M2 Internship

Laboratoire de Physique de l'ENS (LPENS)
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Internship location: Ecole Normale Superieure PARIS
Funding: YES

Random surfaces and models of Earthquakes

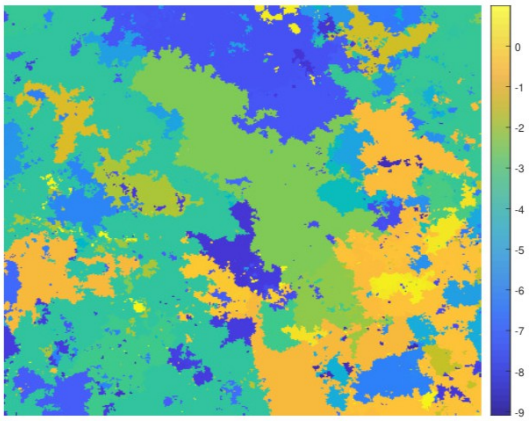
Recent studies on models of Earthquakes (EQ) have identified a connection between properties of earthquakes and random walks [1].
More precisely, in 1 dimensional models, earthquakes develop along a line and their properties depend on the value of the stress which can be modelled as a random walk. In nature, a 2 dimensional geometry is more pertinent to describe faults where earthquake occurs. The stress as a function of position is then a random surface.

This random surface evolves by the successive modifications due to each earthquake. This amounts to the problem of deposition of objects of varying size (the objects are the analogous of the effect of each event on the stress seen as a random surface).

During this internship, we want to investigate the statistical properties of this random deposition process. How do the surface properties evolve in time ? Is there an statistically stationnary regime at long time ?

This will be achieved by numerical simulations of the process and data analysis of the obtained results.
If the candidate is interested, it is also possible to perform analytical calculations using methods of probability theory. Collaborations or discussions with mathematicians are possible.

Illustration : Example of the stress field in a 2D model of earthquakes. Statistical properties of the unstable domaines are largely unknown.



[1] Earthquake magnitude distribution and aftershocks: A statistical geometry explanation
F. Pétrélis, K. Chanard, A. Schubnel, T. Hatano, Physical Review E 107, 034132 (2023)