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Enumeration, structure and generation of triangular partitions

A *triangular partition* is a partition whose Ferrers diagram can be separated from its complement (as a subset of $\mathbb{N}^2$) by a straight line. Having their origins in combinatorial number theory and computer vision, triangular partitions have been studied from a combinatorial perspective by Onn and Sturmfels, and by Corteel et al. under the name *plane corner cuts*, and more recently by Bergeron and Mazin in the context of algebraic combinatorics.

In this talk, we give a new characterization of triangular partitions and the cells that can be added or removed while preserving the triangular condition, and use it to describe the Möbius function of the restriction of Young's lattice to triangular partitions. We obtain a formula for the number of triangular partitions whose Young diagram fits inside a square, deriving, as a byproduct, a new proof of Lipatov's enumeration theorem for balanced words. Finally, we present an algorithm that generates all the triangular partitions of a given size, which is significantly more efficient than previous ones and allows us to compute the number of triangular partitions of size up to 10^5.

This is joint work with Sergi Elizalde.