

# A3 foresight winter school on “Mathematics on Materials Science: Topological Data Analysis and Dynamics”

Date: February 15 and 16, 2016

Venue: Seminar room (2F), AIMR main building, Tohoku Univ., Sendai, Japan

— 2/15 (Mon) —

10:00 - 11:30 Yasuaki Hiraoka

Introduction on Topological data analysis

12:00 - 13:00 Lunch

14:00 - 15:30 Ippei Obayashi

T.B.A

16:00 - 17:30 Edgar Avalos

Frustrated phases under three-dimensional confinement simulated by a set of coupled Cahn-Hilliard equations

18:30 - 20:30 Banquet

— 2/16 (Tue) —

10:00 - 11:30 Emerson Escolar

Introduction to representation theory for topological data analysis

12:00 - 13:00 Lunch

14:00 - 15:30 Miro Kramar

Applications of topological data analysis

16:00 - 17:30 Yasumasa. Nishiura

Pattern dynamics in heterogeneous media

18:30 -20:30 Dinner

Organizer: Y. Hiraoka, Y. Nishiura, I. Obayashi (WPI-AIMR, Tohoku univ.)

Support: A3 foresight

Access to AIMR:

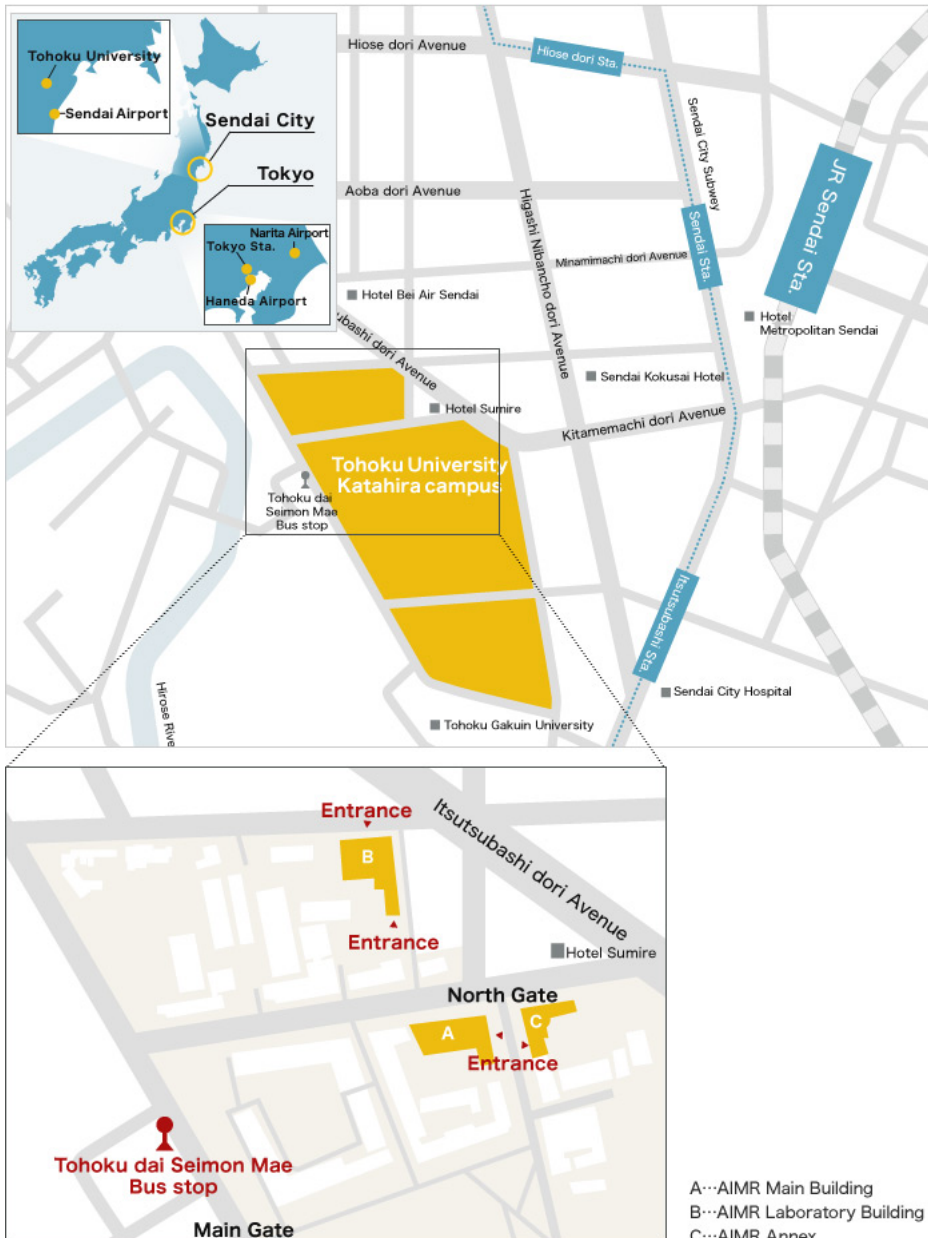
<http://www.wpi-aimr.tohoku.ac.jp/en/about/access/>

For Chinese and Korean participants:

Hotel: Bel Air Sendai (5 minutes walk from AIMR)

The location is displayed in the map below

Banquet and dinners are prepared in the hotel.



# Workshop on Random and Statistical Topology

Date: 2016 February 17, 18, 19

Venue: Seminar room (2F), AIMR main building, Tohoku Univ., Sendai, Japan

## — 2/17 (Wed) —

9:30-10:30 Matthew Kahle (Ohio State Univ.)

2-dimensional simplicial complexes with large homological systoles

10:40-11:40 Sayan Mukherjee (Duke Univ.)

Random walks on simplicial complexes and Cheeger inequalities

13:30-14:30 Yogeshwaran Dhandapani (Indian Statistical Institute)

Limit theorems for Betti numbers of the Boolean model

14:40-15:40 Yasu Hiraoka (Tohoku Univ.)

The lifetime sum and the Tutte polynomial in Linial-Meshulam random complexes

16:00-17:00 TBA

TBA

## — 2/18 (Thu) —

9:30-10:30 Takashi Owada (Technion-Israel Institute of Technology)

Limit theorems for the sum of persistence barcodes

10:40-11:40 Matthew Kahle (Ohio State Univ.)

Maximally persistent cycles in random geometric complexes

13:30-14:30 Genki Kusano (Tohoku Univ.)

Persistence weighted Gaussian kernel for topological data analysis

14:40-15:40 Ulrich Bauer (Technische Universität München)

Learning from persistence diagrams

16:00- Discussion

18:00- Banquet

## — 2/19 (Fri) —

9:30-10:30 Ryokichi Tanaka (Tohoku Univ.)

Numerical characteristics and statistical properties of Gromov hyperbolic groups

10:40-11:40 Yogeshwaran Dhandapani (Indian Statistical Institute)

Random d-Complexes - Minimal spanning acycles and Persistent diagrams

13:30-14:30 Daniel Packwood (Tohoku Univ.)

Markov Chain Monte Carlo with Equivalence Classes: Application to Molecular Self Assembly

14:40-15:40 Sayan Mukherjee (Duke Univ.)

Stochastic topology of distributions on manifolds

Support:

JST CREST TDA (Hiraoka), JSPS Kakenhi Wakate A (Hiraoka), A3 Foresight (Nishiura)

Organizers: K. Fukumizu (ISM), Y. Hiraoka (Tohoku), T. Shirai (Kyushu)

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