國科溫州研究院
Wenzhou Institute UCAS

Host Organization
主办单位
Wenzhou Institute, University of Chinese Academy of Sciences
国科温州研究院

國科溫州研究院
Wenzhou Institute UCAS

DOI2025

International Conference on
PRINCIPLES OF SOFT MATTER SCIENCE

Conference Program & Abstracts

WENZHOU, CHINA
2025.5.10—5.12

國科溫州研究院
Wenzhou Institute UCAS

Soft matter encompasses a diverse class of materials that play essential roles in our daily lives and society. It also forms the physical basis of many biological systems. Therefore, elucidating the principles governing the structures and dynamics of soft matter is a key objective in natural science.

This international workshop will bring together world-class researchers in soft matter science to review the latest advancements and discuss future challenges in the field.

DOI
2025

Date

May 10 – 12, 2025

Venue

Awailou Resort, Wenzhou, China

Organizing committee

Chair: Fangfu Ye (Institute of Physics, CAS & Wenzhou Institute, UCAS)
Co-chair: Shigeyuki Komura (Wenzhou Institute, UCAS)
Xingkun Man (Beihang University)
Fanlong Meng (Institute of Theoretical Physics, CAS)
Jiajia Zhou (South China University of Technology)

Local organizing committee at Wenzhou Institute, UCAS

Chair: Ryohei Seto
Zhanglin Hou
Shigeyuki Komura
Huaqiong Li
Tao Li
Zhiwei Liu
Zhongqiang Xiong
Zhiyuan Zhao
Bin Zheng

Contact

For inquiries, please contact us at doi2025@wiucas.ac.cn.
Emergent contact: Zhiyuan Zhao 赵志远 (+86 135 8842 5237)
Bin Zheng 郑斌 (+86 185 1516 1769)

Schedule

May 10: The registration starts at 16:00 and ends at 20:00.
May 11: The scientific session starts at 9:00. The conference banquet will be held at Awailo Resort.
May 12: The scientific session ends at 17:00.
May 13: Visiting Wenzhou Institute, UCAS (optional activity)

Program

May 11, 2025

8:30	Registration	
9:00 – 9:15	Opening: Fangfu Ye (Institute of Physics, CAS & Wenzhou Institute, UCAS)	
	Shigeyuki Komura (Wenzhou Institute, UCAS)	
9:15 – 9:45	Ronald G. Larson (University of Michigan)	Combining polymer physics and fluid mechanics to understand capillary breakup extensional rheometry (CaBER)
9:45 – 10:15	Yuichi Masubuchi (Nagoya University)	Phantom chain simulations for the rupture of polymer networks
10:15 – 10:45	Coffee Break	
	Bin Zheng (Wenzhou Institute, UCAS)	
10:45 – 11:15	David Andelman (Tel Aviv University)	Recent results in the theory of electrolytes
11:15 – 11:45	Chenxu Wu (Xiamen University)	Soft matter mechanics in terms of energy – from entropy to elasticity
11:45 – 12:00	Group Photo (Outdoor corridor on the first floor)	
12:00 – 13:30	Lunch (Function room 202)	
13:30 – 15:00	**Poster Session**	
	Fanlong Meng (Institute of Theoretical Physics, CAS)	
15:00 – 15:30	Hartmut Löwen (University of Düsseldorf)	Active polymers: from granular over colloidal down to quantum scales
15:30 – 16:00	Toshihiro Kawakatsu (Tohoku University)	Multiscale simulations using particle-field hybrid model
16:00 – 16:30	Haim Diamant (Tel Aviv University)	Collective sedimentation of irregular objects
16:30 – 17:00	Coffee Break	
	Zhiyuan Zhao (Wenzhou Institute, UCAS)	
17:00 – 17:30	Leihan Tang (Westlake University)	Domain-wall statistics and weak first order transition
17:30 – 18:00	Masaki Sano (Shanghai Jiao Tong University)	A bottom-up approach to deciphering tissue dynamics: from cell motility to collective behavior near topological defects
19:00	Banquet (Function room 601)	

May 12, 2025		
Huaqiong Li (Wenzhou Institute, UCAS)		
8:45 – 9:30	Ceremony for China-Japan Innovative Community for Soft Matter Science & Zhejiang-France Joint Laboratory on Soft Matter and Biophysics	
Xingkun Man (Beihang University)		
9:30 – 10:00	Penger Tong (Hong Kong University of Science and Technology)	Rheology of living cells
10:00 – 10:30	Pierre Sens (Institut Curie)	Membrane tubes with pumps
10:30 – 11:00	Coffee Break	
Tao Li (Wenzhou Institute, UCAS)		
11:00 – 11:30	Hiroshi Watanabe (Changchun Institute of Applied Chemistry, CAS)	Nonlinear stress relaxation of end-associative star chain
11:30 – 12:00	Jeff Z. Y. Chen (University of Waterloo)	Confined wormlike chain in a spherical cavity
12:00 – 14:00	Lunch (Function room 202)	
Ryohei Seto (Wenzhou Institute, UCAS)		
14:00 – 14:30	Henri Orland (CEA Saclay)	Transition paths and Schrödinger bridges
14:30 – 15:00	Tetsuo Yamaguchi (The University of Tokyo)	Friction of slender bodies: from gels to plants
15:00 – 15:30	Wenbing Hu (Nanjing University)	Interplay of phase separation and polymer crystallization
15:30 – 16:00	Coffee Break	
Jiajia Zhou (South China University of Technology)		
16:00 – 16:30	An-Chang Shi (McMaster University)	Theory of Frank-Kasper phases in soft matter
16:30 – 17:00	Takashi Taniguchi (Kyoto University)	Effect of phenylalanine dipeptide as an impurity protein on the formation of end-group associations in natural rubber

List of poster presentations

Number	Name and Affiliation	Title
P01	**Chen, Guang** (Peking University)	Universal Scaling Laws for Surface Ionization: Influence of Salt, Confinement and pH
P02	**Chen, Mingfeng** (Zhejiang University)	Multiprogrammable Anisotropic Soft Material via Magneto-Orientation of Ferromagnetic Nanoplates
P03	**Cheng, Zhengdong** (Zhejiang University)	Research Center in Advanced Intelligent Soft Matter
P04	**Dan, Yongjie** (Sichuan University)	Effects of Side Chain on Ion Transport in Polymerized Ionic Liquids
P05	**Gao, Han** (Beihang University)	Response of Magnetic Particle to Rotating Magnetic Field in Viscoelastic Fluid
P06	**Gao, Yongxiang** (Shenzhen University)	Emergent Flow Behavior in a Chiral Active Colloidal Fluid
P07	**Goh, Segun** (Sejong University)	Self-Organization of Autonomously Steering Microswimmers
P08	**Guo, Zilong** (Wenzhou Institute, UCAS)	Anomalous Effect of Denaturant on Protein Unfolding Dynamics Revealed by Single Molecule Manipulation Experiments
P09	**Hong, Liu** (Sun Yat-sen University)	Unifying Various Thermodynamic Compatible Modeling Approaches
P10	**Huang, Shuxin** (Shanghai Jiao Tong University)	Characterization on the Viscoelastic Property of An Electrorheological Fluid of Oxidized Niobium Carbide MXene (Nb_2O_5/C)
P11	**Ibáñez Ibáñez, Pablo Francisco** (Zhejiang University)	The Plastic Phase of Ice in 1D Spaces
P12	**Jiang, Xiuyun** (Shanghai Institute of Microsystem and Information Technology, CAS)	Modeling Gasdermin Self-Assembly and Pore Formation
P13	**Khan, Mohd Yasir** (Harbin Institute of Technology - Shenzhen)	Non-Reciprocal Interactions Enable Programmable Colloidal Transport in a Travelling Activity Wave
P14	**Kong, Xian** (South China University of Technology)	Sequence Effects of Polyelectrolytes Unveiled by Machine Learning and Molecular Simulation
P15	**Li, Changhao** (Wenzhou Institute, UCAS)	Dual Exponential Flux-Force Relation for Irreversible Thermodynamic Processes
P16	**Li, Minglun** (Changchun Institute of Applied Chemistry, CAS)	Thermodynamics and Dynamics of Charged Macromolecules in Confined Spaces
P17	**Li, Zhuqin** (Nanjing University)	Fluidization and Anomalous Density Fluctuations in 2D Voronoi Cell Tissues with Pulsating Activity
P18	**Lu, Yichen** (Huaqiao University)	Self-Organized Phase Separation of Chiral Active Matter: From Coupling-Induced to Intra-chiral Frustration
P19	**Mei, Baicheng** (Beijing Institute of Technology)	Medium-Range Structural Order as the Driver of Activated Dynamics in Glass-Forming Liquids
P20	**Mu, Weihua** (Wenzhou Institute, UCAS)	Adhesive Force Between Biconcave Red Blood Cell Membrane and Bulk Substrate

Number	Name and Affiliation	Title
P21	**Oguz, Erdal Celal** (Institute of Physics, CAS)	Structural Properties of Quasicrystals with Large Rotational Symmetry
P22	**Pan, Deng** (Institute of Theoretical Physics, CAS)	Gardner Transition Coincides with the Emergence of Jamming Scalings in Hard Spheres and Disks
P23	**Qi, Kai** (Shanghai Institute of Microsystem and Information Technology, CAS)	Feedback Mechanism of Globally Ordered Polarization of Multiple Squirmers within Polymer Solutions
P24	**Rao, Yifan** (Zhejiang University)	Na^+-Mg^{2+} Ion Effects on Conformation and Translocation Dynamics of Single-Stranded RNA: Cooperation and Competition
P25	**Sato, Takeshi** (Kanazawa University)	Flow Predictions of Viscoelastic Fluids with Data-Driven Constitutive Models Derived by A Sparse Identification Method
P26	**Shen, Qiuyang** (Nanjing University)	Study on the Effect of Polymer Cohesion on Crystallization Kinetics
P27	**Shen, Zhiqi** (Guangdong Technion - Israel Institute of Technology)	Statistical Characterization of Cell Migration
P28	**Song, Lei** (Zhejiang University)	Exponential-Time Differencing Schemes for Langevin Dynamics of Low-Mass Dumbbell System
P29	**Sun, Dewen** (Changchun Institute of Applied Chemistry, CAS)	Process-Directed Self-Assembly of the Frank-Kasper A15 Structure in Linear, Conformationally Symmetric Block Copolymers
P30	**Sun, Rongsheng** (Nanjing University)	Molecular Mechanism of Yielding in the Semi-Crystalline Polymers
P31	**Tang, Qiyun** (Southeast University)	Unified Theoretical Framework for Temperature Regulation via Evaporation
P32	**Tao, Liyiming** (Beihang University)	Viscosity-Modifying Polymer Modulates Self-Assembly of Highly-Aligned Nanowires via Evaporation-Induced Fluid Flow
P33	**Tian, Fengrui** (East China University of Science and Technology)	Mechanistic Insights into Knot Complexity Effects on Thermodynamic Properties of Ring Polymers
P34	**Wang, Qijun** (East China University of Science and Technology)	The Molecular Simulation Study of the Mechanical Properties of Styrene-Butadiene Rubber: The Impact of Interfacial Bonding
P35	**Wang, Yiting** (Tongji University)	Multi-Target Capture Strategy of the Intelligent Particle
P36	**Xu, Huadan** (University of Edinburgh)	Granular Inclusions in Depletion Gels
P37	**Xu, Xinpeng** (Guangdong Technion - Israel Institute of Technology)	Onsager's Variational Principle in Active and Living Matter Physics
P38	**Yan, Chenming** (Zhejiang University)	BZ Self-Oscillating Legged Robot
P39	**Yan, Yifei** (Beihang University)	Probing Micro-mechanics of Soft Materials Using Three-dimensional In-situ Imaging and Analysis
P40	**Yang, Shaohua** (Beihang University)	How Freezing Breaks Soft Materials
P41	**Yang, Wuyue** (Beijing Institute of Mathematical Sciences and Applications)	Extracting Interaction Kernels for Many-Particle Systems by a Two-Phase Approach
P42	**Yang, Zheng** (The Hong Kong University of Science and Technology - Guangzhou)	Control of Synchronizations of Active-Agent-Laden Droplets
P43	**Yu, Haijun** (Institute of Computational Mathematics, CAS)	OnsagerNet: Thermodynamically Consistent Deep Modeling by a Generalized Onager Principle for Deterministic and Stochastic Systems
P44	**Yu, Zhenhao** (Zhejiang University)	Liquid-Gas Lattice Model Unifying Thermodynamic and Dynamic Behaviors in Supercritical Fluids
P45	**Yuan, Jiaxing** (The Hong Kong University of Science and Technology - Guangzhou)	Network-Forming Phase Separation of Oppositely Charged Polyelectrolytes Forming Coacervates in a Solvent
P46	**Zhang, Ziluo** (Wenzhou Institute, UCAS)	Non-Reciprocal Interactions between Passive and Active Particles
P47	**Zheng, Kaikai** (Zhejiang University)	Exceptions to Fourier's Law at the Macroscale
P48	**Zhou, Yuxin** (Tongji University)	Collective Dynamics in Quorum Sensing Chiral Suspensions
P49	**Zhu, Lailai** (National University of Singapore)	Understanding Inertialess Magnus Lift in Polymeric Fluids

Combining polymer physics and fluid mechanics to understand capillary breakup extensional rheometry (CaBER)

Ronald G. Larson

Department of Chemical Engineering,
University of Michigan
rlarson@umich.edu

Hao-Yu Wang[1], Ranganathan Prabhakar[2], J. Ravi Prakash[3], and Ronald G. Larson[1]

[1] Department of Chemical Engineering, University of Michigan, Ann Arbor, Michigan 48109
[2] Department of Mechanical and Aerospace Engineering, Monash University, Clayton, Victoria 3800, Australia
[3] Department of Chemical Engineering, Monash University, Clayton, Victoria 3800, Australia

In recent years, Capillary Breakup Extensional Rheometry (CaBER) has been used to extract extensional rheology measurements from mobile fluids. The method is to simply extend a droplet of fluid into a filament and measure the shrinkage of its midsection radius as it thins under surface tension, with rate of thinning controlled by extensional stress. Despite its simplicity, the viscosity inferred from the surface tension and time-dependent radius has been difficult to relate to conventional measurements of extensional rheology. Here we shed light on this problem by using Brownian dynamics (BD) simulations of bead-spring polymer chains with finite extensibility (FE), excluded volume (EV), and hydrodynamic interactions (HI), coupled with a simplified multi-stage description of flow kinematics. The deformation dependence of HI is modeled by the approximate “C2D2” model [1] (Prabhakar et al., 2017) which uses a stretch and concentration dependent bead drag coefficient, thereby avoiding the unmanageably large expense of solving the BD equations with the Rotne-Prager tensor for long chains that influence each other hydrodynamically. We confirmed the validity of our simulations by showing significant agreement with literature data for Polyethylene Oxide (PEO) solutions in both step-strain and slow retraction CaBER. We obtained the kinematics of CaBER by a balance of capillary stress, viscous stress, and polymer stress. We found computationally that the apparent relaxation time inferred from the CaBER fiber diameter could be either greater than or less than the conventional equilibrium relaxation time , since FE reduces and HI increases it, to extents that depend on molecular weight, polymer concentration, endplate radii, and endplate separation protocol. A map of these dependencies is presented, which helps clarify the rheology measured by CaBER.

Reference

[1] Prabhakar, R., Sasmal, C., Nguyen, D. A., Sridhar, T., & Prakash, J. R. Phys. Rev. Fluids, 2, 011301 (2017).

Phantom chain simulations for the rupture of polymer networks

Yuichi Masubuchi（增渕雄一）

Department of Materials Physics,
Nagoya University
mas@mp.pse.nagoya-u.ac.jp

Despite numerous attempts, the structure-property relationship of network polymers remains unclear, particularly the impact of network node functionality on fracture behavior. This study employs coarse-grained simulations (1,2) to investigate polymer networks with varying node functionalities and conversion rates. Bead-spring chain sols, devoid of excluded volume, were equilibrated and gelated using the Brownian dynamics scheme. The resulting networks were validated against cycle rank, aligning well with mean-field theory. Networks were then stretched to fracture using an energy minimization scheme, with fracture behavior characterized by strain, stress at break, and work for fracture. For networks with monodisperse strand lengths but different node functionalities and conversion rates, fracture characteristics as functions of cycle rank align on master curves when normalized by branch point density (2). These master curves are consistent for networks formed from mixtures of prepolymers with varying node functionalities (3). Besides, similar master curves are observed for mixtures of linear prepolymers and multi-functional linkers, even with primary loops present (4). Simulations, including the effect of Brownian motion during stretching, also yield similar master curves (5). These findings suggest that the fracture behavior of polymer networks is predominantly governed by cycle rank.

References

[1] Y. Masubuchi et al., Macromolecules, 56, 2217 (2023).
[2] Y. Masubuchi et al., Macromolecules, 56, 9359 (2023).
[3] Y. Masubuchi, Polymer J, 56, 163 (2024).
[4] Y. Masubuchi, Polymer, 297, 126880 (2024).
[5] Y. Masubuchi et al., Polymer J, 57, 483 (2025).

Recent results in the theory of electrolytes

David Andelman

School of Physics and Astronomy,
Tel Aviv University
andelman@tauex.tau.ac.il

The Poisson-Boltzmann theory stems from the pioneering works of Debye and Onsager and is considered even today as the benchmark of ionic solutions and electrified interfaces. It has been instrumental during the last century in predicting charge distributions and interactions between charged surfaces, membranes, electrodes, macromolecules, and colloids. After reviewing the Poisson-Boltzmann theory, I will briefly discuss several extensions and modifications applied to ions and charged macromolecules. These novel ideas include the effect of dipolar solvent molecules, finite size of ions, ionic specificity, surface tension, charge regulation, and conductivity of concentrated ionic solutions.

References

[1] H. Bonneau, Y. Avni, D. Andelman and H. Orland, J. Chem. Phys. 161, 244501 (2024) .
[2] Y. Avni, D. Andelman and R. Podgornik, Curr. Opin. Electrochem. 13, 70-77 (2019) .
[3] Y. Avni, D. Andelman and H. Orland, J. Chem. Phys. 157, 154502 (2022) .
[4] Y. Avni, R. M. Adar, D. Andelman and H. Orland, Phys. Rev. Lett. 128, 098002 (2022).

Soft matter mechanics in terms of energy - from entropy to elasticity

Chen-Xu Wu (吴晨旭)

College of Physical Science and Technology,
Xiamen University
cxwu@xmu.edu.cn

This talk aims to discuss biomechanical features for a couple of soft matter systems in terms of energy, ranging from entropic to elastic contributions. The discussions offer a wide spectrum of specific properties existing in soft matter biomechanics, such as entropy-driven pehnomena, force-induced cellular uptake of nanoparticles, and field-induced positional transition of a suspended microparticle etc.

References

[1] K. Xiao, X. Chen, and C,-X. Wu, Phys. Rev. Research, 1, 033041 (2019).
[2] K. Xiao, X. Chen, X.-Z. Cao and C.-X. Wu, Phys. Rev. E 101 052706 (2020).
[3] K. Xiao and C.-X. Wu, J. Applied Phys. 129, 234701 (2021).
[4] K. Xiao, X. Chen and C.-X. Wu, Phys. Rev. Research 3, 033277 (2021).
[5] K. Xiao and C.-X. Wu, Phys. Rev. E 105(6), 064609 (2022).
[6] X.-Z. Cao, H. Merlitz, C.-X. Wu and M. G. Forest, Phys. Rev. E 106, L022501 (2022).
[7] K. Xiao, R. Ma and C.-X. Wu*, Phys. Rev. E 106, 044411 (2022).
[8] K. Xiao, R. Ma, and C.-X. Wu, Phys. Rev. E 107, 054401 (2023).
[9] K. Xiao, C.-X. Wu and R. Ma, Phys. Rev. Research 5, 023176 (2023).
[10] M.-T. Wang, R. Ma and C.-X. Wu, Phys. Rev. E 108, 034802 (2023).
[11] K. Xiao, J. Li, R. Ma and C.-X. Wu, J. Appl. Phys. 135, 184702 (2024).
[12] K. Xiao and C.-X. Wu, Phys. of Fluids 36， 072105 (2024).
[13] J. Li, K. Wen, K. Xiao, X. Chen, C.-X. Wu, J. Appl. Phys. 137, 054701 (2025).

Active polymers: from granular over colloidal down to quantum scales

Hartmut Löwen

**Institute of Theoretical Physics II: Soft Matter,
Heinrich-Heine University Düsseldorf**
hlowen@hhu.de

A wealth of self-organization processes in active polymer systems will be discussed while the particle size is systematically lowered from macroscopic (granular) to mesoscopic (colloidal) and even finally to quantum. Matter on all these scales can be viewed as soft matter albeit still as extreme cases. For active granular vibrobots we discuss the emergence of a spontaneous self-wrapping in chiral active polymers [1]. For entangled active polymers, new scaling laws are derived and proposed based on computer simulations [2]. Finally the idea of quantum active matter is introduced. A first step is to engineer active motion in quantum systems such as ultracold gases by time-dependent optical fields [3].

References

[1] L. Caprini, I. Abdoli, U. M. B. Marconi, H. Löwen, ***Spontaneous self-wrapping in chiral active polymers***, arXiv:2410.02567
[2] D. Breoni, C. Kurzthaler, B. Liebchen, H. Löwen, S. Mandal, ***Giant Activity-Induced Stress Plateau in Entangled Polymer Solutions***, arXiv:2310.02929
[3] Y. J. Zheng, A. Antonov, B. Liebchen, H. Löwen, ***Engineering active motion in quantum matter***, arXiv:2305.16131

Multiscale simulations using particle-field hybrid model

Toshihiro Kawakatsu（川勝年洋）

**Department of Physics,
Tohoku University**
kawakatu@cmpt.phys.tohoku.ac.jp

In order to offer a multiscale simulation environment for complex flows, we develop a simulation platform named MSSP (Multi-Scale Simulation Platform for complex flows), where microscopic simulators (e.g. microscopic particle simulators/constitutive models) are embedded in each of the fluid particles of Smoothed Particle Hydrodynamics (SPH) simulation [1]. In this simulation, the macroscopic flow field is calculated based on the stress field evaluated by the microscopic simulators.

With the use of MSSP, one can simulate general viscoelastic and elastoplastic flows in the presence of solid/liquid surfaces and obstacles. Here, the difficulty arises from the large demand of computational resources due to the necessity of the fine resolution of the SPH particles near the surfaces. By introducing boundary layer models into MSSP, we succeeded in accurately reproducing the flow behaviors of viscoelastic fluids around obstacles with a largely reduced number of SPH particles. The simulation results are compared with those of experiments and direct numerical simulations (DNS) of hydrodynamic equations.

References

[1] Y. Morii and T. Kawakatsu, Phys. Fluids 33, 093106 (2021).
[2] Y. Morii and T. Kawakatsu, in preparation.

Collective sedimentation of irregular objects

Haim Diamant

School of Chemistry,
Tel Aviv University
hdiamant@tau.ac.il

Unlike symmetric particles such as spheres and rods, an object of irregular shape or mass distribution, sedimenting through a viscous fluid at zero Reynolds number, usually shows an anisotropic or chiral response to the force. We will discuss the effect of such a response on the hydrodynamic interaction between two objects. We will show the profound implications of these interactions for the collective sedimentation of many objects. The tendency of irregular objects to deviate from the flow lines produced by the others either suppresses or enhances density fluctuations, resulting, respectively, in hyperuniform or unstable structures. Some of the conclusions are supported by recent experiments.

Domain-wall statistics and weak first order transition in the two-dimensional random bond Ising model

Leihan Tang (汤雷翰)

Center for Interdisciplinary Studies,
Westlake University
tangleihan@westlake.edu.cn

The ±J random-bond Ising model is a paradigmatic example of a frustrated spin system, where a ferromagnetic phase exists only when the fraction p of ferromagnetic bonds is sufficiently high. Despite extensive studies, the nature of the transition out of this phase remains unresolved, particularly below the Nishimori line. Using an entropic sampling scheme, we investigate the model on a square lattice by tracking the evolution of magnetization-resolved ground states and low-energy excited states while gradually decreasing the number of ferromagnetic bonds. Around a critical value $p_c=0.9$, the largely ferromagnetic ground state abruptly fragments into two opposing but compact domains of comparable size. As p decreases further, a cascade of ever-smaller domains follows. This "first-order-like" behavior is driven by a domain-wall energy $E(L)=\gamma(p)L+aL^{\omega}$, where the line tension $\gamma(P)$ vanishes linearly at p_c , $a>0$, and $\omega=1/3$ is the energy exponent of directed polymers in a disordered medium. The first instance of vanishing domain-wall energy occurs at the largest scale permitted by the system size L, marking the onset of domain fragmentation process. To confirm this scenario and extend the analysis to finite temperatures, we compute the free energy difference $\Delta F(p,T,L)$ under periodic and anti-periodic boundary conditions, using the same bond configuration for both. Through extensive Monte Carlo simulations on systems up to size $L=64$, we perform finite-size scaling analysis to accurately determine the re-entrance behavior at low temperatures and multicritical scaling properties near the Nishimori point [1].

Reference

[1] Yi Liu, Ding Wang, Dao-Xin Yao, L. F. Cugliandolo and Lei-Han Tang, in preparation.

A bottom-up approach to deciphering tissue dynamics: from cell motility to collective behavior near topological defects

Masaki Sano (佐野 雅己)

School of Physics and Astronomy, Institute of Natural Sciences,
Shanghai Jiao Tong University
Universal Biology Institute,
The University of Tokyo
sano@phys.s.u-tokyo.ac.jp

Monolayers of confluent elongated cells are frequently considered active nematics, featuring topological defects. In extensile systems, where cells extend further along their long axis, they can accumulate at +1/2 defects and escape from -1/2 defects. Nevertheless, collective dynamics surrounding integer defects remain insufficiently understood. We induce diverse +1 topological defects (asters, spirals, and targets) within neural progenitor cell monolayers using microfabricated patterns. Remarkably, cells migrate toward the cores of all +1 defects, challenging existing theories and conventional extensile/contractile dichotomy, which predicts escape from highly bent spirals and targets. By combining experiments and a continuum theory derived from a cell-level model, we identify previously overlooked nonlinear active forces driving this unexpected accumulation toward defect cores, providing a unified framework to explain cell behavior across defect types. Our findings establish +1 defects as probes to uncover key nonlinear features of active nematics, offering a methodology to characterize and classify cell monolayers. This approach also reproduces the dynamic responses of the system to external stimuli.

References

[1] Z. Zhao, Y. Yao, H. Li, Y. Zhao, Y. Wang, H. Zhang, H. Chaté, M. Sano, Phys. Rev. Lett. 133, 26, 268301 (2024).
[2] Z. Zhao, H. Li, Y. Yao, Y. Zhao, F. Serra, K. Kawaguchi, H. Zhang, M. Sano, Nature Comm. 16 (1), 2452 (2025).
[3] Y. Yao, Z. Zhao, H. Li, Y. Zhao, H. Zhang, M. Sano, Advanced Science, 12 (11), 2412750 (2024).
[4] H. Li, et al, to be published (2025).

Rheology of living cells

Penger Tong (童彭爾)

Department of Physics,
Hong Kong University of Science and Technology
penger@ust.hk

Living cells exhibit unique mechanical properties that blend fluid- and solid-like behaviors across various spatial and temporal scales. Despite extensive experimental studies revealing a wide range of viscoelastic behaviors, a comprehensive model of cell mechanics remains elusive. For instance, the Young's modulus E of living cells can vary dramatically—by three orders of magnitude (0.1 – 100 kPa)—depending on the samples and experimental techniques used. Current theoretical models often oversimplify the complexities of living cell mechanics, leading to inconsistent results. In this presentation, I will share findings from atomic force microscopy (AFM) measurements of stress relaxation and force indentation across 10 cell types, including epithelial, muscle, neuronal, blood, and stem cells [1]. Our unified quantitative description of the relaxation modulus E(t) reveals an initial exponential decay followed by a long-time power-law decay, along with a persistent modulus. These components of E(t) provide a detailed mechanical profile linked to the hierarchical structure and active stress of living cells. This work establishes a robust framework for characterizing the mechanical state of living cells and exploring their physiological functions and disease states.

This work was done in collaboration with D.-S. Guan, Y.-S. Shen, R. Zhang, P.-B. Huang, P.-Y. Lai, and was partly supported by the Research Grants Council of Hong Kong SAR.

Reference

[1] D.-S. Guan, Y.-S. Shen, R. Zhang, P.-B. Huang, P.-Y. Lai, and P. Tong, Unified description of compressive modulus revealing multiscale mechanics of living cells, Phys. Rev. Research 3, 043166 (2021).

Membrane tubes with pumps

Pierre Sens

Physics of Cells and Cancer,
CNRS/Institut Curie
Pierre.sens@curie.fr

Pumping is one of the primary features of biological cellular membranes, which is required for the mere existence of cells. In this talk, I will discuss some of the consequence of pumping in tubular membranes, including a novel hydro-osmotic instability [1] and the ability of pumping membrane tubes to act as supramolecular water pumps [2]. I will end by describing a simplified model of osmoregulation in freshwater protists [3].

References

[1] S. C. Al-Izzi, G. Rowlands P. Sens and M. S. Turner, Phys. Rev. Let. 120, 138102 (2018).
[2] S. C. Al-Izzi, M. S. Turner and P. Sens, arXiv (2024).
[3] P. Sens and M. S. Turner, in preparation.

Nonlinear stress relaxation of end-associative star chain

Hiroshi Watanabe (渡辺宏)

Changchun Institute of Applied Chemistry
Institute for Chemical Research,
Kyoto University
hiroshi@scl.kyoto-u.ac.jp

For polymers having long-lived associative groups (stickers), slow rheological features are governed by the sticker dissociation. Under small strains, models treating the effect of thermal dissociation of the stickers as an enhancement of local friction have been successfully applied to various associative polymers. In contrast, large strains mechanically disrupt the stickers to activate fast chain motion, and the resulting conformation serves as the initial conformation for the slow sticky relaxation occurring after thermal reformation of the stickers.

We have examined this idea for tetra-PEG star chains having stickers at the arm ends [1]. In unentangled aqueous solutions, the tetra-PEG chains formed an associative network through the stickers to exhibit almost single-Maxwellian relaxation (due to thermal dissociation of the stickers) under a small step strain. In contrast, under large step strains, the chains exhibited time-strain separable nonlinear damping. This nonlinear behavior was analyzed on the basis of the above idea, and the resulting damping function was in good agreement with the experiments. The analysis also demonstrated a breakdown of BKZ constitutive equation under double-step strain when the first and second strains were applied in the opposite directions. A summary of these results will be presented on site.

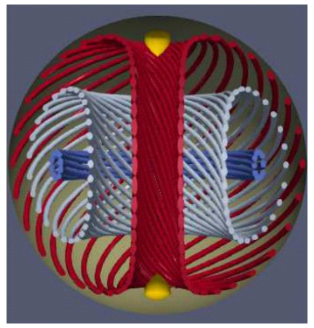
Reference

[1] Zhang et al., J. Soc. Rheol. Japan. 52, 123 (2024); ibid. 52, 143 (2024).

Confined wormlike chain in a spherical cavity

Jeff Z. Y. Chen（陈征宇）

Department of Physics and Astronomy,
University of Waterloo
jeffchen@uwaterloo.ca



One of the basic characteristics of linear dsDNA molecules is their persistence length, typically on the order of 50 nanometers. The DNA chain incurs a large energy penalty if it is bent sharply at this length scale. Viruses of bacteria, known as bacteriophages, typically have dimensions on the order of a few tens of nanometers. Yet, it is known that a bacteriophage actively packages viral DNA inside the capsid and ejects it afterward. The state and organization of the DNA chain inside a confined cavity are thus both practically important and, as it turns out, theoretically challenging. Here, by adopting a commonly used polymer model known as the wormlike chain, we address an idealized question: when a linear DNA molecule is placed inside a spherical cavity, what ordered states can we derive using tools from statistical physics? By solving the model in a rigorous theoretical framework, we present a universal phase diagram for four orientationally ordered and disordered states, based on two relevant physical parameters.

Reference

[1] Q. Liang, Y. Jiang, J. Z. Y. Chen, Physical Review E 100, 032502 (2019).

Transition paths and Schrödinger bridges

Henri Orland

Institut de Physique Théorique,CEA, CNRS,
Université Paris-Saclay

Transition paths are stochastic paths connecting two conformations of a given system. They can be generated by Brownian bridges, which are obtained from a properly modified Langevin equation. Similarly, a Schrödinger bridge is the most probable time-dependent probability distribution that connects two distributions of a system. We show how these two problems can be studied and how they are related to the “Optimal Transport” problem.

References

[1] P. Koehl and H. Orland, J. Chem. Phys. 157, 054105 (2022).
[2] H. Orland, http://arxiv.org/abs/2503.09328.
[3] P.Koehl, M.Delarue and H. Orland, Phys. Rev. Let. 123, 040603 (2019).

Friction of slender bodies: from gels to plants

Tetsuo Yamaguchi (山口哲生)

Department of Biomaterial Sciences,
The University of Tokyo
yamaguchi-tetsuo@gcc.u-tokyo.ac.jp

We discuss the frictional behavior of slender bodies, where interfacial stresses and bending deformations play essential roles. First, we introduce the sliding friction of a viscoelastic gel sheet against a flat substrate [1][2]. We observe a dynamic transition in the stick-slip sliding mode from periodic to chaotic by controlling the driving speed of the gel. We describe the periodic behavior with a simple theoretical model and elucidate the transition mechanism based on the competition between crack propagation and spontaneous wetting [3]. Then, we discuss the pullout of plant roots from soil [4]. We observe a drastic change in the maximum pullout force depending on the branched angles and the bending stiffness of the roots. We develop a theoretical model to describe the pullout behavior of slender and branched structures from granular matter by considering deformation, friction, and yielding. If time permits, we also mention the vibration characteristics of trees. We discuss how branches and leaves absorb energy from a trunk and contribute to suppressing the vibration of the trunk [5].

References

[1] T. Yamaguchi, S. Ohmata, M. Doi, (2009), J. Phys: Condensed Matter 21(20), 205105 (1009).
[2] M. Morishita, M. Kobayashi, T. Yamaguchi, M. Doi, M. (2010), J. Phys: Condensed Matter 22(36), 365104 (2010).
[3] T. Yamaguchi, M. Morishita, T. G. Sano, M. Doi, Soft Matter 18 (26), 4905 (2022).
[4] M. Kinoshita, T. Yamaguchi, in preparation.
[5] H. Fujiwara, T. Yamaguchi, in preparation.

Interplay of phase separation and polymer crystallization

Wenbing Hu (胡文兵)

School of Chemistry and Chemical Engineering,
Nanjing University
wbhu@nju.edu.cn

Phase separation and crystallization are two basic phase transitions in condensed matter physics. We discuss the parallel-packing interactions as the driving force for polymer crystallization [1,2], in company with the mixing interactions as the driving force for phase separation in the lattice model of polymer solutions and blends. The mean-field statistical thermodynamic theory could predict the phase diagrams of phase separation and polymer crystallization [3,4], which guide the dynamic Monte Carlo simulations of the parallel lattice models of polymer solutions and blends to study the kinetic interplay of phase transitions. Some typical examples for a better understanding of morphological control in polymer processing will be presented.

References

[1] W.-B. Hu, J. Chem. Phys. 113(9), 3901-3908(2000).
[2] W.-B. Hu, D. Frenkel, Adv. Polym. Sci. 191, 1-35(2005).
[3] W.-B. Hu, V.B.F. Mathot, D. Frenkel, J. Chem. Phys. 118(22), 10343-10348(2003).
[4] W.-B. Hu, Polymer Physics: A Molecular Approach, Springer-Verlag, Wien, 2013.

Theory of Frank-Kasper phases in soft matter

An-Chang Shi (史安昌)

Department of Physics & Astronomy,
McMaster University
shi@mcmaster.ca

Frank-Kasper phases appear in various physiochemical systems ranging from soft matter such as supramolecular assemblies and block copolymers to exotic matter such as nuclear pastas [1], underscoring the universality of emergent order in condensed matter. Theoretical study of polymeric systems revealed that the formation of these complex ordered phases could be regulated by several mechanisms including conformational asymmetry, copolymer architecture and variety of the polymeric components [2]. However, extending the polymer-specific theory to non-polymeric systems is nontrivial and understanding the emergence of Frank-Kasper phases in soft matter still presents a challenge. We tackled this challenge by developing molecularly-informed Landau theory and density functional theory for various soft matter systems. In particular, we demonstrate that a simple theoretical framework can describe the emergence of the Frank-Kasper phases. Our study provides an initial step for the development of a generic theoretical framework for the understanding of the universality of the phase behavior involving complex ordered phases in various physiochemical systems.

References

[1] Y. Liu et al., Chinese Journal of Polymer Science 41, 607-620 (2023).
[2] W. Li, C. Duan, A.-C. Shi, ACS Macro Lett. 6, 1257-1262 (2017).

Effect of phenylalanine dipeptide as an impurity protein on the formation of end-group associations in natural rubber

Takashi Taniguchi (谷口貴志)

Graduate School of Engineering,
Kyoto University
taniguch@cheme.kyoto-u.ac.jp

Natural rubber (NR), containing non rubber constituents such as proteins, exhibits exceptional characteristics including high toughness, tear resistance, and wet skid resistance. Gaining a thorough understanding of the interplay between proteins and the terminal groups of the cis-1,4-polyisoprene chains in NR is vital for comprehending the superior properties of NR in comparison to synthetic polyisoprene rubber. The terminal ends of the cis-1,4-polyisoprene chains in NR encompass two distinct types of terminal groups: terminals andterminals. Extensive investigations employing solid-state NMR analysis have revealed the structures of the and terminals in NR, identifying as dimethyl allyl-(trans-1,4-isoprene)$_2$ (DMA), while the terminals have been categorized into six types [1]. In this study, our primary focus is to explore the interaction between phenylalanine dipeptide (PAP) and the terminal groups within six types of melt systems (${}_{\omega}\mathrm{PI}_{\alpha n}$ + P, n = 1・・・6, “P” stands for PAP). By utilizing equilibrated systems, various physicalquantities were estimated, including end-to-end distance (Ree), radius of gyration (R_g), end-to-end vector autocorrelation function(C(t)), average rotational relaxation time τ_{rot}, self-diffusion coefficients of polymer chains, radial distribution functions (RDFs) of terminal groups around PAP, and the survival probability P(τ) for terminal groups surrounding PAP. Analysis of C(t) and τ_{rot} unveiled that PAP significantly hinders the dynamics of hydroxy-terminated and ester-terminated polyisoprene chains in the ${}_{\omega}\mathrm{PI}_{\alpha 1\text{-to-}\alpha 6}$ melt systems. Examination of RDFs demonstrated a robust association between PAP molecules and α terminals compared to ω terminal groups. Moreover, the local density of α terminal groups around other α terminal groups was notably reduced in the presence of PAP. The association between PAP and DMA was found to be weaker than that of DMA and DMA, indicating a weak correlation between PAP molecules and ω terminal groups. By employing the potentials of mean force, we conducted an investigation to calculate the cluster formation fraction of terminal groups associated with PAP as well as terminal groups forming clusters of various sizes in the 13 melt systems. Our findings [2] revealed that in the ${}_{H}\mathrm{PI}_{H}$, ${}_{\omega}\mathrm{PI}_{\alpha 1}$, ${}_{\omega}\mathrm{PI}_{\alpha 3}$, and ${}_{\omega}\mathrm{PI}_{\alpha 5}$ systems, firm cluster formation was not observed without PAP. However, in the presence of PAP, stable clusters comprising PAP-α1, PAP-α3, and PAP-α5 were formed. Conversely, in the ${}_{\omega}\mathrm{PI}_{\alpha 2}$ + P, ${}_{\omega}\mathrm{PI}_{\alpha 4}$ + P, and ${}_{\omega}\mathrm{PI}_{\alpha 6}$ + P systems, stable clusters involving α2 and α2, PAP and α2, α4 and α4, PAP and α4, α6 and α6, and PAP and α6 with sizes ranging from 2 to 9 were observed. These findings provide evidence for the formation of physical junction points (PJPs) between PAP molecules and hydroxy- or ester-terminated polyisoprene chains through their respective α1, α2, α3, α4, α5, and α6 terminals. Notably, the formation of globular PJPs between PAP and ester terminal groups was observed, while networked PJPs were established between PAP molecules and hydroxy terminal groups. These PJPs are postulated to be responsible for the superior comprehensive properties exhibited by NR in comparison to synthetic polyisoprene.

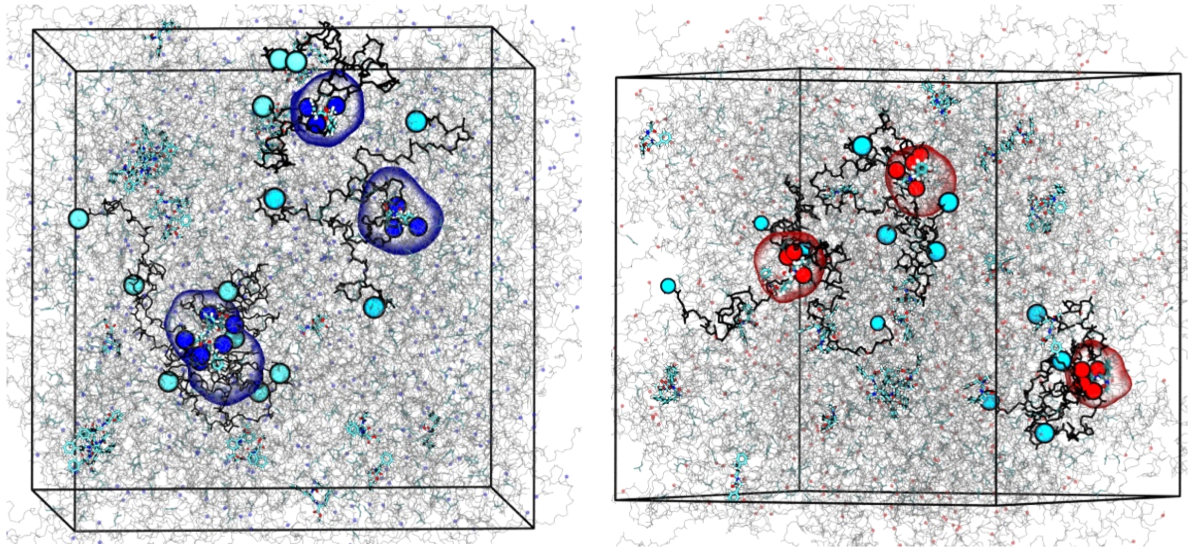


Figure 1. Stable physical junction points of α terminals of cis-1,4-polyisoprene chains around Phenylalanine dipeptide in NR (left figure: $\omega\mathrm{PI}_{\alpha1}$+P system (α1 is drawn by blue color), right figure: $\omega\mathrm{PI}_{\alpha2}$ +P system (α2 is drawn by Red color)).

References

[1] M. Oouchi, et al, Biomacromolecules, 20, 1394-1400 (2019).
[2] Mayank Dixit, Takashi Taniguchi, Macromolecules 57, 2588-2608 (2024).

List of participants

Name	Affiliation
Charbonneau, Patrick	Duke University
Chen, Du	Wenzhou Institute, UCAS
Chen, Guang	Peking University
Chen, Jizhong	Guangdong University of Technology
Chen, Meixia	Shanghai Technical Institute of Electronics & Information
Chen, Shensheng	The Hong Kong University of Science and Technology
Chen, Wenbin	Wenzhou Institute, UCAS
Cheng, Mingfeng	Zhejiang University
Cheng, Zhengdong	Zhejiang University
Dan, Yongjie	Sichuan University
Fan, Suna	Donghua University
Fang, Chao	The Hong Kong University of Science and Technology (Guangzhou)
Feng, Changbin	Wenzhou Institute, UCAS
Gan, Zecheng	The Hong Kong University of Science and Technology (Guangzhou)
Gao, Han	Beihang University
Gao, Yangyang	Beijing University of Chemical Technology
Gao, Yongxiang	Shenzhen University
Goh, Segun	Sejong University
Gu, Jian	Jiangsu Province Hospital
Gu, Kangnan	Hangzhou Normal University
Guo, Zilong	Wenzhou Institute, UCAS
He, Yan	Tsinghua University
Hong, Liu	Sun Yat-sen University
Hou, Zhanglin	Wenzhou Institute, UCAS
Hu, Jiaqi	Hangzhou Normal University
Hu, Qiuhong	Wenzhou Institute, UCAS
Hu, Shiyuan	Beihang University
Huang, Hanzhi	Hangzhou Normal University
Huang, Qian	Sichuan University
Huang, Shuxin	Department of Engineering Mechanics, Shanghai Jiao Tong University
Ibáñez Ibáñez, Pablo Francisco	Zhejiang University
Jiang, Oushuo	Fudan University
Jiang, Xiuyun	Shanghai Microsystem and Information Technology, CAS
Jiang, Yujie	University of Science and Technology Beijing
Jing, Guangyin	Northwest University
Khan, Mohd Yasir	Harbin Institute of Technology Shenzhen

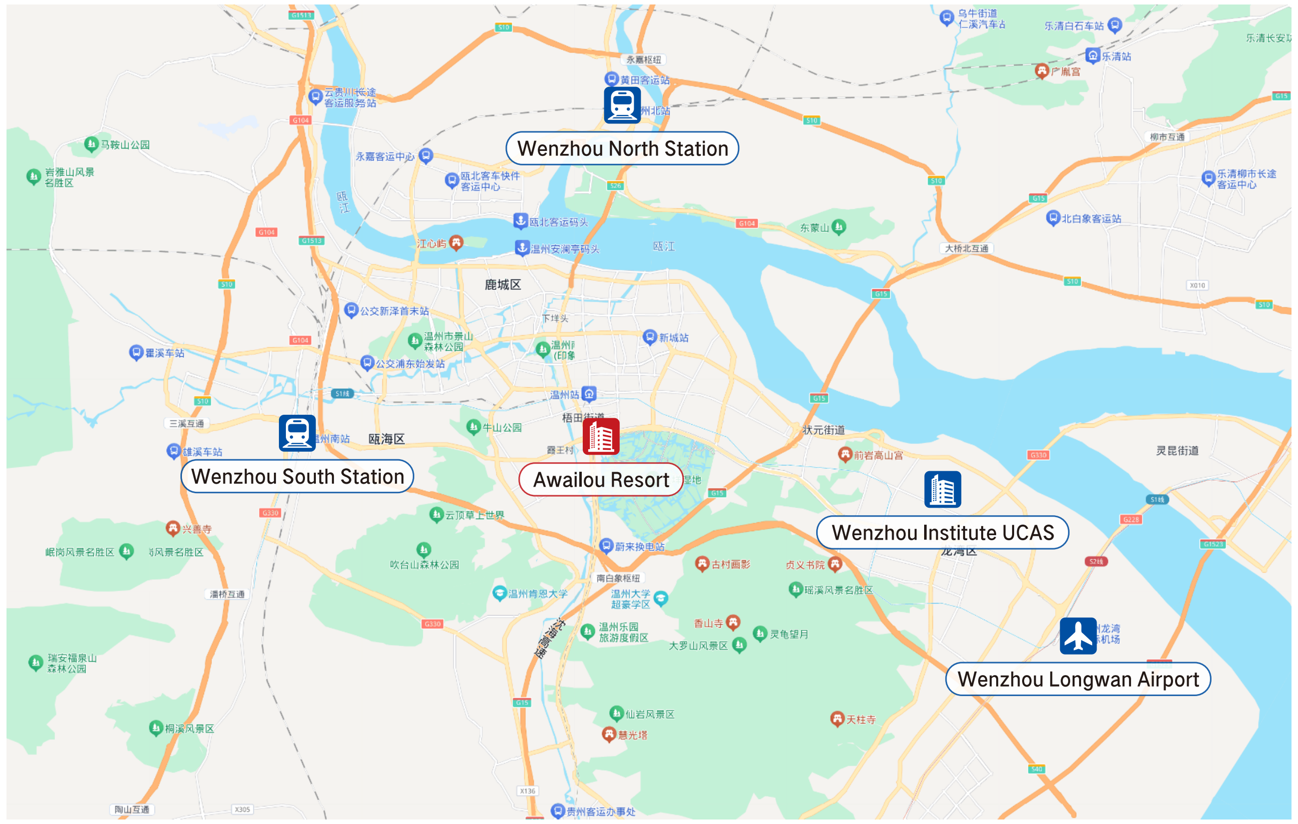
Name	Affiliation
Komura, Shigeyuki	Wenzhou Institute, UCAS
Kong, Xian	South China University of Technology
Lei, Qunli	Nanjing University
Li, Baohui	Nankai University
Li, Changhao	Wenzhou Institute, UCAS
Li, Fancheng	Wuhan University
Li, Huaping	Wenzhou Institute, UCAS
Li, Minglun	Changchun Institute of Applied Chemistry, CAS
Li, Minnai	Wenzhou Institute, UCAS
Li, Tao	Wenzhou Institute, UCAS
Li, Yao	Nankai University
Li, Yuanlong	Tongji University
Li, Ziman	Shanghai Technical Institute of Electronics & Information
Li, Zhuqin	Nanjing University
Lian, Zengju	Ningbo University
Liang, Qing	Zhejiang Normal University
Lin, Haokun	College of Engineering(COE), PKU
Liu, Shuang	Sichuan University
Liu, Zhiwei	Wenzhou Institute, UCAS
Lu, Yichen	Huaqiao University
Ma, Rui	Xiamen University
Man, Xingkun	Beihang University
Mao, Kexiang	Wuhan University
Mei, Baicheng	Beijing Institute of Technology
Meng, Fanlong	Institute of Theoretical Physics, CAS
Meng, Xiangyu	Wenzhou Institute, UCAS
Mu, Weihua	Wenzhou Institute, UCAS
Niu, Yanhua	Sichuan University
Oguz, Erdal Celal	Institute of Physics, Chinese Academy of Sciences
Ouyang, Zhongcan	Institute of Theoretical Physics, CAS
Pan, Deng	Institute of Theoretical Physics, CAS
Qi, Hangkai	Hangzhou Normal University
Qi, Kai	Shanghai Institute of Microsystem and Information Technology
Qi, Shuanhu	Beihang University
Qian, Chenhao	Wenzhou University
Rao, Yifan	Zhejiang University
Sato, Takeshi	Advanced Manufacturing Technology Institute, Kanazawa University
Seto, Ryohei	Wenzhou Institute, UCAS
Shen, Qiuyang	Nanjing University
Shen, Zaiyi	Peking University
Shen, Zhiqi	Guangdong Technion – Israel Institute of Technology
Shi, Linghao	University of Michigan - Ann Arbor
Shi, Rui	Zhejiang University
Song, Lei	Zhejiang University
Song, Xin	Wenzhou Institute, UCAS
Song, Ziyan	Jiangsu Province Hospital
Sun, Aoran	Insitute of physics
Sun, Dewen	Changchun Institute of Applied Chemistry, CAS
Sun, Hanxuan	Hangzhou Normal University
Sun, Lizhen	Zhejiang University of Technology
Sun, Rongsheng	Nanjing University
Tan, Jing	Wenzhou Institute, UCAS
Tang, Qiyun	Southeast University
Tao, Liyiming	Beihang University
Tian, Fengrui	East China University of Science and Technology
Wang, Dapeng	Changchun Institute of Applied Chemistry, CAS
Wang, Ding	Westlake University
Wang, Lianghuang	Wenzhou Institute, UCAS
Wang, Lijin	Anhui University
Wang, Lingyi	Wenzhou Institute, UCAS
Wang, Qian	University of Science and Technology of China
Wang, Qianpei	Zhejiang Sci-Tech University
Wang, Qijun	East China University of Science and Technology
Wang, Xianghong	Shanghai Technical Institute of Electronics & Information
Wang, Xinyuan	Wenzhou Institute, UCAS
Wang, Yiting	Tongji University
Wu, Jiajun	Changchun Institute of Applied Chemistry, CAS
Wu, Siyu	Wenzhou Institute, UCAS
Xie, Qiong	Institute of Theoretical Physics, CAS
Xiong, Zhongqiang	Wenzhou Institute, UCAS
Xu, Huadan	University of Edinburgh
Xu, Xianmin	Academy of Mathematics and Systems Science, CAS
Xu, Xiaofei	East China University of Science and Technology
Xu, Xinpeng	Guangdong Technion - Israel Institute of Technology

Name	Affiliation
Xu, Ye	Beihang University
Xu, Yuanze	Fudan University
Yan, Chenming	Wenzhou University
Yan, Dadong	Zhejiang University
Yan, Yifei	Beihang University
Yan, Zhiqiang	Wenzhou Institute, UCAS
Yang, Mingcheng	Institute of Physics, CAS
Yang, Shaohua	Beihang University
Yang, Wuyue	Beijing Institute of Mathematical Sciences and Applications
Yang, Zheng	The Hong Kong University of Science and Technology (Guangzhou)
Ye, Fangfu	Wenzhou Institute, UCAS
Yu, Haijun	Institute of Computational Mathematics, CAS
Yu, Zhenhao	Zhejiang University
Yuan, Jiaxing	The Hong Kong University of Science and Technology (Guangzhou)
Yuan, Xuefeng	Guangzhou University
Zeng, Mengdie	Wenzhou Institute, UCAS
Zhang, Bo	Nanjing University
Zhang, Chengyuanzhe	Wenzhou Institute, UCAS
Zhang, Guojie	Guangzhou University
Zhang, Hongguang	Wenzhou Institute, UCAS
Zhang, Jianhong	Wenzhou University
Zhang, Pengfei	Donghua University
Zhang, Qiuting	Beihang University
Zhang, Rui	Hong Kong University of Science and Technology
Zhang, Zaicheng	Beihang University
Zhang, Ziluo	Wenzhou Institute, UCAS
Zhao, Chen	Wenzhou Institute, UCAS
Zhao, Rui	Hangzhou Normal University
Zhao, Zhiyuan	Wenzhou Institute, UCAS
Zheng, Bin	Wenzhou Institute, UCAS
Zheng, Dongfang	Beijing University of Chemical Technology
Zheng, Kaikai	Zhejiang University
Zhou, Jiajia	South China University of Technology
Zhou, Xin	University of Chinese Academy of Sciences
Zhou, Yuxin	Tongji University
Zhu, Lailai	National University of Singapore

Venue

Awailou Resort
No. 55, Ouhai Avenue, Ouhai District, Wenzhou, Zhejiang, 325000, China

阿外楼度假酒店
中国浙江省温州市瓯海区瓯海大道55号 邮政编码：325000



From Wenzhou Longwan International Airport

The venue is approximately 20 kilometers from the airport. A taxi ride takes about 30 minutes and costs 30 – 50 RMB. You can also take Metro Line S1 from the Airport Station to Huimin Road Station. It is seven stops and takes about 25 minutes.

From Wenzhou South Railway Station

The venue is approximately 12 kilometers away. A taxi ride takes about 20 minutes and costs 20 – 40 RMB. You can also take Metro Line S1 from Wenzhou South Railway Station to Huimin Road Station. It is four stops and takes about 15 minutes.

From Wenzhou North Railway Station

The venue is approximately 15 kilometers away. A taxi ride takes about 30 minutes and costs 30 – 50 RMB.

The Map of Wenzhou

Recommended Catering and Shopping

- **万象城 Micx**
  温州市瓯海区南白象街道横港头社区瓯越大道1999号
- **印象城 MEGA**
  温州市鹿城区南汇街道惠美社区府东路333号

Recommended Nearby Attractions

- **江心屿 Jiangxin Island**
  温州市鹿城区望江东路119号(星河广场对面)
- **梧田老街 Wutian Old Street**
  温州市瓯海区梧田街道十里河社区东垟西路55号
- **南塘文化旅游区 Nantang Cultural Tourism Area**
  温州市鹿城区南塘街
- **三垟湿地 Sanyang Wetland**
  浙江省温州市瓯海区三垟街道瓯越大道