LIMIT THEOREMS FOR RECURSIVE CELL-SPLITTING SCHEMES

SEBASTIAN MENTEMEIER

Random tessellations form a central class of models considered in stochastic geometry. They are used in a number of concrete applications ranging from metallography to wireless telecommunication, to name just two. Especially during the last decade there has been an increasing interest in random tessellation models that arise as a result of a space-time recursive cell division scheme. The general construction of this type of tessellation can be described as follows. At time zero we fix a convex polytope $W \subset \mathbb{R}^d$ for some space dimension $d \geq 2$ and supply W with an exponential random lifetime. When the lifetime of W has run out, a random hyperplane is selected and is used to "cut" W into two polyhedral sub-cells W^+ and W^- that arise as intersections of W with the two closed half-spaces determined by the hyperplane. Now, the whole procedure is continued recursively and independently within these two sub-cells.

We use the machinery of general branching processes to provide a number of limit theorems for different geometric functionals of the cell-splitting scheme. In particular, we shall prove that the fluctuations of several key geometric functionals can be described by a Gaussian random variable with a heavy-tailed random variance.

This is joint work with Christoph Thäle (Bochum, Germany).