CONVEX HULLS OF RANDOM PROCESSES YA. G. SINAI pdf

1: Courant Institute Probability and Mathematical Physics Seminar

Ya. G. Sinai - Convex hulls of random processes Oleg Viro - Mutual position of hypersurfaces in projective space Alan Weinstein and Ping Xu - Hochschild cohomology and characteristic classes for star-products.

Examples of Dynamic Systems. Definition of Dynamical Systems. The Birkhoff-Khinchin Ergodic Theorem. Decomposition into Ergodic Components. Averaging in the Ergodic Case. Integral and Induced Automorphisms. Weak Mixing, Mixing, Multiple Mixing. Dynamical Systems on Compact Metric Spaces. Invariant Measures Compatible with Differentiability. Translations on the Torus. Homeomorphisms of the Circle. Translations on Compact Topological Groups. Endomorphisms and Automorphisms of Commutative Compact Groups. Definition of Interval Exchange Transformations. An Estimate of the Number of Invariant Measures. Billiards in Polygons and Polyhedra. Billiards in Domains with Convex Boundary. Systems of One-dimensional Point-like Particles. Lorentz Gas and Systems of Hard Spheres. Uniform Distribution of Fractional Parts of Polynomials. Stationary Random Processes and Dynamical Systems. Dynamical Systems of Statistical Mechanics. Dynamical Systems and Partial Differential Equations. Direct and Skew Products of Dynamical Systems. Metric Isomorphism of Skew Products. Equivalence of Dynamical Systems in the Sense of Kakutani. Time Change in Flows. Endomorphisms and Their Natural Extensions. Metric Isomorphism of Bernoulli Automorphisms. K-systems and Exact Endomorphisms. Definition of Special Flows. Proof of the Theorem on Special Representation. Dynamical Systems with Pure Point Spectrum. The Case of Discrete Time. The Case of Continuous Time.

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2: Yakov Sinai - Wikipedia

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Sinai, Limiting probability distribution for a random walk with topological constraints, Chaos 1 2 , Sinai, Two results concerning asymptotic behavior of solutions of the Burgers equation with force, J. Chernov, Statisticheskie svoistva dvumernykh giperbolicheskikh billiardov, Uspekhi mat. Chernov, Statistical properties of two-dimensional hyperbolic billiards, Russ. A Collection of papers. World Scientific, ix, p. Collection of papers , Advanced Series in Nonlinear Dynamics, 2. Sinai, Space-time chaos in chains of weakly interacting hyperbolic mappings, Adv. AMS, , pp]. Sinai, Poisson distribution in a geometric problem, Adv. World Scientific Publishing Co. Chernov, Ergodic properties of certain systems of two-dimensional discs and three-dimensional balls, Advanced Series in Nonlinear Dynamics, 1, â€" [Dynamical systems. Chernov, Entropy of a gas of hard spheres with respect to the group of space-time translations, Advanced Series in Nonlinear Dynamics, 1, â€" [Dynamical systems. Khanin, Feigenbaum universality and the thermodynamic formalism, Advanced Series in Nonlinear Dynamics, 1, â€" [Dynamical systems. Khanin, Smoothness of conjugacies of diffeomorphisms of the circle with rotations, Advanced Series in Nonlinear Dynamics, 1, â€" [Dynamical systems. Sinai, Some new results on first order phase transitions in lattice gas models, Advanced Series in Nonlinear Dynamics, 2, [Mathematical problems of statistical mechanics. I, Advanced Series in Nonlinear Dynamics, 2, [Mathematical problems of statistical mechanics. Continuation, Advanced Series in Nonlinear Dynamics, 2, [Mathematical problems of statistical mechanics. Sinai, Mathematical problems in the theory of quantum chaos, Lect. Springer, ix, pp, ISBN]. Sinai, Scaling behavior of random walks with topological constraints, In: New trends in probability and statistics. Sinai, Hyperbolic billards, Proc. Sinai, Ising models on the Lobachevsky plane, Commun. Sinai, Some mathematical problems in the theory of quantum chaos, Physica A 1 , [Erratum - Physica A ,]. Sinai, Mathematical problems in the theory of quantum chaos, In: Soviet-American perspectives on nonlinear science. American Institute of Physics, New York, Yakhot, Limiting probability distributions of a passive scalar in a random velocity field, Phys. Khanin, Smoothness of conjugacies of diffeomorphisms of the circle with rotations, Russ. Ergodic theory with applications to dynamical systems and statistical mechanics. MIAN, Statisticheskaya mekhanika i teoriya dinamicheskikh sistem. K letiyu so dnya rozhdeniya akad. Nikolaya Nikolaevicha Bogolyubova , [Ya. Sinai, Limit theorems for multiple trigonometric Weyl sums, Proc. Sinai, O nekotorykh rabotakh po ergodicheskoi teorii i matematicheskim problemam statisticheskoi mekhaniki na kafedre teorii veroyatnostei MGU, Teor. Khanin, Renormalization group method in the theory of dynamical systems, Int. B 2 2 , Sinai, Space-time chaos in the system of weakly interacting hyperbolic systems, J. Sinai, Spacetime chaos in coupled map lattices, Nonlinearity, 1 4 , , WoS: Sinai, The absence of the poisson distribution for spacings between quasi-energies in the quantum kicked-rotator model, Physica D 33 , Sinai, Dynamics of local equilibrium Gibbs distributions and Euler equations. The one-dimensional case, Selecta Math. Sinai, Contour models with interaction and their applications, Selecta Math. Sinai, On stable manifolds for class of two-dimensional diffeomorphisms, Lect. Springer, xi, pp, ISBN]. Sinai, Sergei Petrovich Novikov on his fiftieth birthday , Russ. Dobrynin, Zasedaniya seminara imeni I. Chernov, Ergodic properties of certain systems of two-dimensional discs and three-dimensional balls, Russ. Mathematical Physics Reviews, 6. Harwood Academic Publishers, Chur, Sinai, The renormalization group method in the theory of dynamical systems in Russian , Trudy soveshcheniya "Renormgruppa - 86", Dubna, 26â€"29 avg. Dubna, OIYaI, , s. Sinai, From dynamical systems to statistical mechanics and back, Physica A , Shchur, Novyi podkhod k postroeniyu nepodvizhnykh tochek renormgruppy v dinamicheskikh sistemakh, Izvestiya vysshikh uchebnykh zavedenii. Radiofizika, 29 9 , â€" [Ya. Shchur, A new approach to the construction of fixed points of the renormalization group in dynamical systems, Radiophysics and Quantum Electronics, 29 9 ,]. Sinai, Kurs teorii veroyatnostei. Izd-vo MGU, - s. Izd-vo MGU, , s. Fuks, Vladimir Abramovich Rokhlin nekrolog , Uspekhi mat. Fuks,

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Vladimir Abramovich Rokhlin obituary , Russ. Khanin, Feigenbaum universality and the thermodynamic formalism in Hungarian]. Soloveichik, Ergodic properties of a semi-infinite one-dimensional system of statistical mechanics, Commun. Sinai, On the stochasticity in relativistic cosmology, J. Sinai, O strukture spektra raznostnogo operatora Shryodingera s pochti periodicheskim potentsialom okolo levogo kraya, Funkts.

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3: Soshnikov : Gaussian Limit for Determinantal Random Point Fields

It is well known that for a standard Brownian motion (BM) {B(t), t â‰¥ 0} with values in R d, its convex hull V (t) = conv{B(s), s â‰¤ t} with probability 1 for each t > 0 contains 0 as an interior point. We also know that the winding number of a typical path of a two-dimensional BM is equal to.

A new class of probability limit theorems, A self-avoiding random walk, A survey of random processes with reinforcement, An asymptotic property of Gaussian processes. An asymptotic result for Brownian polymers, Angular asymptotics for multidimensional non-homogeneous random walks with asymptotically zero drifts, Markov Processes Relat. Asymptotic behavior of Brownian polymers, Probab. Ballistic behaviour for biased self-avoiding walks, Ballistic phase of self-interacting random walks, in: Conformal invariance of planar looperased random walks and uniform spanning trees, Criteria for stochastic processes II: Criteria for the recurrence or transience of stochastic processes Elements of the Random Walk, On the average of a random walk, On the scaling limit of planar selfavoiding walk, in: Fractal Geometry and Applications: On the speed of a planar random walk avoiding its past convex hull, Probabilistic analysis of directed polymers in a random environment: Theory and Examples, 4th ed. Random aggregation and random-walking center of mass, Random Polymer Models, Random Walks and Random Environments; Volume 1: Random walks that avoid their past convex hull, Rate of escape and central limit theorem for the supercritical Lamperti problem, Scaling limit of the prudent walk, A Brownian model with local time drift, Probab. Ergodic behaviour and almost-sure convergence. The asymptotic determinant of the discrete The escape probability for integrated Brownian motion with non-zero drift,

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4: Andrew Wade - Presentations

Comprehensive, self-contained exposition of classical probability theory and the theory of random processes Dwells on a number of modern topics, not addressed in most text-books Author Ya. G. Sinai is one of the world's leading probabilists and mathematical physicists A one-year course in.

Exit problems near hyperbolic equilibria and noisy heteroclinic networks Motivated by a simple model of sequential decision making, we study small random perturbations of a dynamical system in a neighborhood of a heteroclinic network, that is, a collection of hyperbolic equilibrium points and corresponding connecting trajectories. Based on a detailed study of the exit problem from a neighborhood of a hyperbolic equilibrium, we show that the probability of tracing any particular path in the network decays at most polynomially in the size of the noise and establish sharp asymptotics on the time required to complete these journeys. Using these results, we describe the metastable hierarchy that emerges on polynomially long timescales. Friday December 8, Local inhomogeneous circular law The density of eigenvalues of large random matrices typically converges to a deterministic limit as the dimension of the matrix tends to infinity. In the Hermitian case, the best known examples are the Wigner semicircle law for Wigner ensembles and the Marchenko-Pastur law for sample covariance matrices. The eigenvalue distribution of a matrix X with centered, independent entries converges to a limiting density supported on a disk. Although inhomogeneous in general, the density is uniform for identical variances. In this special case, the local circular law by Bourgade et al. In the general case, the density is obtained via solving a system of deterministic equations. In my talk, I explain how a detailed stability analysis of these equations yields the local inhomogeneous circular law in the bulk spectrum for a general variance profile of the entries of X. Among these properties, an important role is played by the statistics of the number of stationary points, which is expected to be relevant in determining the evolution of local dynamics within the landscape. The model is obtained adding to the a spherical p-spin Hamiltonian a term favoring configurations that are aligned to a given configuration on the sphere the signal , and reproduces the spiked-tensor model for a specific choice of parameters. I will describe the phase transitions that occur in the structure of the landscape when changing the signal-to-noise ratio, and provide some details on the calculation of the quenched complexity, that is performed using a replicated version of the Kac-Rice formula. Friday December 15, On the extreme and large-value landscape of the discrete Gaussian free field and friends I will discuss some new results concerning extreme and large values of the 2D discrete Gaussian free field and related processes. These include finer structural properties of its extremal landscape, scaling limits for its high but not extreme level sets and the asymptotic growth of the infinite volume pinned DGFF. Based on joint work some in progress with M. In Fyodorov and Bouchaud conjectured an exact formula for the density of the total mass of this GMC. In this talk we will give a rigorous proof of this formula. Our method is inspired by the technology developed by Kupiainen, Rhodes and Vargas to derive the DOZZ formula in the context of Liouville conformal field theory on the Riemann sphere. The novel ingredients are the study of the Liouville theory on Riemann surfaces with a boundary and the key observations that the negative moments of the total mass of GMC determine its law and are equal to one-point correlation functions of Liouville conformal field theory in the disk. Finally we will discuss applications in random matrix theory, asymptotics of the maximum of the GFF, and tail expansions of GMC. Click on the title to read the abstract. Friday February 10, Uniform large deviations principle for a general class of stochastic partial differential equations. As this phrase suggests, there is a strong connection between the probabilities of rare events and the time it takes those events to occur. The theory of large deviations was developed in the s by Varadhan, Freidlin, Wentzell and others to quantify both the decay rates of probabilities of rare events for finite-dimensional stochastic differential equations and the growth rates of the so-called exit times, the amount of time it takes for those events to occur. The exit time problems require the large deviations principles to be uniform with respect to initial conditions in bounded sets. Over the past few decades, researches have proven uniform large deviations principles for many examples of stochastic partial differential equations, but the methods tend to be equation specific and dependent on the chosen topology of the function space. In this talk, I demonstrate how to use a weak

convergence approach and the uniform Laplace principle to prove large deviations principles that are uniform with respect to initial conditions in bounded sets. This is a needed improvement over the previous formulations which only could be used to prove uniformity over compact sets. The method works for a large class of semilinear Banach-space-valued stochastic differential equations whose linear part generates a compact semigroup. It is conjectured that the limit theorems are universal, in the sense that they do not depend on the microscopic details of the model. However, the geometry and boundary conditions have an influence on the nature of limiting statistics. In this talk we will explore the situation in a half space. We will see how the limiting fluctuations depend on the distance to the boundary and the boundary condition, using the example of last passage percolation in a half-quadrant. It turns out that the algebraic structure behind the integrability of last passage percolation is also related to the stochastic six-vertex model in a half quadrant. Via scaling limits, this leads to a limit theorem for the current in ASEP when particles are confined to the positive integers. The rates of these processes are in general neither uniformly Lipschitz continuous nor bounded away from zero, obstructing the straightforward application of large deviation theory to this framework. We bypass these issues by respectively applying tools of Lyapunov stability theory and recent results on interacting particle systems. This way, we characterize a class of processes obeying a LDP in path space, and extend the latter to infinite time intervals through Wentzell-Freidlin W-F theory. Finally, we provide natural sufficient topological conditions on the network of reactions for the applicability of our LDP and W-F results. These conditions can be checked algorithmically. Friday February 24, Percolative properties of Brownian interlacements and its vacant set In this talk, I will give a brief introduction to Brownian interlacements, and investigate various percolative properties regarding this model. Roughly speaking, Brownian interlacements can be described as a certain Poissonian cloud of doubly-infinite continuous trajectories in the d-dimensional Euclidean space, d greater or equal to 3, with the intensity measure governed by a level parameter. We are interested in both the interlacement set, which is an enlargement "the sausages" of the union of the trace in the aforementioned cloud of trajectories, and the vacant set, which is the complement of the interlacement set. I will talk about the following results: We shall discuss properties of geodesics in this metric. Random coalescing geodesics have a range of nice properties. By showing that they are in some sense dense is the space of geodesics, we may extrapolate these properties to all infinite geodesics. This is joint work with Chris Hoffman. The result is sharp in the sense that it extends to all Sobolev spaces where the equation is well-posed in a reasonable sense. This is a probabilistic manifestation of the familiar competition between nonlinearity and dispersion: Joint work with Tadahiro Oh and Nikolai Tzvetkov. This is a Markov chain generated by a discrete non-divergence form operator. The result is based on the analysis of the percolation structure of the non-reversible environment and renormalization arguments. Joint work with N. Friday March 17,

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5: AMS eBooks: American Mathematical Society Translations: Series 2

Variance asymptotics and central limit theorems for generalized growth processes with applications to convex hulls and maximal points Schreiber, T. and Yukich, J. E., The Annals of Probability, The Annals of Probability,

Random walks in random environments Combinatorics and analysis in spatial probability, Eindhoven Poster: Limit theory for random spatial graph models for drainage networks and network evolution 26 November Some aspects of percolation Percolation theory has proved a challenging and fruitful subject for mathematicians and physicists over the last 50 years or so. Percolation is still fertile ground for interplay between mathematics and physics, including for example phase transitions, renormalization ideas, and conformal field theory. The basic bond percolation model declares each edge of an infinite lattice "open" with probability p otherwise it is "closed". Fundamental questions involve the existence and properties of any "infinite cluster" formed by open edges. In this talk I will give an overview of some of the central models and results in percolation theory, including classical results of Harris and Kesten and recent work of Lawler, Schramm, Werner and Smirnov on "conformal invariance". If such a random walk is spatially homogeneous, its position can be expressed as a sum of independent identically distributed random vectors, and these homogeneous random walks are well understood. The most subtle case is when the mean drift i. The assumption of spatial homogeneity, while simplifying the mathematical analysis, is not always realistic for applications. As soon as the spatial homogeneity assumption is relaxed, the situation becomes much more complicated: I will give an introduction to some results on non-homogeneous random walks with asymptotically zero mean-drift, that is, the magnitude of the drift at a point tends to 0 as the distance of that point from the origin tends to infinity. It turns out that this is the natural regime in which to look for important phase transitions in asymptotic behaviour. I will also discuss recent joint work with Iain MacPhee and Mikhail Menshikov Durham concerned with angular asymptotics, i. In this talk I will give a non-technical overview of some of the central models and results in percolation theory, including classical results of Harris and Kesten and recent work of Lawler, Schramm, Werner and Smirnov on "conformal invariance". A self-interacting random walk model for polymer chains Random walks are often used to model polymer molecules in solution. The classical selfavoiding walk model has some disadvantages. We introduce a new model that is a genuine stochastic process, in which the walk interacts with its previous path. The selfinteraction is mediated by the centre of mass of the previous trajectory. The model can be tuned to model polymers in extended or collapsed phases. In the extended phase, we present rigorous results on the scaling of the model. This is joint work with F. If such a random walk is spatially homogeneous, its position can be expressed as a sum of independent identically distributed random vectors. Such homogeneous random walks are classical and the literature devoted to their study extensive, particularly when the state-space is the d-dimensional integer lattice. Thus it is desirable to study non-homogeneous random walks. As soon as the spatial homogeneity assumption is relaxed, the situation becomes much more complicated. Even in the zero-drift case, a non-homogeneous random walk can behave completely differently to a zero-drift homogeneous random walk, and can be transient in two dimensions, for instance. Such potentially wild behaviour means that results for non-homogeneous random walks often have to be stated under rather restrictive conditions, and techniques from the study of homogeneous random walks are difficult to apply. I will give an introduction to some of the known results on non-homogeneous random walks with asymptotically zero mean-drift, that is, the magnitude of the drift at a point tends to 0 as the distance of that point from the origin tends to infinity. Limit theory for random spatial graph models for drainage networks and network evolution 10 February Strathclyde population modelling and epidemiology seminar Some probabilistic population models.

6: Ergodic Theory - I P Cornfeld, S V Fomin, Y G Sinai - HÃ¤ftad () | Bokus

Random convex hulls are the convex hulls of a set of N random points in a plane chosen according to some given distribution. The points may be chosen independently each from an.

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7: Publications and Invited Talks | Satya Majumdar

The fractional Brownian motion of index $0 G is a bounded convex domain that contains 0 at its boundary.

8: Random walk with barycentric self-interaction - CORE

Let X={X(t),tâˆˆ[0,1]} be a process on [0,1] and be the convex hull of its www.enganchecubano.com structure of the set ext(VX) of extreme points of VX is studied. For a Gaussian process X with stationary.

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