Stochastic modelling of thermal effects in a cristal

Subject

In nano electronic, magnetic effects are of prime importance for ferromagnetic components. In oder to model these effects, the micromagnetism theory, introduced by W.-F. Brown during 30', is nowadays actively exploited [1,2]. Nevertheless, the heat effects remain a mostly misunderstood phenomenon. To understand this important phenomenon whose impact can be as strong as the local vanishing of magnetic properties, the ideal tool is stochastic modelling. In this context, a first study has been carried out, both theoretically and numerically, for an isolated magnetic spin modelling the behavior of a single atom [3,4]. The goal of this internship is to continue this project for a net of particles by relying on the studies performed in a deterministic framework [5] for controllability of magnetic state of a finite set of magnetic spins.

On the one hand, the internship will include a theoretical part highly based on the notion of Stochastic Differential Equations. We will be interested in the long time behavior of a stochastic dynamic system defined as coupled stochastic differential equations. On the other hand, a software will be developed in Python to infer and illustrate the theoretical results. The work started during this internship should naturally lead to a PhD research.

Framework

The internship will take place in Laboratoire Jean Kuntzmann.

Contacts

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Bibliography

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