Institute for Applied Mathematics, Bonn University

Oberseminar Stochastik

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Universality in Random Growth Processes

Universality in disordered systems has always played a central role in the direction of research in Probability and Mathematical Physics, a classical example being the Gaussian universality class (the central limit theorem). In this talk, I will describe a different universality class for random growth models, called the KPZ universality class. Since Kardar, Parisi and Zhang introduced the KPZ equation in their seminal paper in 1986, the equation has made appearances everywhere from bacterial growth, fire front, coffee stain to the top edge of a randomized game of Tetris; and this field has become a subject of intense research interest in Mathematics and Physics for the last 15 to 20 years. The random growth processes that are expected to have the same scaling and asymptotic fluctuations as the KPZ equation and converge to the universal limiting object called the KPZ fixed point, are said to lie in the KPZ universality class, though this KPZ universality conjecture has been rigorously proved for only a handful of models till now. Here, I will talk about some recent results on universal geometric properties of the KPZ fixed point and the underlying landscape and show that the KPZ equation and exclusion processes converge to the KPZ fixed point under the 1:2:3 scaling, establishing the KPZ universality conjecture for these models, which were long-standing open problems in this field.
The talk is based on joint works with Jeremy Quastel, Balint Virag and Duncan Dauvergne.