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Conditional expectations and subordination of polynomials in free random variables via Boolean cumulants

Abstract: In this joint talk our goal is to establish Boolean cumulants as an effective tool for the calculation of conditional expectations and distributions of polynomials in free random variables. In particular using Boolean cumulants one can obtain "subordination" equations for the resolvents of arbitrary polynomials in free random variables, generalizing the case of free additive and multiplicative free convolution previously established by Biane and Voiculescu.

The talk is divided into two parts:

1. In the first part we present a new (more algebraic) approach to our previous results from [1], which relate conditional expectations and Boolean cumulants.

2. In the second part we will explain how to compute the distribution of any polynomial in free random variables using the algebraic relations obtained in the first part.

[1] Lehner, Franz; Szpojankowski, Kamil. Boolean cumulants and subordination in free probability. Random Matrices Theory Appl. 10 (2021), no. 4,