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COLLOQUIUM DI DIPARTIMENTO

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Connecting and projecting random points: a gate to novel functional estimates

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Abstract

I will formulate two simple models of stochastic geometry: the first one involves the projection of a random Gaussian point on a closed convex cone, and the second one consists in the construction of a random graph on the plane. For each of them, I will explain how the fluctuations of several key quantities can be controlled by using functional inequalities, like Poincaré, logarithmic Sobolev and information/transport estimates. The resulting bounds will allow us to present a number of quantitative results that are part of a growing body of literature focussing on probabilistic approximations via variational techniques, that have been successfully applied to fields as diverse as compressed sensing, the geometry of random fields on homogeneous spaces, polymer models, computer sciences and time series analysis. The presentation will be adapted to a general mathematical audience, and is based on a large number of contributions by many authors, spread over almost a decade.

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