RIMS 共同研究

Introductory Workshop on Feynman Path Integral and Microlocal Analysis

京都大学数理解析研究所の共同事業の一つとして、下記の共同研究を開催します。

研究代表者：熊ノ郷 直人（工学院大学）

副研究代表者：Byoung Soo Kim (Seoul National University of Science and Technology)

山崎 晋（日本大学）

千葉康生（東京工科大学）

日時: 2011 年 6 月 21 日（火) 10:00～6 月 24 日（金)17:00

場所:京都大学数理解析研究所（111 号室）

京都市左京区北白川追分町 市バス京大農学部前または北白川下車

6 月 21 日(火)

10:00～11:00　**一瀬　孝**（金沢大学）

Imaginary-time path integrals for three magnetic relativistic Schrödinger operators, Part 1

11:20～12:20　**Bong Jin Kim** (Daejin University)

A note on the integral transforms on function spaces, Part 1

14:00～15:00　**飛田　武幸**（名古屋大学）

White noise approach to Feynman path integrals, Part 1

15:20～16:20　**Kun Sik Ryu** (Hannam University)

Introduction to the analogue of Wiener measure space and its applications, Part 1

6 月 22 日（水）

10:00～11:00　**藤原　大輔**（学習院大学）

Stationary phase method for oscillatory integrals over a space of large dimension, Part 1

11:20～12:20　**Bong Jin Kim** (Daejin University)

A note on the integral transforms on function spaces, Part 2

14:00～15:00　**飛田　武幸**（名古屋大学）

White noise approach to Feynman path integrals, Part 2

15:20～16:20　**Kun Sik Ryu** (Hannam University)

Introduction to the analogue of Wiener measure space and its applications, Part 2

6 月 23 日(木)

10:00～11:00　**藤原 大輔**（学習院大学）

Stationary phase method for oscillatory integrals over a space of large dimension, Part 2

11:20～12:20　**Dong Hyun Cho** (Kyonggi University)

A survey of an analogue of conditional analytic Feynman integrals on a function space, Part 1

14:00～15:00　**Byoung Soo Kim** (Seoul National University of Science and Technology)

Introduction to Feynman's operational calculi for noncommuting operators, Part 1

15:20～16:20　**熊ノ郷　直人**（工学院大学）

Phase space Feynman path integrals by time slicing approximation, Part 1

6 月 24 日（金）

10:00～11:00　**一瀬　孝**（金沢大学）

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14:00～15:00　**Byoung Soo Kim** (Seoul National University of Science and Technology)

Introduction to Feynman's operational calculi for noncommuting operators, Part 2

15:20～16:20　**熊ノ郷　直人**（工学院大学）

Phase space Feynman path integrals by time slicing approximation, Part 2

本共同研究は、数理解析研究所および科学研究費基盤研究(C)21540196, (C)20540191 の援助を受けています。

Kun Sik Ryu,

"Introduction to the analogue of Wiener measure space and its applications"

In this lecture, we will introduce the definition of analogue of Wiener measure space and the motivation of it. We investigate various properties of it - integration formulae for some functionals on analogue of Wiener space, the relationship among the Bartle integral and the measure-valued measure on analogue of Wiener space, the relationship among the Dovrakov integral and the operator-valued measure on analogue of Wiener space, the simple formula for conditional expectation with respect to analogue of Wiener measure, the measure-valued Feynman-Kac formula and Volterra integral equation, including the basic calculation for it.

Contents;

1) Historical Background and Preliminies

2) The complex-valued analogue of Wiener measure

3) Fernique's Theorem and integration formula for some analogue of Wiener functionals

4) Translation Theorem and Paley-Wiener -Zygmund integral for analogue of Wiener measure

5) the relationship among the Bartle integral and the measure-valued measure on analogue of Wiener space

6)the relationship among the Dovrakov integral and the operator-valued measure on analogue of Wiener space

7) measure-valued Feynman-Kac formula

8) Volterra integral equation for the measure-valued Feynman-Kac formula.

Byoung Soo Kim,

"Introduction to Feynman's operational calculi for noncommuting operators"

Feynman's 1951 paper on the operational calculus for noncommuting operators arouse out of his ingenious work on quantum electrodynamics and was inspired in part by his earlier work on the Feynman path integral. Indeed, Feynman thought of his operational calculus as a kind of generalized path integral. Much surprisingly varied work on the subject has been done since by mathematicians and physicists. Recently Jefferies and Johnson developed mathematical rigorous approach to Feynman's operational calculi. In this talk we give definitions and properties of Feynman's operational calculi initiated by Jefferies and Johnson. In particular, extraction of a linear factor and measure permutation formula for Feynman's operational calculi will be given.

Dong Hyun Cho,

"A survey of an analogue of conditional analytic Feynman integrals on a function space"

In this lecture, we introduce two kinds of simple formulas for the conditional expectations on the analogue of Wiener space which is introduced by Ryu and Im. Using the simple formulas, we evaluate the conditional analytic Feynman integrals of various kinds of functions which are useful in Feynman integration theories itself and quantum mechanics. We then find a solution of an integral equation which is formally equivalent to the Schrödinger differential equation. We also provide a change of scale transformation using the simple formulas and prove that the operator-valued Feynman integral can expressed through the analogues of conditional analytic Feynman integrals on that space.