UNIVERSITÄT BIELEFELD

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Stochastic Geometry Beyond Independence and its Applications

The classical paradigm of randomness is the model of independent and identically distributed (i.i.d.) random variables, and venturing beyond i.i.d. is often considered a challenge to be overcome.
In this talk, we will explore a different perspective, wherein stochastic systems with constraints in fact aid in understanding fundamental problems. Our constrained systems are well-motivated from statistical physics, including models like the random critical points and determinantal probability measures.
These will be used to shed important light on natural questions of relevance in understanding data, including problems of likelihood maximization and dimensionality reduction. En route, we will explore connections to spiked random matrix models and novel asymptotics for the fluctuations of spectrally constrained random systems. Based on the joint works below.

[1] Gaussian determinantal processes: A new model for directionality in data, with P. Rigollet, Proceedings of the National Academy of Sciences, vol. 117, no. 24 (2020), pp. 13207--13213
[2] Fluctuation and Entropy in Spectrally Constrained random fields, with K. Adhikari, J.L. Lebowitz, Communications in Math. Physics, 386, 749–780 (2021).
[3] Maximum Likelihood under constraints: Degeneracies and Random Critical Points, with S. Chaudhuri, U. Gangopadhyay, submitted.

Wednesday, 13 July 2022,
09:00 via Zoom
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