IWNET 2025: Detailed Program

Syros, Greece, June 08-11, 2025

Sunday, June 08, 2025

18:00-21:00 Welcome Reception & Meeting Registration

Monday, June 09, 2025

08:00 Welcome Remarks
V.G. Mavrantzas

08:10 Presentation of Honored Speaker, Professor Miroslav Grmela
A.N. Beris

Session 1: FUNDAMENTALS (Chair: H. C. Öttinger)

08:20 Role of geometry in multiscale thermodynamics [1]
M. Grmela

09:00 Onsager principle in soft matter physics [2]
M. Doi

09:20 Diffusion process and the Prigogine's principle of minimum entropy production [3]
R.E. Gonzalez-Narvaez, M. López de Haro, F. Vázquez

09:40 Small and simple systems that favor the arrow of time [4]
R.V. Chamberlin

10:00 *Coffee Break*

Session 2: TRANSPORT PHENOMENA (Chair: H. Struchtrup)

10:20 On the axioms of heat transfer and multi-component diffusion in the Euclidean space [5]
K. Dubey, B. Tiwari, D. Thapliyal, R.K. Arya, G.D. Verros

10:40 On the Chapman–Enskog solution and its relation with first-order dissipative fluid theories [6]
A. R. Méndez, A. L. García-Perciante, O. Sarbach

11:00 Stochastic Norton dynamics: An alternative approach for the computation of transport coefficients in dissipative particle dynamics [7]
X. Wu, X. Shang

11:20 Nonlinearity in the heat transport models [8]
Michele Sciacca

11:40 *Discussion*

12:00 *Lunch Break*

Session 3: CHEMICAL REACTIONS – EVOLUTION (Chair: M. Pavelka)

14:00 Variational approach to chemical reactions beyond local equilibrium [9]
F. Herrera-Castro, J. Antonio del Río Portilla

14:20 Chemical kinetics of Lennard-Jones cluster isomerization using the Onsager – Machlup action [10]
J. Engler, M. Pavelka

14:40 Study of the entropy production density of reversible reaction-diffusion models in narrow channels [11]
G. Chacón-Acosta, M. Núñez-López

15:00 Recognizing Generalized Gradient Dynamics by Means of Machine Learning [12]
V. Votruba, M. Pavelka

15:20 *Coffee Break*

Session 4: INTERNAL VARIABLES (Chair: P. Stephanou)

15:40 A thermodynamically consistent framework for the inclusion of micro-inertia in complex materials flow models [13]
A.N. Beris, B. J. Edwards

16:00 A statistical mechanics framework for thermodynamics with internal variables and its application to phase transforming systems [14]
T. Leadbetter, P.K. Purohit, C. Reina

16:20 Methodology for incorporating constraints into Poisson and dissipation bracket theory [15]
B.J. Edwards and A.N. Beris

16:40 *Discussion*

17:00 *End of 1st day*

Tuesday, June 10, 2025

Session 5: EMERGENCE (Chair: M. Grmela)

08:40 Zentropy, free energy landscape, and non-equilibrium thermodynamics [16, INVITED]
Zi-Kui Liu

09:20 Is irreversibility emergent? Is irreversibility doomed? [17]
H.C. Öttinger

09:40 On the emergence of non-equilibrium thermodynamics from Hamiltonian mechanics [18]
K. Mladá, M. Pavelka, V. Klika

10:00 *Discussion*

10:20 *Coffee Break*

Session 6: RELATIVISTIC APPLICATIONS (Chair: R. Chamberlin)

10:40 Relativistic dissipative fluids in the trace-fixed particle frame: foundations and properties [19]
A.L. García-Perciante, O. Sarbach

11:00 Relativistic hydrodynamics from the generalized bracket formalism of non-equilibrium thermodynamics [20]
V.G. Mavrantzas

11:20 Thermodynamic compatibility of weakly nonlocal fluids with a scalar field [21]
P. Ván, M. Szücs

11:40 *Discussion*

12:00 *Lunch Break*

Session 7: MULTIPHASE SYSTEMS (Chair: A. Kazakidi)

14:00 Global isomorphism with Ising model for the properties of liquid-gas surface [22]
V. Kulinskii, A. Maslechko

14:20 Non-equilibrium processes at liquid-vapor interfaces [23]
H. Struchtrup, P. Feyzi Oskouei

14:40 Exact Response Theory and Kuramoto dynamics: dissipative effects in non-equilibrium phase transitions [24]
M. Colangeli, L. Rondoni

15:00 Thermomechanics of oriented granular gas [25]
B. Nadler, H. Struchtrup

15:20 *Discussion*

15:40 *Coffee Break*

Session 8: POSTERS AND EXCURSION

16:00 Poster Session

17:20 *Break*

18:00 *Excursion to Ancient Syros and Workshop Dinner*

22:30 *End of 2nd day*

Wednesday, June 11, 2025

Session 9: MATERIAL APPLICATIONS (Chair: V. Harmandaris)

08:40 Application of the Rayleighian approach to the magnetic hysteresis problem [26]
A. Skarlatos, P. Vafeas

09:00 Ultrafast entropy production in non-equilibrium magnets [27]

F. Tietjen, R.M. Geilhufe

09:20 A molecular dynamics study on hydrogen embrittlement of ferrous and non-ferrous alloys [28]
P. Syroglou, K. Ritos

09:40 A variable entanglement density constitutive model for entangled polymer melts derived using non-equilibrium thermodynamics and comparison with atomistic NEMD simulations [29]
P.S. Stephanou

10:00 *Coffee Break*

Session 10: POLYMERIC SYSTEMS (Chair: M. Doi)

10:20 Pioneering Fluctuations in Viscoelastic Stress: A Comparison of the Temporary Network and Dumbbell models [30]
A. Winters, J. Vermant

10:40 Efforts to implement fluctuating hydrodynamics in the mesoscopic modeling of polymer solutions [31]
S.G. Yiantsios

11:00 Equilibrium and non-equilibrium dynamics of polymers confined in nanopores [32]
P. Kardasis, G. Floudas

11:20 Probing the heterogeneous non-equilibrium behavior of polymer nanocomposites via simulations across scales [33]
H. Reda, A. Chazirakis, V. Harmandaris

11:40 *Discussion*

12:00 *Lunch Break*

Session 11: DYNAMICS (Chair: A. Winters)

14:00 A biphasic haemodynamic model in microvascular networks [34]
T. Wisitponchai, J. Wu, A. Kazakidi

14:20 Two hundred years of Sadi Carnot's concept of heat exchange [35]
J. Badur, T. Ochrymiuk, W. Dudda

14:40 *General Discussion & Deliberations about the next IWNET Meeting*

15:20 *Break*

18:00 *Farewell Dinner & End of the Workshop*

Poster Presentations

P1 Stable nanothermodynamics: beyond Boltzmann's factor for thermal equilibrium and nanoscale fluctuations
Ralph V. Chamberlin

P2 Zentropy: Integrating Quantum and Statistical Mechanics for Non-equilibrium Thermodynamics

Zi-Kui Liu

P3 Global Stability Analysis of the Dynamic Heartbeat Model
J.C. Pacheco-Páez, J.C. Chimal-Eguía, D. Ladino-Luna, J.R. Luevano-Enriquez, R.T. Páez-Hernández

P4 Behavior of the Curzon and Ahlborn cycle under the efficient power and power density criterion based on the ecological function
D. Ladino-Luna, J.C. Chimal-Eguía, J.C. Pacheco-Páez, R.T. Páez-Hernández

P5 Stability analysis of a relativistic hydrodynamics model derived from non-equilibrium thermodynamics in a Lorentz-boosted frame
Panagiotis Panagopoulos Papageorgiou, Vlasis G. Mavrantzas

P6 Modeling the Rheological Behavior of Cement Pastes
A. K. Ioannou, P. S. Stephanou

P7 Phonon hydrodynamics of short channels: solids and superfluids
L. Saluto, D. Jou