# Diffusion-limited and ballistic aggregation

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Diffusion-limited aggregation (DLA) is a stochastic model for cluster growth proposed by Witten and Sander in 1981. Particles started from infinity perform random walks until they hit the cluster for the first time and are attached there. The model is easy to simulate and produces dendrite-like structures mimicking those observed in several physical phenomena, including colloidal aggregation and dielectric breakdown. Despite its popularity in physics and its rather simple definition, not much is known rigorously about this model. One of the few things known is an upper bound on the growth rate of the diameter of the cluster due to Kesten (1987), which can also be interpreted as a lower bound on the fractal dimension of the cluster.

Another popular cluster growth model in physics is ballistic aggregation, which up to now has not attracted much attention in the maths literature. Here particles move along straight lines and similar dendrite-like clusters are generated. In the talk we review both models. Using Kesten's techniques, we obtain a bound for the growth rate of the cluster in the ballistic model, which in this case allows to deduce its fractal dimension.

Based on joint work with Tillmann Bosch.