

Berlin Leipzig Seminar

Analysis/probability theory

Second Meeting Summer Term 2008

Organized by the DFG Research Group *Analysis and Stochastics in Complex Physical Systems*

DATE: Friday, 20 June 2008

VENUE: Technical University Berlin, Institute for Mathematics, Str. des 17. Juni 136, 10623 Berlin, Room MA313/314

PROGRAMME:

9:40–10:30: **Enzo Olivieri (Università Roma Due ‘Tor Vergata’)**

Escape from metastability for conservative dynamics at low temperature

Abstract: After an elementary general introduction to the subject, we describe the difficulties arising in the context of the microscopic Kawasaki dynamics. Then we try to give some ideas that should lead to the solution of the various problems.

10:40–11:30: **Valentin A. Zagrebnov (Université de la Méditerranée and Centre de Physique Théorique Marseille)**

Bose-Einstein condensation in external potentials

Abstract: Bose-Einstein condensation (BEC) of the free boson gas was predicted in 1925 and rehabilitated only in 1938 by F. London, who was motivated by superfluidity of the liquid Helium-4. BEC is a subtle collective quantum phenomenon which can be mathematically expressed as formation of a coherent state (vector) in the boson Fock space. Recent mathematical studies showed that the structure of the BEC may be more complicated (generalized BEC à la van den Berg-Lewis-Pulé or a dynamical condensation) than the one predicted in 1925. This concerns the free Bose gas, as well as the systems with particle interactions or embedded in external potentials, like in the recent experiments with bosons in traps (Nobel Prize 2001) and an important progress in the mathematical description of these systems by Lieb-Seiringer-Solovej-Yngvason. In spite of that the BEC is still a challenging problem of Mathematical Physics. In my lecture I am going to discuss mathematical problems related to only one particular question: how can BEC be modified by external potentials? I give a review of some cases in which one can prove that it survives (and even amplifies), including the cases of traps, random potentials and magnetic/electric fields.

11:40–12:30: **Joe Pule (University College Dublin)**

Long cycles and Bose-Einstein condensation in the infinite-range-hopping Bose-Hubbard model

Abstract: We study the relation between long cycles and Bose-Condensation in the ‘Infinite range Bose-Hubbard model with a hard core’. We calculate the density of particles on long cycles in the thermodynamic limit and find that the existence of a non-zero long cycle density coincides with the occurrence of Bose-Einstein condensation but this density is not equal to that of the Bose condensate. We give some partial results for the ‘Infinite range Bose-Hubbard model without a hard core’.

Everybody is welcome to attend.

Wolfgang König, University of Leipzig