Frontiers in Non-equilibrium Physics 2024

Monday, July 1, 2024 - Friday, August 2, 2024

Scientific Program

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YKIS2024/DDAP13 July 1st (Mon.)-5th (Fri.)
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July 1st (Mon.)
Chair Hisao Hayakawa
13:25-13:30 Opening address
13:30-14:20 Sergej Flach "Many Body Thermalization Close to Integrability"
14:20-15:10 Naomichi Hatano "Non-Hermitian Quantum Mechanics: How we came up with the Hatano-Nelson model"
15:10-15:35 break

Chair Sergej Flach
15:35-16:00 Ken Imura "Wave-packet and entanglement dynamics in a non-Hermitian system"
16:00-16:25 Savannah Garmon "Weak-coupling bound states in semi-infinite topological waveguide QED"
16:25-17:15 Jiangbin Gong "Universal fluctuations in 2D Anderson localization"

July 2nd (Tue.)
Chair Naomichi Hatano
09:30-10:20 Kohei Kawabata "Symmetry classification of non-Hermitian random matrices and open quantum systems"
10:20-10:45 break

Chair Kohei Kawabata
10:45-11:10 Tingzhang Shi "Exact work distribution and the Jarzynski's equality of a relativistic particle in an expanding piston"
11:10-12:00 Kohei Nakajima "Chaos in reservoir computing"
Lunch

Chair Kazumasa Takeuchi
13:30-14:20 Susumu Goto "Dynamics of particles in turbulent flow"

Chair Tan Van Vu
14:20-15:10 Poster preview 1 (Odd numbers)
15:10-15:35 coffee break
15:35-17:30 Poster session 1 (Odd numbers)

July 3rd (Wed.)
Chair Susumu Goto
09:30-09:55 Sadhitro De† "Surprising aspects of Lagrangian dispersion in shock-dominated turbulence" (Online)
09:55-10:20 Yunyun Li "Clustering of quorum sensing colloidal particles"
10:20-10:45 break

Chair Haitao Quan
10:45-11:10 Youngkyoung Bae "Decoding the underdamped Langevin equation from trajectories via Bayesian neural networks"
11:10-12:00 Urna Basu "Activity driven energy transport"

Lunch

Chair Hiroshi Kori
13:30-14:20 Haitao Quan "Special Relativistic Covariant Fluctuation Theorems"
14:20-14:45 Kazumasa A. Takeuchi "Evaluating the instability and the inertial manifold dimension of space-time chaos from time series data"
14:45-15:10 Chikeung Chan "Detection of Anticipatory Dynamics Between a Pair of Zebrafish"
15:10-15:35 coffee break

Chair Urna Basu
15:35-16:00 Sibaram Ruidas† "Onset and growth of many-body chaos in a symmetry-broken phase" (Online)
16:00-16:25 Tomasz Kapitaniak "Chimera states for coupled pendula"
16:25-17:15 Hiroshi Kori "Synchronization and desynchronization in higher-order networks"

July 4th (Thu.)
Chair Jae Sung Lee
09:30-10:20 Kiyoshi Kanazawa "Statistical physics of the long-memory order flow in financial market microstructure"
10:20-10:45 break

Chair Pik-Yin Lai
10:45-11:10 Kazuya Fujimoto "Random matrix statistics in correlation dynamics of fermions"
11:10-12:00 Jae Sung Lee "Stochastic Differential Equation for a System Coupled to a Thermostatic Bath via an Arbitrary Interaction Hamiltonian"
Lunch

Chair Kuniyasu Saitoh
13:30-14:20 Pik-Yin Lai "Extreme value statistics and avalanches in moving contact line and solid friction"
14:20-15:10 Poster preview 2 (Even numbers)
15:10-15:35 coffee break
15:35-17:30 Poster session 2 (Even numbers)

July 5th (Fri.)
Chair Leihan Tang
09:30-09:55 Ling Feng "Asymptotic Edge of Chaos as Guiding Principle for Neural Network Training"
09:55-10:20 Fumito Mori "Inference theory for coupling direction between synchronized oscillators and its experimental verification"
10:20-10:45 break

Chair Kiyoshi Kanazawa
10:45-11:10 Yuki Ishiguro "Exact solutions in the multi-dimensional ASEP"
11:10-12:00 Leihan Tang "Emergence of Mattis-type order in annealed SK spin glass: exact results and simulations"
12:00-12:05 Closing remarks

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July 8th (Mon.) - 19th (Fri.): Stochastic Thermodynamics
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July 8th (Mon.) Chair Hisao Hayakawa
10:00-10:10 Opening address
10:10-11:00 Marti Perarnau-Llobet "Collective Advantages in Finite-Time Thermodynamics"
11:00-11:30 Yue Liu "Collective advantages in memory erasure: Beyond the Landauer principle"
11:30-12:00 Keiji Saito "Third-law like trade-off relation in stochastic thermodynamics"
Lunch
15:00-15:30 coffee break

July 9th (Tue.) Chair: Keiji Saito
09:30-10:20 Yoshihiko Hasegawa "Thermodynamic tradeoff relations in quantum systems"
10:20-11:10 Xhek Turkeshi "Error-resilient transitions in random circuits"
11:10-11:30 break
Chair: Yoshihiko Hasegawa
11:30-12:00 Tan Van Vu "Thermodynamics of fidelity in quantum gates"
Lunch
15:00-15:30 coffee break

July 10th (Wed.)
Chair: Andreas Dechant
09:30-10:20 Gentaro Watanabe "Fluctuations in small heat engines from quasi-static to finite-time regimes"
10:20-10:50 Victor Mukherjee "Collective effects enhanced quantum engines"
10:50-11:10 break
Chair: Xhek Turkeshi
11:10-12:00 John Goold "The thermodynamics of the quantum Mpemba effect"
Lunch
Chair: Tan Van Vu
13:40-15:00 Poster preview
15:00-15:30 coffee break
15:30-17:30 Poster session

July 11th (Thu.)
Chair: Marti Perarnau-Llobet
09:30-10:00 Takase Shimizu "Experimental verification of Landauer principle under a constraint of nonequilibrium initial state"
10:00-10:50 Andreas Dechant "Maxwell’s demon improves sensing out of equilibrium"
10:50-11:10 break
Chair: Gentaro Watanabe
11:10-12:00 Ken Funo "Dynamics of a quantum system interacting with non-Gaussian baths"
Lunch
15:00-15:30 coffee break
Chair: Hisao Hayakawa
15:30-16:00 Géraldine Haack† "Manipulating entanglement at exceptional points in dissipative quantum systems" (online)

July 12th (Fri.) Chair: John Goold
09:30-10:00 Paul Fabian Menczel "Unravelings of time-local quantum master equations"
10:00-10:50 Kay Brandner "Mesoscopic systems with weak memory: A mathematical framework beyond the Markov approximation"
10:50-11:10 break
Chair: Kay Brandner
11:10-11:40 Ken Mochizuki "Measurement-induced spectral transition"
11:40-12:10 Ludovico Tesser, "Out-of-Equilibrium Fluctuation-Dissipation Bounds"
Lunch

July 16th (Tue.) Chair: Haitao Quan
09:30-10:20 Massimiliano Gennaro Esposito "Nonequilibrium phase transitions: Energetics and macroscopic fluctuations"
10:20-11:10 Takahiro Sagawa "Thermodynamically optimal measurement and feedback in finite time"
11:10-11:30 break
Chair: Takahiro Sagawa
11:30-12:00 Haitao Quan "Hierarchical structure of fluctuation theorems for a driven system in contact with multiple heat reservoirs"
Lunch
15:00-15:30 coffee break

July 17th (Wed.)
Chair: Massimiliano Gennaro Esposito
09:30-10:20 Simone Pigolotti "Statistical physics of proliferating systems"
10:20-11:10 Anatoli Polkovnikov "Universal slow relaxation of weakly nonintegrable systems"
11:10-11:30 break
Chair: Simone Pigolotti
11:30-12:00 Shiling Liang "A Minimal Model for Carnot Efficiency at Maximum Power"
Lunch
Chair: Keiji Saito
13:40-15:00 Poster preview
15:00-15:30 coffee break
15:30-17:30 Poster session

July 18th (Thu.)
Chair: Hiroyasu Tajima
09:30-10:00 Kiyoshi Kanazawa "Stochastic thermodynamics for general non-Markovian processes"
10:00-10:50 Archak Purkayastha "Quantum transport and exceptional points of transfer matrix"
10:50-11:10 break
Chair: Kiyoshi Kanazawa
11:10-12:00 Sosuke Ito "Optimal transport and thermodynamics for the learning"
12:00-12:30 Daniel Maria Busiello "Tuning transduction from hidden observables to optimise information harvesting"
Lunch
15:00-15:30 coffee break

July 19th (Fri.)
Chair: Tan Van Vu
09:30-10:20 Iman Marvian "Energy-conserving quantum circuits, new conservation laws, and their implications for equilibration"
10:20-11:10 Hiroyasu Tajima "Coherence costs and effects in dynamics of thermodynamics"

11:10-11:30 break
Chair: Iman Marvian
11:30-12:20 Atsushi Noguchi "Quantum engine with superconducting qubits"
12:20-12:30 Closing remarks

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July 22nd (Mon.) - 26th (Fri.): Active Matter, Non-reciprocal transitions, and the Mpemba effect
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July 22nd (Mon.)
Chair: Hisao Hayakawa
09:55-10:00 Opening address
10:00-10:50 Shin-ichi Sasa "Non-equilibrium Phase Coexistence"
10:50-11:10 break
11:10-12:00 Zhiyue Lu "Geometry of Nonequilibrium Non-Stationary Processes"
Lunch
15:00-15:30 coffee break

July 23rd (Tue.)
Chair: Marija Vucelja
09:30-10:20 John Bechhoefer "Anomalous thermal relaxation in a colloidal system"
10:20-11:10 Andrés Santos "Unraveling the Mpemba and Kovacs effects using time-delayed Newton's cooling law"
11:10-11:30 break
Chair: Frederic van Wijland
11:30-12:20 Marija Vucelja "Anomalous thermal relaxations of physical systems"
Lunch
15:00-15:30 coffee break

July 24th (Wed.)
Chair: Filberto Ares
09:30-10:00 Hisao Hayakawa "Thermodynamics of Mpemba effect"
10:00-10:50 Amit Kumar Chatterjee "Quantum Mpemba effect: exceptional points and complex eigenvalues"
10:50-11:10 break
Chair: John Bechhoefer
11:10-12:00 Filberto Ares "Entanglement asymmetry and the quantum Mpemba effect"
Lunch
Chair Kazumasa Takeuchi
14:00-15:00 Poster preview
15:00-15:30 coffee break
15:30-17:30 Poster session

July 25th (Thu.)
Chair: Grzegorz Szamel
09:30-10:00 Ryo Hanai "Non-reciprocal frustration physics"
10:00-10:50 Tzer Han Tan "Odd dynamics in living chiral crystal"
10:50-11:10 break
Chair: Ryo Hanai
11:10-12:00 Jaime Agudo-Canalejo "Self-organisation through nonequilibrium catalytic activity"
Lunch

Chair: Andres Santos
13:40-14:30 Frédéric van Wijland "Accelerating sampling by irreversible methods"
14:30-15:00 Masaki Sano "Integer Topological Defects Reveal Hidden Nonlinear Active Force in Active Nematics"
15:00-15:30 coffee break
Chair: Amit Kumar Chatterjee
15:30-16:20 Grzegorz Szamel "Extremely Persistent Dense Active Fluids"

July 26th (Fri.)
Chair: Masaki Sano
09:30-10:20 Hong-Yan Shih "Statistical model and universality class of transitional turbulence"
10:20-11:10 Kenta Ishimoto "Non-reciprocity in microswimming"
11:10-11:30 break
Chair: Hong-Yan Shih
11:30-12:20 Kazumasa Takeuchi "Route to turbulence of bacterial suspensions under confinement"
12:20-12:30 Closing remarks

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July 29th (Mon.) - August 2nd (Fri.): Jamming and rheology of dense matters
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July 29th (Mon.)
Chair: Hisao Hayakawa
09:25-09:30 Opening address
09:30-10:20 Itamar Procaccia "Elasticity, plasticity and screening in amorphous solids"
10:20-11:10 Yuliang Jin "Jamming is a first-order transition with quenched disorder in amorphous materials sheared by cyclic quasistatic deformations"
11:10-11:30 break
Chair: Itamar Procaccia
11:30-12:20 Misaki Ozawa "Elasticity, facilitation, avalanches of relaxation, and dynamic heterogeneity in glass-forming liquids"
Lunch
Chair: Yuliang Jin
14:00-14:30 Takeaki Araki "Cooperative motion caused by by thermally activated jumps in Johari-Goldstein mode"
14:30-15:00 Samuel Poincloux "Jamming of a sponge-like granular media"
15:00-15:30 coffee break
Chair: Michio Otsuki
15:30-16:00 Tetsuo Yamaguchi "Mechanics of plant root pullout from soil"

July 30th (Tue.)
Chair: Harukuni Ikeda
09:30-10:20 Yiqiu Zhao "Jamming and Memory Formation in Densely-Filled Soft Composites"
10:20-11:10 Yujie Wang "Experimental study of the statistical mechanics and dynamics of granular materials"
11:10-11:30 break
Chair: Hideyuki Mizuno
11:30-12:20 Matthias Fuchs "Vibrational phenomena in athermal amorphous solids and the un-jamming transition"
Lunch
15:00-15:30 coffee break
YITP Colloquium

Chair: Hisao Hayakawa
15:30-17:00 Jorge Kurchan "Time-reparametrization invariance: from glasses to toy black holes"

July 31st (Wed.)
Chair: Kuniyasu Saitoh
09:30-10:20 Takeshi Kawasaki "Unified Understanding of Nonlinear Rheology Near the Jamming Transition Point"
10:20-11:10 Ryohei Seto "Constitutive modeling of dense suspensions"
11:10-11:30 break
Chair: Takeshi Kawasaki
11:30-12:00 Kuniyasu Saitoh "Jamming of deformable foams"
12:00-12:30 Michio Otsuki "Flow of jammed granular materials"
Lunch
Chair: Satoshi Takada
14:00-15:00 Poster preview
15:00-15:30 coffee break
15:30-17:30 Poster session

August 1st (Thu.)
Chair: Matthias Fuchs
09:50-10:20 Yuki Takaha "Avalanche criticality of rearrangements in aging glasses"
10:20-11:10 Hideyuki Mizuno "Effective medium theory for viscoelasticity of soft jammed solids"
11:10-11:30 break
11:30-12:00 Satoshi Takada "Kinetic theory of moderately dense dry granular particles under a simple shear"
Lunch
15:00-15:30 coffee break

August 2nd (Fri.)
Chair: Hsuan-Yi Chen
09:30-10:20 Harukuni Ikeda "Jamming with Tunable Roughness"
10:20-11:10 Ning Xu "Similarities between active matter and sheared systems"
11:10-11:30 break
Chair: Ning Xu
11:30-12:20 Hsuan-Yi Chen "Statistics of stick-slip dynamics in contact line motion and dry friction"
12:20-12:30 Closing Remarks

Poster Session (YKIS2024/DDAP13): Odd Numbers

P1. Yossi Andreano
"Prediction of mechanical, thermal, and electrical properties of copper alloys based on composition and processing using machine learning"
P3. Athokpam Langlen Chanu
"Complexity, Fluctuations and Dissipation in Nonlinear, Non-equilibrium models"
P5. Pablo Bayona Pena
"Entanglement Spectrum crossings as a dynamical probe of point gapped non-Hermitian topology"
P7. Anggit Driasaditya
"Machine Learning Utilization to Predict Quinazoline Derivatives as Hepatitis B Virus Inhibitors"
P9. Sparsh Gupta
"Quantum jumps in driven-dissipative disordered many-body systems"
P11. Kei Inoue

"The Extended Entropic Chaos Degree and Its Applications to Continuous-Time Dynamical Systems"
P13. Susumu Ito
"Selective decision making and collective motion of fish via visual attention"
P15. Hui Jiang
"Stability of V-formation of birds by aerodynamic interaction"
P17. Rio Sudwitama Persadanta Kaban
"Prediction of Tensile Strength, Hardness, and Melting Point of Nickel and Iron-Nickel Based Superalloys Based on Composition Using Machine Learning"
P19. Yuzuru Kato
"A definition of quantum asymptotic phase function for analyzing quantum synchronization from the Koopman operator viewpoint"
P21. Heejeong Kim
"Field Disorder and Universality Classes in the Transverse-Field Ising Ferromagnet: A Two-Dimensional Investigation"
P23. Hironori Makino
"Quantum chaos and Bifurcation in billiard systems"
P25. Tsuyoshi Mizuguchi
"Gait dependency of waist motion in human locomotion"
P27. Yusra Ahmed Muthanna Saeed
"Explosive transitions in coupled Lorenz oscillators"
P29. Shousuke Ohmori
"The dynamical properties of low-dimensional ultradiscrete dynamical systems"
P31. Jing Qin
"Stochastic fluctuating model for two cilia synchronization"
P33. Shun Sakurai
"Boltzmann-Ginzburg-Landau theory for active particles with chemotaxis and orientational interaction"
P35. Shanhe Su
"Performance optimization of a finite-time quantum tricycle"
P37. Yuta Tateyama
"Bifurcation analysis of spatiotemporal dynamics in the one-dimensional non-reciprocal Swift-Hohenberg model"
P39. Yuki Watanabe
"Tracking Chemical Reaction Networks Driven Time-Periodically from the Viewpoint of Condensed Matter Physics"
P41. Manami Yamagishi
"Decoherence in quantum active particles: towards classical active particles"
P43. Yoshiyuki Y. Yamaguchi
"Discontinuous codimension-two bifurcation in a Vlasov system"
P45. Taichi Yamamoto
"Estimating asymptotic phase function of limit-cycle oscillators using Gaussian process regression"
P47. Kazuyuki Yoshimura
"Attenuation of soliton by thermal vibration and anomalous heat transport in the FPUT lattice"

Poster Session (YKIS2024/DDAP13): Even Numbers

P2. Yuki Araya
"Hydrodynamic simulation of synchronized oscillatory flows in two coupled collapsible tubes"
P4. Ping Fang
"Symmetry and dynamics universality in quantum chaos"
P6. Kuo-Chih Hung

"Global bifurcation diagrams of a prescribed curvature problem arising in a generalized MEMS model"
P8. Matheus Henrique Junqueira Saldanha
"Evaluating the Effectiveness of Precursor Data on Earthquake Forecasting Depending on Earthquake Depth"

P10. Fumiyoshi Kuwashima
"Highly efficient THz wave using chaotic supremacy"
P12. Euijoon Kwon
"Emergent Dynamic Patterns in Chemokinetic Active Matter with Fuel Consumption"

P14. Akari Matsuki
"Inference of coupling network of oscillatory systems using the circle map"
P16. Pavel Muraev
"Signatures of Quantum Chaos and fermionization in the incoherent transport of bosonic carriers in the Bose-Hubbard chain"
P18. Kenta Ohira
"Delay induced transient dynamics with resonance and resurgence"
P20. Takahiro Orito
"Measurement-only dynamical phase transition of topological and boundary orders in toric code and gauge-Higgs models"
P22. Abdul Quadir
"Extreme Events Scaling in Finite-Size Abelian Sandpile Model"
P24. Abhishek Sharma
"Active Granular Nematics"
P26. Lev A. Smirnov
"Dynamics of large oscillator ensembles with random interactions"
P28. Tomohiro Tanogami
"Universality and scale-to-scale information flow in turbulence"
P30. Xinhai Tong
"Multimode Brownian oscillators: Exact solutions to heat transport"
P32. Yuxin Wu
"Scaling relations for finite-time first-order phase transition"
P34. Yusuke Yanagisawa
"Phase coexistence in a weakly stochastic reaction-diffusion system"

Poster Session (2nd week)

P2. Chi-Keung Chan
"Anticipation and negative group delay in a retina"
P3. Yoshiaki Horiike
"Relaxational entropy production classifies structures of interaction networks"
P4. Samy Lakhal
"Intermittency of wind power productions"
P5. Cesar Maldonado
"Irreversibility properties of ECGs as indicators of heart conditions"
P6. Pavel Muraev
"Conductance transition with interacting bosons in an Aharonov-Bohm cage"
P7. Jonas Roenning
"Active Brownian and run-and-tumble particles trapped at boundaries: a first-passage approach"
P8. Kazuhiko Seki
"Influence of reflecting boundary on fluctuation relation in a lattice random walk model"

P9. Tingzhang Shi
"Exact work distribution and the Jarzynski's equality of a relativistic particle in an expanding piston"

P11. Guohua Xu
"Geometric Bound for Thermodynamic Uncertainty Relation in Periodically Driven Systems"
P12. Zhongmin Zhang
"TBA"
P13. Jiming Zheng
"Information Geometry of Markovian Trajectories and Universal Thermodynamic Bounds on Non-stationary Responses"

Poster Session (3rd week)

P1. Ruicheng Bao
"Estimating irreversibility under coarse-graining"
P2. Pablo Bayona Pena
"Entanglement Spectrum crossings as a dynamical probe of point gapped non-Hermitian topology"
P3. Rodrigo Braz Teixeira
"Liquid Hopfield model: retrieval and localization in multi-component mixtures"
P4. Yongjae Oh
"Phase separation of active particles with chemokinesis and fuel depletion"
P5. Jong-Min Park
"Equation of motion for nonequilibrium dynamics with strong system-bath coupling"
P6. Shanhe Su
"Efficiency bounds for bipartite information driven thermodynamic systems"
P7. Tomohiro Tanogami
"Universality and scale-to-scale information flow in turbulence"
P8. Yuxin Wu
"Scaling relations for finite-time first-order phase transition"
P9. Yusuke Yanagisawa
"Phase coexistence in a weakly stochastic reaction-diffusion system"
P10. Ryosuke Yoshii
"Quantum heat engine in presence of exceptional points"

Poster Session (4th week)

P1. Valentin Anfray
"Role of mobility in epidemic spread"
P2. Juan Carrillo
"Self-aligning bi-actuated active dumbbells"
P3. Soumen Das
"Role of kinematic constraints in regulating energy flow in a model active matter system"
P4. Takashi Goto
"Observation of collective states of magnetotactic bacteria confined in circular wells"
P5. Ken-Ichiro Imura
"Wave-packet and entanglement dynamics in a non-Hermitian system"
P6. Yutaka Kinoshita
"Effect of a quenched random field on a two-dimensional active nematics"
P7. Yuta Kuroda
"Long-range translational order and hyperuniformity in two-dimensional chiral active crystal"
P8. Yunyun Li

"Clustering of quorum sensing colloidal particles"
P9. Anirban Mukherjee
"Hyperuniformity without conservation laws - examples from ecosystem models"
P10. Yusra Ahmed Muthanna Saeed
"Explosive transitions in coupled Lorenz oscillators"
P11. Hsiang-Yun Tseng
"The effects of collective motion on a rapid evolution system"
P12. Yoshihito Uchida
"2D network with asymmetric flow of bacterial collective motion"
P13. Shion Yamashika
"Quantum Mpemba effect of bosons in an optical lattice"
P14. Kento Yasuda
"Statistical formulation of Onsager-Machlup variational principle"

Poster Session (5th week)

P1. Duc Truyen Dam
"Unjamming transition of dense active matter"
P2. Ryo Kitagawa
"Self-organized spatial inhomogeneity in self-propelled two-dimensional hard disk systems"
P3. Hirokazu Maruoka
"Impact-induced hardening of suspensions of milimetre patricles"
P4. Fumiaki Nakai
"Reducing Segregation in Vibrated Binary-Sized Granular Mixtures by Excessive Small Particle Introduction"
P5. Kota Noto
"Eigenvalue Analysis and Instability Including Wavenumbers"
P6 Abdul Quadir
"Extreme Events Scaling in Finite-Size Abelian Sandpile Model"
P7. Robert Ross
"Growth generates super-Poissonian pattern on squid skin"
P8. Ryota Saito
"GNN prediction of cavity-induced hopping motion in deeply supercooled binary hard disk systems"
P9. Abhishek Sharma
"Active Granular Nematics"
P10. Aditya Singh
"Classical water-wave analogues of the Aharonov-Bohm Effect"
P11. Ryudo Suzuki
"Force Indeterminacy and History Dependence in DEM Simulations of Small Number of Particles"
P12. Taiki Tokuyoshi
"Phase transition in dense self-propelled hard triangle systems by Newtonian Event-Chain Monte Carlo"
P13. Chang Xu
"Designing Nonlinear Mechanics of Soft Composite Solids using Shear Jamming"
P14. Kiwamu Yoshii
"Glassy behavior in a deformable particle model"