

Departmental Colloquium

TBA

Maya Banks and Félix Lequen (UIC)

Abstract:

2nd speaker: Felix Lequen

Title: Bourgain's construction of finitely supported measures with regular Furstenberg measure

Abstract: In this talk, I will explain how to study the regularity of a very natural object in random dynamics called the Furstenberg measure. I will first try to explain how this problem relates to natural fractal-like structures we find in dynamics in general, and why it is interesting and very rich in its own right, using the case of Bernoulli convolutions. These can be seen as measure generalizations of the usual middle-third Cantor set, in particular when there are overlaps. In this context Erdős observed in the 30s that there are some non-trivial phenomena, for instance with a number-theoretic flavour.

I will then move on to the random iterations of matrices, that is a random walk on matrices, focusing on the case of $SL(2, \mathbb{R})$, where the Furstenberg measure alluded to above contains much of the interesting asymptotic information. It had been

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conjectured that for a finitely supported random walk on matrices, the Furstenberg measure is never absolutely continuous with respect to the Lebesgue measure. Following a construction of Bourgain, I will show how to construct examples where the Furstenberg measure is absolutely continuous and its density has high regularity. This construction relies essentially on a spectral gap property due to Boutonnet-Ioanna-Salehi-Golsefidy that I will introduce.

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