Stephen Melczer* (smelczer@sas.upenn.edu). Asymptotic regime change for multivariate generating functions.

The study of multivariate generating functions comprises the domain of Analytic Combinatorics in Several Variables (ACSV). Analogously to the univariate case, the techniques of ACSV show how the singularities of a (typically rational) multivariate generating function dictate asymptotics of its coefficients. Unlike the univariate case, however, a multivariate generating function encodes a wealth of sequences. In particular, one can fix a direction vector $\mathbf{r} = (r_1, \ldots, r_d) \in \mathbb{R}^d_{>0}$ and examine asymptotics of the coefficient sequence $f_{nr_1, \ldots, nr_d}$ as $n$ approaches infinity. Although this definition is a priori only non-trivial when $\mathbf{r}$ contains rational entries, the techniques of ACSV show asymptotics typically vary in a uniformly predictable way as $\mathbf{r}$ varies smoothly, meaning asymptotics can be defined in a limit sense for “generic” directions $\mathbf{r} \in \mathbb{R}^d_{>0}$.

In this talk we discuss the first uniform study of non-generic directions, around which asymptotics sharply transition, and study how this transition between different regimes occurs.

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