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Fakultät für Mathematik

BERUFUNGSVORTRÄGE
„Stochastik“

Die Berufungsvorträge schließen folgende Punkte mit ein:

Didaktischer Vortrag (20 Minuten)
Fragen/Pause (10 Minuten)
Wissenschaftlicher Vortrag (45 Minuten)
Fragen/Pause (15 Minuten)
Kommissionelles Hearing -
(Dekanatsbesprechungszimmer, 11. Stock)

Freitag, 13. Oktober 2017, Besprechungszimmer 9. Stock

Prof. Hendrik Weber (University of Warwick)

10:00 Uhr: Didaktischer Vortrag

“Lindeberg’s proof of the Central Limit Theorem”

The Central Limit Theorem states roughly speaking that a properly rescaled sum of many random variables is approximately Gaussian if the individual random variables are “sufficiently independent” and if the sum is not dominated by a just a few terms. I will give a proof of a simple version of this theorem, which uses a method due to Lindeberg.

10:30 Uhr: Wissenschaftlicher Vortrag

“The Phi-4 equation - scaling limits, meta-stability and the role of infinity”

This talk is concerned with a stochastic partial differential equation (SPDE) driven by a singular noise term namely space-time white noise. Solutions to such an equation are in general very irregular: they have to be interpreted as Schwartz distributions rather than as functions, and in order to give a meaning the equation it often has to be interpreted in a “renormalized” sense, i.e. some formally "infinite terms”.
In this talk I will focus on a particular SPDE, namely the dynamic Phi-4 model. I want to discuss two very different situations where this equation arises naturally: as a scaling limit for an interacting particle system and as a model for meta-stability. I will explain in particular, which role the “infinite terms” play in each of these situations.

Freitag, 13. Oktober 2017, Besprechungszimmer 9. Stock

Prof. Mykhaylo Shkolnikov (Princeton)

16:00 Uhr: Didaktischer Vortrag

“Mathematical analysis of card shuffling”

Given a card shuffling technique, how many shuffles does it take to thoroughly shuffle a deck of cards? I will explain a general method for answering this question and will illustrate it on the so-called top-to-random shuffle. Based on “Shuffling cards and stopping times” by David Aldous and Persi Diaconis.

16:30 Uhr: Wissenschaftlicher Vortrag

“A new approach to the largest eigenvalues of random matrices”

I will discuss a new method for the study of fluctuations of the largest eigenvalues in various random symmetric matrix ensembles. Such ensembles include, in particular, models for sample covariance matrices from high-dimensional data. The new approach is tailored to obtaining distributional information for the limiting point processes and combines the moment method for tridiagonal random matrices with strong invariance principles for random walks and their local times. Based on joint works with Vadim Gorin and Pierre Yves Gaudreau Lamarre.

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Montag, 16. Oktober 2017, Sky Lounge

Prof. Vadim Kaloshin
(University of Maryland)

10:00 Uhr: Didaktischer Vortrag

“Can you hear the shape of a drum?”

M. Kac popularized the question “Can you hear the shape of a drum?”. Mathematically, we consider a bounded planar domain Ω and the associated Dirichlet problem

$$\Delta u+\lambda^2 u=0, u|_{\partial \Omega}=0. $$

The set of λ’s such that this equation has a solution, denoted $\Delta(\Omega)$ is called the Laplace spectrum of Ω. Does Laplace spectrum determine Ω? During the lecture we shall discuss the history and the recent progress on this problem. This is joint works with J. De Simoi, A. Figalli and Q. Wei.

10:30 Uhr: Wissenschaftlicher Vortrag

“Stochastic Arnold Diffusion”

In 1964, Arnold constructed an example of a nearly integrable deterministic system exhibiting instabilities. In the 1970s, physicist Chirikov coined the term for this phenomenon “Arnold diffusion”, where diffusion refers to stochastic nature of instability. One of the most famous examples of stochastic instabilities for nearly integrable systems is dynamics of Asteroids in Kirkwood gaps in the Asteroid belt. They were discovered numerically by astronomer Wisdom. During the talk we describe a class of nearly integrable deterministic systems, where we prove stochastic diffusive behavior. Namely, we show that distributions given by deterministic evolution of certain random initial conditions weakly converge to a diffusion process. This result is conceptually different from known mathematical results, where existence of “diffusing orbits” is shown. This work is based on joint papers with Castejon, Guardia, J. Zhang, and K. Zhang.

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Fragen/Pause (15 Minuten)
Kommissionelles Hearing -
(Dekanatsbesprechungszimmer, 11. Stock)

Donnerstag, 19. Oktober 2017, Sky Lounge

Prof. Nicolas Perkowski
(Humboldt-Universität zu Berlin)

10:00 Uhr: Didaktischer Vortrag

“Das Gesetz der großen Zahl”

Die Bedeutung des Wortes “Wahrscheinlichkeit” ist ein höchst komplexes philosophisches Problem, das wir in der mathematischen Wahrscheinlichkeitstheorie nicht lösen können. Kolmogorovs maßtheoretische Axiomatisierung der Stochastik basiert auf mehr oder weniger einleuchtenden idealisierten Annahmen an das Wesen von Wahrscheinlichkeiten und zunächst ist nicht klar, inwiefern diese die “physikalischen” Realitäten abbilden. Jedoch vereinfacht sich unser philosophisches Problem im Falle eines unendlich oft wiederholbaren zufälligen Experiments, wo wir eine klare frequentistische Interpretation für Wahrscheinlichkeiten haben. Das Gesetz der großen Zahl, welches ich in meinem Lehrvortrag motivieren und beweisen werde, zeigt, dass zumindest in dieser Situation die mathematische Theorie mit der Intuition übereinstimmt. Eine schöne Anwendung ist ein einfacher (wenn auch recht ineffizienter) Algorithmus zur Berechnung der Zahl Pi.

10:30 Uhr: Wissenschaftlicher Vortrag

“Recent trends in singular stochastic partial differential equations”

One of the main objectives of stochastic analysis is the study of randomly evolving systems, whose dynamics are usually described in terms of stochastic differential equations. However, formal considerations in mathematical physics often lead to so called “singular stochastic partial differential equations” (singular SPDEs), which have been ill posed for decades. The problem is the interplay of very singular noise with nonlinearities which can create small scale resonances that have be removed through a renormalization procedure. In the past five years we have seen a number of mathematical breakthroughs which allow us to finally solve and study such singular SPDEs, and I will present some of the main developments on the guiding example of the Kardar-Parisi-Zhang equation.