

# Special Week Concentrated on IDAQP

September 7 ~ 10, 2016  
Chungbuk National University

## Intensive Courses (September 7 ~ 8)

Venue: Room 412, Building S1-1

- **Introduction to Quantum White Noise**  
(Nobuaki Obata: Tohoku University)

Quantum white noise theory provides a framework for the study of boson quantum fields, quantum stochastic processes as well as classical Gaussian processes. We overview the basic ideas and some of recent topics.

- **A Generalized Quantum Walks and Its Spectrum**  
(Etsuo Segawa: Tohoku University)

## Program

Date	Time	Lecturer	Title
September 7 (S1-1 412)	15:00 ~ 16:30	Nobuaki Obata	QWN
	16:30 ~ 18:00	Etsuo Segawa	GQWS
September 8 (S1-1 412)	15:00 ~ 16:30	Nobuaki Obata	QWN
	16:30 ~ 18:00	Etsuo Segawa	GQWS

## Mini-Workshop on IDAQP (September 9 ~ 10)

Venue: Room 435, Building S1-1

## ABSTRACTS

- **Nobuhiro Asai (Aichi University of Education): Radial density function associated to the Fock space of type B and Rogers-Szegö polynomials**

In the first part of my talk, we shall give a quick review of the paper [2] on the Fock space associated with Coxeter groups of type B. In the second part, we shall present recent results on the corresponding radial density function (Bargmann distribution) represented by the Rogers-Szegö polynomials [1].

### References

- [1] N. Asai, M. Bozejko, and T. Hasebe, Radial Bargmann representation for the Fock space of type B, *J. Math. Phys.* 57 (2016), 021702 (13 pages).
- [2] M. Bozejko, W. Ejsmont, and T. Hasebe, Fock space associated with Coxeter-groups of type B, *J. Funct. Anal.* 269 (2015), 1769-1795.

- **Ameur Dhahri (Chungbuk National University): Open quantum random walks and associated quantum Markov chains**

- **Jaeseong Heo (Hanyang University): Multiple recurrence, ergodic theory for actions of noncommutative groups**

- **Un Cig Ji (Chungbuk National University): Displacement operators and generalization of Cameron-Martin (Girsanov) theorem**

In this talk, we discuss the displacement operators within the framework of quantum white noise calculus. The displacement operators are characterized by implementation problems which are equivalent to linear differential equations associated with the quantum white noise derivatives for white noise operators. Then the displacement operators are applied to study a generalization of the Cameron-Martin (Girsanov) theorem. More precisely, we prove that the affine transform, with an isometric dilation and a regular drift, of a Brownian motion is again a Brownian motion with respect to a new probability measure which is derived explicitly in terms of the displacement operators. This talk is a series of joint works with Nobuaki Obata.

- **Sejong Kim (Chungbuk National University): An order inequality characterizing invariant and contractive barycenters**

On the typical example of Hadamard spaces, the open convex cone of positive definite matrices, we establish an order inequality of probability measures characterizing the Cartan barycenter among other invariant and contractive barycenters.

- **Norio Konno (Yokohama National University): Stationary and limit measures of quantum walks**

We consider stationary measures of discrete-time quantum walks in one dimension. Moreover we discuss a relation between stationary and limit measures of the quantum walks.

- **Nobuaki Obata (Tohoku University): Quadratic embedding of graphs**

Spectral theory of graphs is interesting for its wide applications. The distance matrix and its entry-wise exponential called Q-matrix are discussed as well as some open problems

- **Etsuo Segawa (Tohoku University): Quantum walks on half line relate to orthogonal polynomials**

- **Hyun Jae Yoo (Hankyong National University): Multi-dimensional Favard's theory**

In this talk we discuss multi-dimensional Favard's theory. Given a (probability) measure on the real line with all moments finite, the orthogonal polynomials satisfy the so called three-term recurrence relation. Favard's theorem addresses the reverse relation. That is, if a system of polynomials satisfy the three-term recurrence relation, the polynomials are orthogonal w.r.t. a linear functional. On the other hand, the three-term recurrence relation amounts to define a one mode interacting Fock space with creation, annihilation, and preservation operators (CAP operators). The aim is to extend this study to multi-dimensional spaces. We construct an interacting Fock space associated with a probability measure on a multi-dimensional Euclidean space. Now the CAP operators should satisfy some permutation relations. In this talk we focus our discussion for the construction of a probability measure from a priori given interacting Fock space with CAP operators satisfying afore mentioned commutation relations. The main ingredient is to use multi-dimensional spectral theorem, and this idea was developed by Xu. This is a joint work with Ameer Dhahri and Nobuaki Obata.

## Program

Date	Time	Speaker & Title
September 9	14:00~14:50	N. Obata: Quadratic embedding of graphs
	14:50~15:00	Coffee Break
	15:00~15:50	H. J. Yoo: Multi-dimensional Favard's theory
	15:50~16:00	Coffee Break
	16:00~16:50	N. Asai: Radial density function associated to the Fock space of type B and Rogers-Szegö polynomials
	16:50~17:00	Coffee Break
	17:00~17:50	S. Kim: An order inequality characterizing invariant and contractive barycenters
	18:00~	Dinner
September 10	10:00~10:50	N. Konno: Stationary and limit measures of quantum walks
	10:50~11:00	Coffee Break
	11:00~11:50	J. Heo: Multiple recurrence, ergodic theory for actions of noncommutative groups
	11:50~14:00	Lunch
	14:00~14:50	E. Segawa: Quantum walks on half line relate to orthogonal polynomials
	14:50~15:00	Coffee Break
	15:00~15:50	A. Dhahri: Open quantum random walks and associated quantum Markov chains
	15:50~16:00	Coffee Break
	16:00~16:50	U. C. Ji: Displacement operators and generalization of Cameron-Martin-Girsanov theorem
	18:00~	Dinner