Schedule (tentative)

Probability And Representation Theory in Edinburgh (PARTE)

26-28 February 2014

Wednesday 26

- 9-9.30 Welcome and introduction
- 9.30 - 10.10 V. Feray Talk 1
- 10.15 - 10.55 P. Biane Talk 1
- 11-11.30 Coffee break
- 11.30 - 12.10 V. Feray Talk 2
- 12.15-12.30 Discuss plans for afternoon, identify areas that people want to pursue and/or learn more about, split into smaller groups, with each group lead by a subset of the speakers and organisers. Some of these groups might hold informal tutorials, others can have exploratory discussions, or even problem solving activities (although more likely this would be for later sessions).

- 2-3.15 Group sessions
- 3.15-3.30 Groups briefly report on progress, restructuring groups as appropriate
- 3.30-4 Tea break
- 4-5 Group sessions

Thursday 27

- 9.30 - 10.10 P. Biane Talk 2
- 10.15 - 10.55 N. Berestycki Talk 1
- 11-11.30 Coffee break
- 11.30 - 12.10 N. Berestycki Talk 2
- 12.15-12.30 Discuss plans for afternoon, split into smaller groups.

- 2-3.15 Group sessions
- 3.15-3.30 Groups briefly report on progress, restructuring groups as appropriate
- 3.30-4 Tea break
- 4-5 Group sessions

Friday 28

- 9.30 - 10.10 P. Biane Talk 3
- 10.15 - 10.55 N. Berestycki Talk 3
- 11-11.30 Coffee break
- 11.30 - 12.10 V. Feray Talk 3
- 12.15-12.30 Open discussion

Titles and abstract of the three minicourses

Introduction to mixing times of random walks (Nathanael Berestyck):

How many times must a deck of cards be shuffled so that its distribution is "approximately random"?

After explaining how to formalise this question, I will introduce the cutoff phenomenon, discovered by Diaconis and Shahshahani and by Aldous in the early eighties. Roughly speaking this says that there is a sudden transition between a phase where the deck is "far from random" and one where it is "almost perfectly random". I will discuss a few techniques that have been useful in this area, coming from relatively different directions: probabilistic ideas, analytic and geometric tools, and representation theory. No prior notions of probability or analysis will be assumed.

Random walks on noncommutative spaces, Pitman theorem and representation theory (Philippe Biane):

I will survey the theory of random walks on noncommutative spaces, and show how they lead naturally to extensions of the theorem of Pitman, via the Littelmann path model.

Large Young diagrams under Plancherel measure (Valentin Féray):

Representation theory of finite groups yields a probability measure, called Plancherel's measure, on irreducible representations of a given finite group : just take $P(V) = dim(V)^2/|G|$. If we consider an increasing sequence of groups G_n, then it is natural to wonder what a random representation looks like ? In particular, what is the asymptotic behavior of the character of a random irreducible representation of G_n on a fixed element of G_k ?

In this mini-course, I would like to present the ideas developed by Kerov, Ivanov and Olshanski to answer this question in the case of symmetric groups. In this setting, using the method of moments and combinatorial arguments, they proved the Gaussian fluctuations of characters. Using Stein method and a construction of J. Fulman, one can also obtain some bound on the speed of convergence. Finally, we shall see how one can deduce from these results on characters, some results on the "shape" of the Young diagrams indexing the representations.