

Probabilistic Operator Algebra Seminar

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Title: *The Boolean quadratic forms and tangent law*

In [2] we study the limit sums of free commutators and anticommutators and show that the generalized tangent function

$$\frac{\tan z}{1 - x \tan z}$$

describes the limit distribution. This is the generating function of the higher order tangent numbers of Carlitz and Scoville [1, (1.6)] which arose in connection with the enumeration of certain permutations.

In the paper [3] we continue to study the limit of weighted sums of Boolean commutators and anticommutators and we show that the shifted generalized tangent function appears in a limit theorem. In order to do this, we shall provide an arbitrary cumulants formula of the quadratic form. In my lecture I intend to explain how we arrived at this result.

References

- [1] Carlitz, Leonard, and Richard Scoville. *Tangent numbers and operators*. Duke Math. J. 39(3) (1972): 413-429.
- [2] Ejsmont, Wiktor, and Franz Lehner. *The free tangent law*. Advances in Applied Mathematics 121 (2020): 102093.
- [3] Ejsmont, Wiktor, and Patrycja Hećka. *The Boolean quadratic forms and tangent law*. arXiv preprint arXiv:2304.02985 (2023).