Spectra of Random Operators and Related Topics

Main Session (supported by RIMS)

- January 8-9, 2015
- Room 111, Research Institute for Mathematical Sciences, Kyoto University

Seminar (voluntary)

- January 10, 2015
- Room 226, Graduate School of Human and Environmenetal Studies Bldg., Kyoto University

Organized by: Naomasa Ueki (Kyoto University)
Fumihiko Nakano (Gakushuin University)
Nariyuki Minami (Keio University)
Contact to: Nariyuki Minami, minami@a5.keio.jp

Program

Main Session
January 8

9:00-9:10 Opening address

9:10-9:50 Fumihiko Nakano (Gakushuin University)
Poisson limit theorem for some one dimensional random Schrödinger operators

10:00–10:40 Ryoki Fukushima (Kyoto University)
Homogenization and fluctuation for eigenvalues of lattice Anderson Hamiltonians

11:00–11:40 Andrei Giniatoulline (Los Andes University)
On the spectral properties of operators describing normal oscillations in 3-dimensional rotating stratified fluid

11:30–13:30 lunch break

13:30–14:10 Qinghui Liu (Beijing Institute of Technology)
On the Hausdorff dimension of the spectrum of Thue-Morse Hamiltonian

14:20–15:00 Yanhui Qu (Tsinghua University)
The spectral properties of strongly coupled Sturm Hamiltonian of constant type

15:20–16:00 Shin'ichi Kotani (Kwansei Gakuin University)
Transformation of Herglotz functions and KdV equation

16:10–16:50 Takuya Mine (Kyoto Institute of Technology)
On the Schrödinger operators with random δ magnetic fields

January 9

9:10–9:50 Tomi Ohtsuki
Density of states and conductance in topological insulator nanofilms

10:00–10:40 Yoshiki Ueoka (Osaka University)
Critical exponent of the localization length for the Anderson transition and corresponding methods

11:00–11:40 Tohru Koma (Gakushuin University)
Topological current in fractional Chern insulators

11:40–13:30 lunch break

13:30–14:10 Tomohiro Sasamoto (Tokyo Institute of Technology)
Analysis of the q-Hahn stochastic processes

14:20–15:00 Makoto Katori (Chuo University)
Elliptic determinant evaluations and diffusion processes

15:20–16:00 Sergio Andraus (University of Tokyo)
Relaxation of interacting particle systems using Dunkl operators

16:10–16:50 Takashi Imamura (Chiba University)
The O'Connell-Yor directed polymer and a deformed GUE weight

Seminar
January 10

9:10–9:50 Naomasa Ueki (Kyoto University)
Anderson localization in Gausian random magnetic fields

10:00–10:40 Nariyuki Minami (Keio University)
On a class of generalized Sturm-Liouville operators

10:50–11:30 Discussion

December 3, 2014

Abstracts

On the spectral properties of operators describing normal oscillations in 3-dimensional rotating stratified fluid (A. Giniatoulline)

We find the structure and localization of the essential spectrum and discrete spectrum of the operators generated by systems modeling the dynamics of rotating stratified fluid. For viscous fluid, the essential spectrum consists of three real points, which move to infinity if the viscosity parameter tends to zero.

However, for the inviscid fluid the essential spectrum contains the interval of the imaginary axis. We also mention the background and the motivation of the problem, as well as the conclusions, from the physical point of view.

Critical exponent of the localization length for the Anderson transition and corresponding methods (Y. Ueoka)

The Anderson transition is a quantum phase transition induced by the strength of disorder. Similarly to other continuous phase transitions, critical phenomena of the Anderson transition have been studied with scaling theory and renormalization group methods. One of the most important hypothesis in this field is universality. For the critical exponents describing behavior of physical quantity near the transition, it is believed to depend only on the fundamental properties of the system such as dimensionality and symmetry. Critical exponents has been estimated numerically, theoretically, and experimentally. But, the critical exponent for the localization length ν estimated numerically in Anderson model differ from theoretical estimates. In field theoretical approach, critical exponent as a function of the dimensionality was calculated to finite order as perturbation from two dimension. The value of the critical exponent was estimated by approximate resummation method so called Borel-Pad analysis about twenty years ago. We have improved Borel-Pad analysis to incorporate asymptotic behavior at infinite dimension for same series. It gives much better estimation compared with numerical result for the Anderson model. I will talk about further improvement of this method for other symmetry, especially the systems including spin-orbit coupling. I may show some numerical study for such system if possible.

References [1] Y. Ueoka, K. Slevin: J. Phys. Soc. Jpn. 83, 084711 (2014) [2] S. Hikami: Prog. Theor. Phys. Suppl. 107, 213 (1992) [3] F. Evers, A. D. Mirlin: Rev. Mod. Phys. 80, 1355 (2008)