

# Workshop “Workshop on Applied Topology 2019”

Date: January 7-11, 2019

Place: Maskawa Building for Education and Research, Kyoto University, Japan

Access: <https://www.kyoto-u.ac.jp/en/access/north-campus-map.html>

## Program

### Monday, January 7

- 9:30 – 10:30 Mark Grant (University of Aberdeen) 1  
Topological Aspects of Robot Motion Planning 1
- 10:30 – 10:45 Coffee Break
- 10:45 – 11:45 Justin Michael Curry (SUNY Albany) 1  
Refining Persistence via Enriched Topological Summaries 1
- 11:45 – 13:30 Lunch Break
- 13:30 – 14:00 Dmitry Feichtner-Kozlov (University of Bremen)  
Computing Explicit Homology Classes Using Discrete Morse Theory
- 14:00 – 14:30 Jay Shah (University of Notre Dame)  
Algorithmic Canonical Stratifications of Simplicial Complexes
- 14:30 – 15:00 Coffee Break
- 15:00 – 15:30 Gard Spreemann (École Polytechnique Fédérale de Lausanne)  
Homological Clustering and Simplicial Convolutional Neural Networks
- 15:30 – 16:00 Jacek Brodzki (University of Southampton)  
Topological Analysis of the Chemical Space: Understanding Aqueous Solubility
- 16:00 – 16:30 Break
- 16:30 – 17:00 Yuuki Shimizu (Kyoto University)  
Point Vortex Dynamics on Minimal Surfaces
- 17:00 – 17:30 Michio Yoshiwaki (RIKEN AIP/Kyoto University/Osaka City University)  
On Interval Decomposability of 2D Persistence Modules

### Tuesday, January 8

- 9:30 – 10:30 Matthew Kahle (The Ohio State University) 1  
Configuration Spaces of Hard Disks in An Infinite Strip
- 10:30 – 10:45 Coffee Break
- 10:45 – 11:45 Takashi Sakajo (Kyoto University) 1  
Classification of 2D Hamiltonian Vector Fields and  
Topological Flow Data Analysis: Theory, Computation and Applications 1
- 11:45 – 13:30 Lunch Break
- 13:30 – 14:00 Arseniy Akopyan (IST Austria)  
Waists of Balls in Different Spaces
- 14:00 – 14:30 Emerson G. Escolar (Kyoto University)  
Every 1D Persistence Module is a Restriction of Some Indecomposable  
2D Persistence Module
- 14:30 – 15:00 Coffee Break
- 15:00 – 15:30 Kiyotaka Suzaki (Kyushu University)  
A limit theorem for persistence diagrams of random complexes built over  
marked point processes
- 15:30 – 16:00 Nicolas Berkouk (INRIA Saclay)  
A Derived Isometry Theorem for Constructible Sheaves on  $\mathbb{R}$
- 16:00 – 17:30 Poster Session

**Wednesday, January 9**

- 9:30 – 10:30 Peter Bubenik (University of Florida) 1  
Learning geometry using topology and persistence landscapes
- 10:30 – 10:45 Coffee Break
- 10:45 – 11:45 Mark Grant (University of Aberdeen) 2  
Topological Aspects of Robot Motion Planning 2
- 18:00 – 20:00 Banquet

**Thursday, January 10**

- 9:30 – 10:30 Justin Michael Curry (SUNY Albany) 2  
Refining Persistence via Enriched Topological Summaries 2
- 10:30 – 10:45 Coffee Break
- 10:45 – 11:45 Matthew Kahle (The Ohio State University) 2  
Cycles in Random Simplicial Complexes, Large and Small
- 11:45 – 13:30 Lunch Break
- 13:30 – 14:00 Ran Levi (University of Aberdeen)  
Synaptic plasticity through topological methods
- 14:00 – 14:30 Takaaki Nara (The University of Tokyo)  
Localization of The Neural Current Source in The Human Brain Based  
on a Mapping from a Sphere to the Cortical Surface
- 14:30 – 15:00 Coffee Break
- 15:00 – 15:30 Marian Mrozek (Jagiellonian University)  
Conley Complexes and Connection Matrices in Combinatorial Topological Dynamics
- 15:30 – 16:00 Mateusz Juda (Jagiellonian University)  
Helioseismic and Magnetic Imager Data Classification  
using Combinatorial Topological Dynamics
- 16:00 – 16:30 Break
- 16:30 – 17:00 Victoria Vedyushkina (Lomonosov Moscow State University)  
Integrable Billiards: Generalizations and Applications to Mechanics
- 17:00 – 17:30 Kelly Spendlove (Rutgers University)  
A Computational Framework for Connection Matrix Theory

**Friday, January 11**

- 9:30 – 10:30 Takashi Sakajo (Kyoto University) 2  
Classification of 2D Hamiltonian Vector Fields and  
Topological Flow Data Analysis: Theory, Computation and Applications 2
- 10:30 – 10:45 Coffee Break
- 10:45 – 11:45 Peter Bubenik (University of Florida) 2  
Algebraic distances for persistent homology

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Organizing committee:

Yasuaki Hiraoka (Kyoto University/Riken)  
Shizuo Kaji (Kyushu University)  
Hiroshi Kokubu (Kyoto University)  
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Local organizers:

Emerson Escolar (Kyoto University)  
Killian Meehan (Kyoto University)  
Fumiko Ogushi (Kyoto University)  
Michio Yoshiwaki (RIKEN AIP/Kyoto University/Osaka City University)

## List of poster talks

- PT-01 Henry Kirveslahti Sub-image analysis using topological summary statistics
- PT-02 Georg Osang Analyzing sphere packings with higher order persistence
- PT-03 Katharina Oelsboeck Manipulating hole systems
- PT-04 Sergey Avvakumov Convex fair partitions into arbitrary number of pieces
- PT-05 Woojin Kim Rank invariant for zigzag modules
- PT-06 Vladislav A. Kibkalo Fomenko-Zieschang invariants and topology of Kovalevskaya integrable systems
- PT-07 Irina Kharcheva Generalized integrable billiards and Fomenko conjecture.
- PT-08 Huy Mai Integral transforms with respect to the Euler characteristic integration
- PT-09 Jisu Kim Persistent homology of KDE filtration on Rips complex
- PT-10 Lacombe Théo Metrics for persistence diagrams: An optimal transport view
- PT-11 Dejan Govc Rips magnitude
- PT-12 Oliver Vipond Multiparameter persistence landscapes
- PT-13 Syed Mohamad Sadiq Bin Syed Musa Early warning signal for floods using persistent homology
- PT-14 Arturo Espinosa Baro Thoughts on sectional category and relative cohomology
- PT-15 Nur Fariha Syaquina Zulkepli Cluster analysis of haze episodes based on topological features
- PT-16 Fatimah Abdul Razak Persistent homology on malaysian data sets
- PT-17 Kang-Ju Lee Simplicial Kirchhoff index
- PT-18 Lewis Mead Large random simplicial complexes
- PT-19 Yu-Min Chung Persistence curves: A new vectorization of persistence diagrams
- PT-20 Yingying Wu Comparison theorems of phylogenetic spaces and algebraic fans
- PT-21 Akshay Goel Persistent homology of random Čech complexes on manifolds
- PT-22 Killian Meehan Auslander-Reiten graph distance as a bottleneck metric
- PT-23 Younng-Jin Kim Harmonic cycles and rational winding numbers
- PT-24 Tatsuya Mikami Percolation on homology generators in codimension one
- PT-25 Jose Gabriel Carrasquel Vera Sectional category á la Quillen
- PT-26 Zbigniew Błaszczuk Topological complexity and efficiency of motion planning algorithms
- PT-27 Teresa Heiss Streaming algorithm for Euler characteristic curves of multidimensional images