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Higher order freeness

Second order freeness was invented by Roland Speicher and myself to do for fluctuations of random matrices what Voiculescu did for moments. Namely if one has two ensembles of random matrices X_N and Y_N and one knows their limiting distributions and that they are asymptotically free, then one knows the limiting distributions of sums and products of X_N and Y_N. If they are asymtotically free of second order then one can do the same for their fluctuations. The idea of first and second order freeness can be extended to freeness of all orders. I will discuss recent developments and problems in higher order freeness.