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Busemann Functions and Equilibrium Measures in Last Passage Percolation

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The interplay between two-dimensional percolation growth models and one-dimensional particle processes has always been a fruitful source of interesting mathematical phenomena. In this talk we will describe a connection between the construction of Busemann functions in the Hammersley last-passage percolation model with i.i.d. random weights, and the existence, ergodicity and uniqueness of equilibrium measures for the related (multi-class) interacting particle process.

As we shall see, in the classical Hammersley model where each point has weight one, this approach brings a new and rather geometrical solution of the longest increasing subsequence problem, as well as a detailed description of the scaling behavior of the Busemann function along different directions.

A precise description of the equilibrium measure for a case other than constant weights is not known. However, we will indicate how for example strong mixing properties of this measure would lead to a proof of cube-root behavior of the length of the longest path.

This is joint work with Leandro Pimentel.