Speaker: Roberto Cominetti (PUC-Chile)

Title: Fixed-point Error Bounds for Mean-Payoff Markov Decision Processes

Abstract: We establish finite time error bounds for the classical Krasnoselski-Mann iteration
for computing fixed points of nonexpansive maps in general normed spaces. The bounds are
derived from recursive optimal transport estimates which are reinterpreted as a specific Markov
chain on $\mathbb{Z}^2$ and subsequently connected with classical estimates for the gambler's
ruin. The bounds are next extended to Krasnoselski-Mann iterations subject to stochastic
perturbations, which provide error bounds and complexity results for reinforcement learning
in mean-payoff Markov decision processes.

Based on joint work with: Mario Bravo, Matías Pavez-Signé, José Soto, and José Vaisman

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Speaker: Gonzalo Contador (UTFSM)

Title: Optimal methods for approximating and combining discrete p-values

Abstract: Combining dependent or discrete tests for a global hypothesis has a broad array of applications, but global p-value calculation is challenging. The methodology developed for the independent and continuous case tends to significantly inflate the type I error rate, leading to significant false discoveries in big data
analyses. This presentation provides a general test statistic based on the optimal transport map towards $G^{1}(U)$, where $U\sim$ Uniform[0,1] and G is a continuous CDF in a location-scale family with moments of order 2. Under mild conditions, the methods are shown to be asymptotically accurate (and computationally efficient, using moment-ratio matching and joint-distribution surrogating). We provide optimal transport bounds on the approximation quality that, along with canonical statistical power criteria, guide the choice of G for a specific contrast.

Speaker: Alexander Drewitz (Univ. zu Köln)

Title: (Near-)critical behavior of a strongly correlated percolation model

Abstract: For (near-)critical independent Bernoulli percolation, particularly profound results have been obtained in the high-dimensional setting as well as on planar lattices. We consider a strongly correlated percolation model — the level sets of the metric graph Gaussian free field — where significant understanding has also been developed regarding its (near-)critical behavior in intermediate dimensions. We will explain the origin of the model's integrability, and discuss its implications for the associated universality class. A particular focus will be on recent results for the critical exponents associated to the volume of critical connected components.

Speaker: Nicolás Frevenza (UDELAR)

Title: Some equations on random geometric graphs

Abstract: In this talk, we will explore the probabilistic representation of certain nonlinear partial differential equations (PDEs) and analyze how these representations contribute to understanding of the PDEs in a discrete setting. Specifically, we will focus on the case where the environment is a random geometric graph. We examine the conditions under which this representation successfully recovers the PDE in the limit.

Speaker: Manuel González-Navarrete (Universidad de la Frontera)

Title: On the asymptotic characterization of discrete-time reinforced processes.

Abstract: In this talk, we will study some sequences of strongly dependent random variables. In particular, we prove convergence results such as the law of large numbers, the law of the iterated logarithm, and functional and almost sure versions of the central limit theorem. We also analyze the instances in which the sequences are in equilibrium. The main technique used is based on the martingale approach.
Based on joint works with: Víctor Vázquez-Guevara, BUAP, Mexico; Rodrigo Lambert, UFMT, Brazil and Kerlyns Martinez, UdeC, Chile.

Speaker: Roberto Imbuzeiro Oliveira (IMPA)

Title: Geometric planted matchings

Abstract: Take a point cloud of n i.i.d. random vectors from a distribution P over R^d, add i.i.d. noise from some distribution Q to each point, and forget the labels of all points. To what extent can one match each point in the original point cloud to its noisy version? The case where P and Q are isotropic Gaussians was studied by Kunitsky and Niles-Weed. In this paper, we obtain results for a number of other distributions. In particular, when the dimension d, P and Q are fixed, and n diverges, we find matching upper and lower bounds on the number of mistakes made by the optimal strategy. We also obtain results on higher-dimensional settings. One important technical tool for the lower bounds is to relate this problem to matchings in a random geometric graph built on the original data cloud. The talk is based on arXiv:2403.17469, which is joint work with Lucas Schwengber (PhD student at UC Berkeley).

Speaker: Milton Jara (IMPA)

Title: Sharp convergence of the stochastic Curie-Weiss model.

Abstract: As a way to analyze the dependence of mixing properties of Markov chains on their initial conditions, we introduce the formalism of **sharp convergence**, which is borrowed from Varadhan's formulation of large deviations principles. We apply this formalism to describe the convergence to its invariant measure of the Glauber dynamics associated with the Curie-Weiss measure on the supercritical phase. In particular we refine and generalize results of Levin, Luczak and Peres about the mixing time of the dynamics and we compute how much the speed is improved by initiating the dynamics at the right density.

Joint work with Freddy Hernández, Universidad Nacional de Colombia, Bogotá

Speaker: Claudio Landim (IMPA)

Title: Fluctuation in Glauber-Kawasaki dynamics

Abstract: We find a scaling limit of the space-time mass
fluctuation field of Glauber + Kawasaki particle dynamics around its

hydrodynamic mean curvature interface limit. Here, the Glauber rates are scaled by $K=K_N$, the Kawasaki rates by N^2 and space by $1/N$.

We identify the fluctuation limit as a Gaussian field when $K_N\uparrow \infty$ in $d\leq 2$. In the one dimensional case, the field limit is given by $e (v_1) B_t$ where B_t is a Brownian motion and e is the normalized derivative of a decreasing `standing wave' solution ϕ of $\partial^2_{v_1} \phi - V'(\phi)=0$ on R, where V' is the homogenization of the Glauber rates. In two dimensions, the limit is $e(v_1)Z_t(v_2)$ where Z_t is the solution of a one dimensional stochastic heat equation.

Speaker: Renato Soares dos Santos (Universidade Federal de Minas Gerais)

Title: Weakly self-avoiding random walk in a random potential

Abstract: We consider a model of a simple random walk influenced by two competing types of interaction: an attractive one towards high values of a random potential, and a self-repellent one measured by its self-intersections (in the spirit of the weakly self-avoiding random walk). We identify the log asymptotics of the partition function of the model and also the typical path behaviour giving the main contribution. The latter comes out of a variational formula and shows concentration on a random finite number of points, each occupied for a positive fraction of time. Joint work with Wolfgang König, Nicolas Pétrélis and Willem van Zuijlen.

Speaker: Maria Eulalia Vares (Universidade Federal do Rio de Janeiro)

Title: Contact process on interchange process

Abstract: I will discuss the behavior of the following model for epidemics on the d-dimensional integer lattice: Particles perform a nearest neighbor stirring process with jump rate v. During their motion, infected particles may transmit the infection to a neighboring particle or may recover, similarly to a Harris contact process. We thus have, besides v, two important parameters: the transmission rate and the density of particles p (assumed to be distributed as the Bernoulli product measure). We investigate survival or extinction of the infection in terms of v and p, both in the limit when v tends to infinity or to zero.

This is part of a joint work with Marcelo Hilário (UFMG), Daniel Ungaretti (UFRJ) and Daniel Valesin (Warwick)