Jeff Steif (Chalmers University of Technology)

Title: Poisson Generated Processes

Abstract: Motivated by Sznitman's random interlacement process, we consider a general class of processes which can be constructed in a similar manner. Namely, one considers a general Poisson process on the collection of subsets of a given set S and the corresponding "Poisson Generated Process" is obtained by taking the union of the sets which arise in the Poisson process. In this way, we obtain a random subset of S or equivalently a 0-1 valued process indexed by S.

We study which processes can arise in this way. For example, we look at Markov chains, renewal processes, fully invariant processes, averages of product measures and stationary processes.

This is very much "work in progress".

The talk is based on joint work with Stein Andreas Bethuelsen, Malin Palö Forsström and Nina Gantert.

Christian Maes (KU Leuven)

Title: On disagreement and accessibility

Abstract: Starting from work on disagreement percolation, we move to methods using first passage times to show the boundedness of the solution of a Poisson equation appearing in the context of thermal response of nonequilibrium systems.

Pierre Nolin (City University of Hong Kong)

Title: 2D forest fires near and beyond the critical time

Abstract: Bernoulli percolation can be used to analyze planar forest fire (or epidemics) processes. In such processes, all vertices of a lattice are initially vacant, and then become occupied at rate 1. When an occupied vertex is hit by lightning, which occurs at a (typically very small) rate, all the vertices connected to it "burn" immediately, i.e. they become vacant.

We analyze the behavior of such processes near and beyond criticality, that is, when large components of occupied sites appear. They display a form of self-organized criticality, where the phase transition of Bernoulli percolation plays an important role. In particular, a peculiar and striking phenomenon arises, that we call "near-critical avalanches".

This talk is based on joint works with Rob and with Wai-Kit Lam (National Taiwan University, Taipei).

Wei Qian (City University of Hong Kong)

Title: Conformally invariant fields out of Brownian loop soups

Abstract: For each central charge $c\in (0,1]$, we construct a conformally invariant field which is a measurable function of the local time field $\mathcal{L}$ of the Brownian loop soup with intensity c and i.i.d. signs given to each cluster. This field is canonically associated to $\mathcal{L}$, in a sense which is similar to the isomorphism theory that associates the Gaussian free field to the loop soup with critical intensity. Isomorphisms between Brownian motions and random fields were previously developed by Symanzik, Brydges-Fröhlich-Spencer, Dynkin and Le Jan in several different settings. Further, we show that the (non-nested) CLE loops form level lines for this field and that there exists a constant height gap between the values of the field on either side of the CLE loops.

In a key intermediate step, we obtain the crossing exponent for the event that a cluster in the subcritical loop soup passes near a given point. Among other things, it allows us to deduce that a cluster in a loop soup with intensity $c\in(0,1]$ possesses a nondegenerate Minkowski content in some non-explicit gauge function $r\mapsto r^2 |\log r|^{1-c/2+o(1)}$.

This talk is based on joint works with Antoine Jego (EPFL) and Titus Lupu (CNRS).

V2/14aug

Alberto Gandolfi (NYU Abu Dhabi)

Title: A Brownian Loop Soup based Conformal Field Theory

Abstract: In this talk, we introduce a conformal field theory whose primary operators are based on counting the outer contours of loops from the Brownian Loop Soup (BLS). The resulting fields are conformally covariant and constitute a simplified version of other conformally invariant fields that have been recently extracted from the BLS. Nonetheless, they represent a rather explicit example of a conformal field theory in which several correlation functions can be computed to various degrees of exactness. In particular, several explicit scaling dimensions and three- and four-point function constants are obtained by comparison with the *O*(*n*) model and the scaling limit of percolation.

Geoffrey Grimmett (Cambridge University)

Title: Hyperbolic planar percolation

Abstract: Sykes and Essam (1964) noted a relationship between the critical points of site percolation on a planar graph G and its so-called matching graph G_*, namely $p_c(G) + p_c(G_*) = 1$. When G is non-amenable, it turns out that the relationship is more complicated and involves instead the 'uniqueness critical point' of G_*.

A key technique is a method for expressing a planar site percolation process on a matching pair of graphs in terms of a dependent bond process on a related pair. The methods used allow positive answers to two conjectures of Benjamini and Schramm (1996).

A related problem is to prove the (obvious, but false in general) strict inequality $p_c(G_*) < p_c(G)$. This is shown to hold for transitive planar graphs G, and for two classes of quasi-transitive graphs. It is an open problem to complete the picture in the quasi-transitive case.

(Joint work with Zhongyang Li.)

V2/14aug

Diederik van Engelenburg (University of Vienna)

Title: From disagreement percolation to the BKT transition.

Abstract: In the early nineties, Rob introduced ``disagreement percolation'' and showed how it can be used to provide a uniqueness condition for Gibbs measures. I will give a review of some generalizations of this idea, initiated by Sheffield, and how it plays a central role in our current understanding of gradient models / height functions. Although perhaps not always visible, this understanding is essential in all modern proofs of the BKT transition.

Based on joint work with Marcin Lis.

Abstract Balint Toth https://sites.google.com/view/balint-toth-math/home

Title:
Random walks in divergence free random environments

Abstract:
I will survey results and some open questions related to random walks (and diffusions) in divergence-free drift fields. The problems are mainly motivated by the need of understanding long time asymptotic behaviour (normal or anomalous diffusion) of advective motion of particles in disordered media – e.g. in incompressible turbulent flow. Probabilistic and analytic aspects will be highlighted.