Mini-Course

(February 5 and 6, 2022)

Titles and Abstracts (in alphabetic order)

Finite Group Actions on C*-algebras
Ali Asadi Vasfi
Czech Academy of Sciences

Abstract: In this talk we introduce C*-algebra crossed products for discrete group actions and discuss their basic properties. Then we restrict our attention to the case of finite group actions with (tracial) Rokhlin property and discuss structure results on the crossed product (most notable that of simplicity) in this particular case.

Ultrapowers of C*-algebras
Jorge Castillejos
Instituto de Ciencias Matemáticas

Abstract: We introduce ultrapowers of C*-algebras and their applications in the formulation of certain approximation properties.

Introduction to Operator Systems
Alexander Frei
University of Copenhagen

Abstract: We give an introduction to operator systems to get everybody ready for working with such. For this we start with their concrete definition in terms of ambient operator algebras and discuss the central relation between norm and positivity. With this at hand, we then move on to completely positive maps (in short cp-maps) and relate them to completely bounded maps.
As a special case we will then discuss cp-maps either from or into complex numbers (seen as a one-dimensional operator system) and their latter reformulation in terms of the so-called Choi-matrix. We then continue with the Hahn-Banach and Stinespring's theorem for operator systems,

respectively, and finish off with the abstract characterisation of operator systems given by Choi and Effros.

A Short Course on $\mathcal{Z}$- and $\mathcal{W}$-absorption

Nasser Golestani
Tarbiat Modares University and IPM

Abstract: We introduce Jiang-Su algebra $\mathcal{Z}$ and Razak-Jacelon algebra $\mathcal{W}$ and discuss their significance in Elliott's classification program. We also briefly discuss (strongly) self-absorbing C*-algebras and their basic properties.

Amenability Notions in Operator Algebras

Javad Mohammadkarimi
Tarbiat Modares University

Abstract: We discuss the notion(s) of amenability in C*-algebras and von Neumann algebras as well as recent amenability notions for C*-dynamical systems. We also briefly discuss the notion of amenability at infinity for locally compact groups.

A Crash Course in Boundary Theory

Zahra Naghavi
IPM

Abstract: We introduce the notion of Furstenberg boundary for a discrete group. We discuss how C*-simplicity and unique trace property of a discrete group characterize by some dynamical properties on Furstenberg boundary. We also briefly discuss some recent work around this areas which lead to introduce new boundaries.

Subfactors and Jones Index

Mohammad Shavandi
Tarbiat Modares University

Abstract: We introduce Jones (index) theory of subfactors. We also briefly discuss the C*-algebraic counterparts (such as Watatani index) and applications of index theory (in this narrow sense) in structure theory of C*- and W*-algebras.

The 9th Workshop on
Operator Algebras and their Applications, February 7-9, 2022
School of Mathematics, IPM, Tehran, IRAN

Free Probability Theory and Random Matrices

Carlos Vargas
Guanajuato

Abstract: In this talk I will present the basics of free probability, along with some of its main applications for understanding several random matrix models. This method was first introduced by Voiculescu in 1991, as he used free independence to describe the asymptotic collective behavior of Wigner and Wishart random matrices.