

Uppsala Ph.D. Mathematics Conference

Report of Contributions

Contribution ID: 1

Type: **not specified**

Ramified covers and root stacks

Friday, 6 March 2020 09:45 (45 minutes)

A ramified cover X of a surface S gives rise to ramification data in the following sense: the locus in S over which X is ramified will look like a union of curves and to each curve we associate the corresponding ramification index. Conversely, given a finite number of curves in S intersecting only transversely, and a positive integer for each curve, we may ask when such data comes from a ramified cover. We will explain how to give a criteria for when this is the case, using root stacks.

Presenter: AHLQVIST, Eric (KTH)

Contribution ID: 2

Type: **not specified**

Importance sampling and weak convergence in population genetics

Friday, 6 March 2020 14:00 (45 minutes)

Importance sampling algorithms are used in population genetics to estimate small probabilities of gene configurations. In order to prove the efficiency of these algorithms, it is necessary to determine the asymptotic behaviour of the sampling probabilities. As a first step in this direction, we show weak convergence for a sequence of coalescent processes and the corresponding mutation processes, as the sample size goes to infinity. Time is scaled and convergence of semigroups is proved. The limiting process consists of a deterministic part and of conditionally independent Poisson processes with varying intensity. This is a work in progress with H.Hult (KTH).

Presenter: FAVERO, Martina (KTH)

Contribution ID: 3

Type: **not specified**

Introduction to homological mirror symmetry and the Fukaya category

Friday, 6 March 2020 10:45 (45 minutes)

Homological mirror symmetry is a deep mathematical conjecture proposed by Maxim Kontsevich at the 1994 ICM in Zürich, and it is about a certain relationship between the two mathematical areas of symplectic geometry and algebraic geometry. More precisely, the conjecture states that there is a derived equivalence between the so-called Fukaya category in symplectic geometry, and the category of coherent sheaves which is well-studied in the field of algebraic geometry. The conjecture is an attempt at understanding mirror symmetry in string theory which is well-known by physicists.

In this talk I will first go through history and origins of the conjecture. After that, an introduction to symplectic geometry will be given and the goal will be to give the audience a feeling of what the Fukaya category is.

Presenter: ASPLUND, Johan (Uppsala University)

Contribution ID: 4

Type: **not specified**

Strategic ability, information and memory

Friday, 6 March 2020 13:00 (45 minutes)

A typical game theoretic question is this: given some set of information and available memory, what conditions can an agent force? This talk will tackle the converse: given a class of conditions, what information and memory does an agent need to force the conditions? Specifically, I present the logic ATL *for reasoning about strategic ability in a multi-agent settings, and show that for certain fragments of ATL*, one can restrict the information available to agents without limiting their strategic abilities.

Presenter: AHLSEN, Daniel (Stockholm University)

Contribution ID: 5

Type: **not specified**

The Gaussian free field: local sets and their dimensions

Friday, 6 March 2020 15:15 (45 minutes)

The two-dimensional Gaussian free field is the canonical model for a random surface and is important in many different areas of mathematics and physics. It is the two-dimensional time analog of Brownian motion and enjoys many similar properties, such as a certain domain Markov property and local sets, i.e., higher-dimensional versions of stopping times. In this talk, we introduce these notions, with the Brownian motion in mind, and discuss the properties of these random sets as well as briefly describe how to compute the dimensions of a certain class of local sets. The talk is based on joint work with Avelio Sepúlveda and Fredrik Viklund.

Presenter: KRISTIANSSON SCHOUG, Lukas (KTH)

Contribution ID: 6

Type: **not specified**

Percolation

Friday, 6 March 2020 16:15 (45 minutes)

Percolation studies the behaviour of clusters in random graphs. It has applications to modeling phenomena as diverse as magnetism, spread of infectious diseases, and the adaption of new technologies in society. This talk will give a brief overview of the theory of percolation, starting from the celebrated Harris-Kesten theorem on percolation in the square lattice in two dimensions. We will in particular consider tools used to study percolation in random geometric graphs and the configuration model. Finally, we will consider what new questions arise when we drop the independence requirement from the standard percolation process.

Presenter: STRÖMBERG, Johanna (Uppsala University)