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Free Probability for Pairs of Faces

Free probability is a non-commutative probability theory that arises by examining the joint moments of operators acting on the left-hand side of reduced free product spaces. Introduced by Voiculescu in the 1980s, free probability has become an important part of the theory of operator algebras with applications to random matrix theory and subfactor theory.

Last year, Voiculescu introduced the notion of bi-free independence in order to simultaneously study the left and right representations of algebras on reduced free product spaces. In this talk, we will survey the recent advances in bi-free probability including the (ℓ, r)-cumulants, partial R-transforms, and the combinatorical structures of bi-free probability.