

Random walks and random media

**ECTS** : 6

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**Description du contenu de l'enseignement :**

- **Random walks in random environment** are random processes obtained after launching a Markovian walker on  $\mathbb{Z}^d$  equipped with a random field of transition probabilities. We will review classical results (recurrence / transience, LLN, Sinai regime, Kesten Kozlov Spitzer regime) in dimension  $d=1$  where the behaviour of the walk is well understood but also study the difficult multidimensional case  $d \geq 2$  where even simple questions (as LLN) remains open.
- **Potential theory and electrical networks**: the analogy with electrical networks gives a physical insight as well as a robust method for proving recurrence or transience of reversible random walks on the Euclidean lattice or more general graphs.
- **Random interlacement**, introduced by Sznitman in the early 2010, may be seen as a « soup » of random walk paths. It plays an decisive role both as a limit object for many random walk models and also as a tractable long range correlated random field.

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