomial growth is virtually nilpotent. Alternative proofs have been given by Kleiner and Shalom–Tao. In this note, we give yet another proof of Gromov's theorem, along the line of Shalom and Chifan–Sinclair, which is based on the analysis of reduced cohomology. (In fact, it requires a few more lines than their works and my contribution is very small.)

Sarah Reznikov
The faithful subalgebra

Abstract. Uniqueness theorems for combinatorially defined C*-algebras provide conditions under which a representation of the (universal) C*-algebra associated to combinatorial data—from a directed graph, for example—is faithful. Classical uniqueness theorems all require either an aperiodicity assumption on the underlying graph-like object or a gauge invariance condition on the representation in question. I will discuss results on k-graph and groupoid algebras that require neither type of assumption, instead identifying a subalgebra from which injectivity lifts. We further discus the properties of this subalgebra and how they are reflected in the underlying combinatorial object.

Thomas Sinclair
W^*-Rigidity for the von Neumann Algebras of Products of Hyperbolic Groups

Abstract. We show that if $\Gamma = \Gamma_1 \times \cdots \times \Gamma_n$ is a product of $n \geq 2$ non-elementary ICC hyperbolic groups then any discrete group Λ which is W^*-equivalent to Γ decomposes as a k-fold direct sum exactly when k=n. This gives a group-level strengthening of Ozawa and Popa's unique prime decomposition theorem by removing all assumptions on the group Λ. This result in combination with Margulis' normal subgroup theorem allows us to give examples of lattices in the same Lie group which do not generate stably equivalent II_1 factors. This is joint work with Ionut Chifan and Rolando de Santiago.

Noah Snyder

A new understanding of the Asaeda-Haagerup subfactor

Abstract. The classification of small index subfactors yielded several new subfactors, which are now beginning to be understood. The Asaeda-Haagerup small index subfactor gives a Morita equivalence between two fusion categories. We determine all fusion categories in this Morita equivalence class (there are exactly 6) and all Morita equivalences between them. In particular, we give a new "symmetric" construction of the Asaeda-Haagerup subfactor. This construction allows for new computations (for example, of the Drinfel'd center of the Asaeda-Haagerup fusion categories) and suggests that Asaeda- Haagerup might live in an infinite family. Furthermore, we identify the Brauer-Picard 3-groupoid of Asaeda-Haagerup and construct a new extension of the Asaeda-Haagerup fusion categories by the Klein 4-group.