

Free probability

Organizer: Victor Perez Abreu, Mexico

Free probability was developed in the 1980s by Dan-Virgil Voiculescu, whose initial objective was to solve certain problems relating to the structure of Von Neumann's algebras. It has been a subject of increasing attention in the last two decades. A particular subject of interest is the parallelism between some concepts in classical and free probability. The purpose of this Contributed Session is to provide recent advances in free probability related to subjects in classical probability. Each presentation will have a five-minutes introductory part for an audience of researchers and students working in classical probability and stochastic processes. The subject of the presentations include parallelism between Fourier and Cauchy transforms with application to variance functions, classical and free extreme value laws, classical and free Lévy bases, and classical and free deconvolutions of probability measures. The order of the potential speakers would be as the authors are presented in this proposal below. The speakers are from four different countries, Canada, Denmark, Mexico and USA, and include young and senior researchers.

Conferences:

Unimodal distributions in free probability

Takahiro Hasebe, Hokkaido University, Japan

Recently various results about unimodal distributions are obtained regarding free additive convolution on the real line and free multiplicative convolution on the unit circle. I will summarize those results as well as open problems.

Conditional expectations through Boolean cumulants and subordination - towards a better understanding of the Lukacs property in free probability

Jacek Wesolowski, Warsaw Polytechnic, Poland

Following recently discovered connections between Boolean cumulants and freeness, we use them to derive explicit formulas for a family of conditional expectations in free variables. These expressions are given in terms of operators acting on the Boolean transform of the underlying variable. Furthermore, we show how the approach through Boolean cumulants together with subordination simplifies free versions of some Lukacs type regression characterizations. This is a joint work with Kamil Szpojankowski (Warsaw University of Technology, Poland).

Extreme values in free probability

J. C. Wang, University of Saskatchewan, Canada

In this talk we will first review the free analogue of extreme value theory developed by Ben Arous and Voiculescu, where the theory of regular variation plays an important role as in its classical counterpart. Then we present our joint work with Hao-Wei Huang on bi-free extreme values, in which the theory of copulas is an indispensable tool.

On Lévy bases in free probability
Steen Thorbjørnsen, Aarhus University, Denmark

A free Lévy basis is the free probability analog of an infinitely divisible independently scattered random measure (a.k.a. a classical Lévy basis). The latter were thoroughly studied in a seminal paper by B.S. Rajput and J. Rosinski from 1989, which included inter alia a theory for integration of deterministic functions with respect to a classical Lévy basis.

In this talk we present a general existence result for free Lévy bases and a theory of integration with respect to such in parallel to the theory developed by Rajput and Rosinski. We further apply the presented integration theory to establish a Lévy-Itô type decomposition for a general free Lévy basis.