OHIO Conference - Abstracts

The Ohio State University, Columbus, OH

Saturday, April 28, 2018 - Cockins Hall 240

10:00-10:40: Marcel Bischoff: ***Completely positive actions on local nets of observables.*** Quantum field theory can be axiomatized in the Haag-Kastler approach using operator algebra by so-called local nets of observables. I will talk about a notion of an action of a hypergroup on local nets of observables by completely positive maps. I will show how this gives a Galois like theory for chiral rational conformal field theory in the operator algebraic approach.

10:50-11:30: Elizabeth Gillaspy: ***Generalized gauge actions, KMS states, and Hausdorff dimension for higher-rank graphs.*** The infinite path space Λ^∞ of a higher-rank graph Λ is (often) a Cantor set – compact, perfect, totally disconnected. Together with Carla Farsi, Sooran Kang, Nadia Larsen, and Judith Packer, we have found several ways to put a metric on this Cantor set, and computed the associated Hausdorff dimension and measure. It turns out that the same data we needed to metrize Λ^∞ also gives us a generalized gauge action on $C^*(\Lambda)$ – and the KMS states associated to this action are intimately tied to the Hausdorff measure on Λ^∞. To us, this was an unexpected link between the dynamical information exhibited by a higher-rank graph (as exhibited in its KMS states) and its fractal structure.
All the words in the title will be defined during the talk; no prior familiarity with higher-rank graphs, KMS states, or Hausdorff dimension will be assumed.

11:40-12:10: Paul McKenney: ***Rigidity of corona algebras.*** In the last decade it has become clear through examples that set theory has a strong influence on the structure of the automorphism group of a corona algebra. In particular, the Continuum Hypothesis (CH) often implies that the automorphism group of a corona algebra is large and pathological, whereas the Proper Forcing Axiom (PFA) often implies that it only contains those automorphisms that are, in some sense, definable. This phenomenon was quantified by Coskey and Farah in the form of two conjectures involving CH and PFA. In this talk I will explain these two conjectures and some recent work of mine with Alessandro Vignati in which we verify the PFA conjecture for a large class of corona algebras.

2:00-2:40: Thomas Sinclair: ***On the classification of group von Neumann algebras.*** I will discuss recent progress and future directions on structural and classification results for II_1 factors associated to countable, discrete groups. This talk is based in part on joint works with Ionut Chifan, Ben Hayes, Daniel Hoff, and Rolando de Santiago.

2:50-3:30: Paul Gary Weiss: ***The commutator structure of operator ideals.*** The additive commutators of operators belonging to two-sided ideals of $\mathrm{B}(H)$ are characterized. For ideals I and J, the space, $[I, J]$, of all finite sums of (I, J)-commutators is characterized and found to equal $[IJ, \mathrm{B}(H)]$. An historical survey of this subject will be presented along with open problems and some recent progress. Time permitting I will discuss recent work on the subideal structure of $\mathrm{B}(H)$, that is ideals inside the compacts $\mathrm{K}(H)$ and on $\mathrm{B}(H)$-semigroup ideals on a problem of Radjavi concerning semigroups with automatic selfadjoint ideals.

4:00-4:30: Matthew Neal: ***Order Theorems for Non Self-Adjoint Operator Algebras.*** Recent work by Blecher, Reed, and the speaker have established an effective order theory for non-self-adjoint operator algebras and Jordan operator algebras. Somewhat surprisingly, this program yields a comparison theory, Urysohn's lemmas, and strong results about positive and completely positive projections on non-self-adjoint operator algebras and Jordan operator algebras. These results nontrivially generalize the corresponding classical theorems for C*-algebras. In this talk we will explain the basic order theory and results and then indicate difficulties and unsolved problems.

4:40-5:10: Chao Xu: ***Zeta-determinant of a complex conformal variation of metric, over Heisenberg module over noncommutative two tori.*** Given $g \in \mathrm{SL}(2, \mathbb{Z})$, the Heisenberg module $E(g, \theta)$ is the Strong Morita equivalent bimodule between A_θ and $A_{g\theta}$. It is the deformation of algebraic bundles over ordinary two tori T. Pseudo-differential calculus over noncommutative two tori, was extended to Heisenberg modules, by M. Lesch and H. Moscovici in 2015. A complex conformal variation of Dirac operator on the Heisenberg module, is of the form $D(w) = k^w D_0$, with D_0 being any Dirac type operators, k self-adjoint positively definite in $A_{\theta'}$, w in complex plane. Following D. Quillen's idea, a second variation of log-determinant has geometric interpretation as the Kahler curvature of the Determinant line bundle over space of Fredholm operators $F(H)$. One can compute this curvature using symbolic calculation over the Heisenberg module. Both heat kernel method and the method of using Kontsevich-Vishik trace can be applied in this variation.