

Scientific report on short visit grant RGLIS 4855

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Purpose of the visit. The visit aimed at a collaboration with V. Sidoravicius and at sharing ideas with other researchers at MSRI.

Description of the work carried out during the visit. We mainly investigated the model of a greedy random walk cleaning a Poisson point process and close variants of it. We also worked and had interesting discussions involving in particular Steffen Rhode on once reinforced random walks.

Description of the main results obtained. In the aim of getting a better understanding of the two-dimensional Poisson cleaning process (sometimes called greedy random walk on a Poisson point process, or tourist walk) we considered the case of a strip, which turned out to already display an intricate behavior, challenging but still apparently within reach. We could start to understand the mechanism that leads us to conjecture recurrence of the process; we did so by means of a one-dimensional simplified (but possibly more general in some ways) setup that still displays that same mechanisms. The scheme involves interesting and unexpected “discrete scale invariances” that suggest a sharper result than mere recurrence. Due to lack of time, details of the proof are still under way but we are confident and they shall be our main focus in the moments to come. Concerning the other on-going project on reinforced random walks, our work this time mainly concerned a high dimensional setting, in the light of results about loop-erased random walks; progress was slow and we didn't get a formal result yet but we will keep working on this difficult subject.

Future collaboration with host institution. We are planning to continue the collaboration in Paris in July 2012. We will also be attending a few conferences in common (in Modena, Istanbul, Oberwolfach) which will provide opportunities to meet again regularly and allow the main project to be hopefully completed in a short term.

Projected publication/articles resulting or to result from your grant. The preliminary results obtained on our main project should soon enable us to start writing a joint publication. Our secondary project is still in too early stages to plan a publication but we certainly hope to have it give matter for other articles in a near future as well.