



# Meiji University Global COE Program 22<sup>th</sup> Mathematical Sciences based on



## Modeling, Analysis and Simulation seminar

Date : April 27, 2010, 16:30 ~ 18:00

Location : Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A207

**Takuya Machida** (Meiji Univ.)

**Title : The limit theorems for a time-dependent  
discrete-time quantum walk on the line**

**Abstract :** The quantum walks describes quantum versions of classical random walks. Relating with computer science, quantum walks are investigated as quantum search algorithms. The quantum search algorithms, e.g. Grover's algorithm, expressed by quantum walks are expected more exponentially faster than their classical counterparts. We study time-dependent discrete-time quantum walks on the one-dimensional lattice. By using the Fourier analysis, we can compute the limit distribution of a two-period quantum walk defined by two orthogonal matrices or special unitary matrices. For the symmetric case, the distribution is determined by one of two matrices. Moreover, we consider two special cases and present limit theorems. In this case, the probability distribution becomes a one-period (usual) quantum walks.

Everyone is welcome to attend the MAS seminar.

Meiji institute for Advanced Study of Mathematical Science (<http://www.mims.meiji.ac.jp>)

(Organizers: M. Mimura, D. Ueyama, Y. Wakano, K. Ikeda and S. Kinoshita)

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(<http://gcoe.mims.meiji.ac.jp/>), the Grant-in-Aid for Scientific Research (S), "Mathematical Theory of Nonlinear-Non-equilibrium Reaction-Diffusion Systems" by M. Mimura

(<http://nnrds.math.meiji.ac.jp/>).



Access: 10 minutes on foot from Ikuta St. Odakyu line,  
Or 10 minutes by bus No. 13「明治大学正門前」, get off at the last stop.  
See [http://www.meiji.ac.jp/koho/campus\\_guide/](http://www.meiji.ac.jp/koho/campus_guide/) for details.