2020
Thermodynamics 2.0

Conference Program
June 22 – 24, Massachusetts, USA.

International Association for the Integration of Science and Engineering

www.iaisae.org
# THERMODYNAMICS 2.0 | INTERNATIONAL CONFERENCE

**June 22 – 24, 2020**

Website: https://iaisae.org/index.php/agenda-schedule/

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## Program at Glance: Sessions and Time Table*

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* Time in Boston, Massachusetts, United States: Eastern Daylight Time (EDT), UTC – 4 hrs. https://time.is/Boston
Day 1 program: Monday, June 22

Monday morning, June 22 – 9:00 – 11:30 (Time in Boston, USA) REGISTER HERE

9:00 am Welcome and opening remarks  
Chair: Cemal Basaran

9:30 am Keynote: Adrian Bejan, Duke University  
Freedom and Evolution

10:15 am Peter Ván, Department of Theoretical Physics, Wigner Research Centre for Physics  
Emergent or Fundamental? About the Origin of Thermodynamic Universality

10:45 am Ping Ao, Shanghai Center for Systems Biomedicine, China  
Quantifying Evolutionary Processes: Roles of Fundamental Theorem of Natural...

Monday morning/afternoon, June 22 – 11:30 – 12:30 (Time in Boston, USA) REGISTER HERE

Chair: Nabin Malakar

11:30 am Invited: Bernard Guy, Mines Saint-Etienne, Institut Mines Télécom, France  
In what sense can we say that movement precedes space and time?

12:15 am James Thornton, Jensen Beach, Florida  
Why is there life?

Monday afternoon, June 22 – 13:00 – 15:00 (Time in Boston, USA) REGISTER HERE

SESSION T01: EVOLUTION I

Chair: Pier Luigi Gentili

1:00 pm Themis Matsoukas, Pennsylvania State University, University Par, USA  
Thermodynamics and the Evolution of Stochastic Populations

1:20 pm John S Torday, University of California, Los Angeles, USA  
A Thermodynamic Unification of Physics and Biology

1:40 pm Peter A. Corning, Institute for the Study of Complex Systems, Seattle WA, USA  
Thermoeconomics: Beyond the Second Law
SESSION T03: THEORETICAL ADVANCES I

Chair: Garvin H Boyle

2:00 pm  Todd Hylton, University of California San Diego, USA
Thermodynamic Neural Network

2:30 pm  Georgi Georgiev, Assumption University and Worcester Polytechnic Institute
A General Model of Self-Organization and Development of Complex Systems ...

Monday afternoon, June 22 – 13:00 – 15:00 (Time in Boston, USA) REGISTER HERE

SESSION T02: THERMODYNAMICS, CONSTRUCTAL LAW AND APPLICATIONS

Chair: Nathaniel Umukoro

1:00 pm  Michael T. Takac
The Science of Rights

1:20 pm  Sam Baker, Global Frontiers Inc., Manchester, Vermont, USA
A New Natural Science of Economics

1:40 pm  Veronika Poór, Theory in Practice, Netherlands
Non-Equilibrium Thermodynamics for Non-Equilibrium Economics

SESSION T04: ECONOMY AND DISTRIBUTION FUNCTION

Chair: Victor Yakovenko

2:00 pm  Venkat Venkatasubramanian, Columbia University, USA
How Much Income Inequality is Fair? A Statistical Teledynamics Perspective

2:20 pm  Yunus Kinkhabwala, Cornell University, Ithaca, NY, USA
Density-Functional Fluctuation Theory of Residential Demography

2:40 pm  Leila Hedayatifar, New England Complex Systems Institute, Cambridge, MA, USA
Social Fragmentation: Data Analysis and Modeling Frameworks

Monday afternoon, June 22 – 15:15 – 16:15 (Time in Boston, USA) REGISTER HERE

SESSION T05: COMPLEX SYSTEM

Chair: Shabnam Mousavi

3:15 pm  Klaus Jaffe, Universidad Simón Bolívar, Venezuela
Synergy overcomes the Second law by increasing Free Energy while decreasing Entropy

3:35 pm  Benjamin De Bari, University of Connecticut, Storrs, USA
Functional Interdependence in Coupled Dissipative Structures: Physical Foundations of ...

3:55 pm  Pier Luigi Gentili, University of Perugia, Italy
The XXI Century Challenges and Complexity
REGISTER HERE

SESSION T06: SOCIAL DYNAMICS: POPULATION, POWER AND NETWORK

Chair: Michael Francis McCullough

3:15 pm  Blair Fix, York University, Toronto, Canada
Energy and Institution Size

3:35 pm  Shimshon Bichler, Capital As Power, Israel
Growing Through Sabotage

3:55 pm  Erald Kolasi
The Physics of Capitalism

REGISTER HERE

Chair: Klaus Jaffe

4:30 pm  Keynote: Terrence Deacon, University of California Berkeley
Teledynamics: Specifying the Dynamical Principles of Intrinsical

5:15 pm  Dilip Kondepudi, Wake Forest University, USA
Why are Organisms so Different from Machines?

5:45 pm  Arto Annila, University of Helsinki, Finland
The Origin of Ubiquitous Patterns
Day 2 program: Tuesday, June 23

Tuesday morning, June 23 – 8:30 – 10:30 (Time in Boston, USA) REGISTER HERE

Chair: Cal Abel

8:30 am  **Keynote: Steve Keen, ISRS, University College London**  
Why System Dynamics Must Supplant Equilibrium Modelling

9:15 am  **Victor Yakovenko, University of Maryland, College Park, USA**  
Economic inequality from a statistical physics point of view

9:45 am  **H. Eugene Stanley, Boston University, USA**  
Econophysics: Using Statistical Physics Concepts to Offer Insights into Economic Questions

Tuesday morning, June 23 – 10:30 – 11:30 (Time in Boston, USA) REGISTER HERE

SESSION T07: DYNAMICS OF LIVING SYSTEMS

Chair: Alec Groysman

10:45 am  **Soumya Banerjee, University of Cambridge, Cambridge, UK**  
A Roadmap for a Computational and Informational Theory of Life

11:05 am  **Seán Ó Nualláin, Foundations of Mind, Israel**  
Friston, Free Energy and the Late Walter Freeman III

11:25 am  **Carsten Herrmann-Pillath, Erfurt University, Germany**  
Thermodynamics, Economic Evolution and Growth of Information: The Perspective...

Tuesday morning, June 23 – 10:30 – 11:30 (Time in Boston, USA) REGISTER HERE

SESSION T08: THEORETICAL ADVANCES II

Chair: John S Torday

10:45 am  **Bernard Guy, Mines Saint-Etienne, Institut Mines Télécom, France**  
Exploring the Links between Thermodynamics and Social Sciences: The Contribution..

11:05 am  **Burin Gumjudpai, Naresuan University, Thailand**  
Thermodynamics Formulation of Economics

11:25 am  **Libb Thims, Institute of Human Thermodynamics, USA**  
A Theoretical Torricelli Social Barometer to Measure Social Pressure
Tuesday afternoon, June 23 – 12:15 – 15:00 (Time in Boston, USA) REGISTER HERE

12:15 am  **Ram Poudel, IAISAE**
Organizers' Brown Bag: The Evolution of Cooperative Behavior in

Chair: Todd Hylton

1:00 pm  **Keynote: Katalin Martinás, ELTE, Budapest, Hungary**
Thermodynamics for Evolution

1:45 pm  **Wassim M. Haddad, Georgia Institute of Technology, USA**
The Role of Thermodynamics in the Control of Large-Scale Dynamical Systems and...

2:15 pm  **Rod Swenson, CESPA Fellow, University of Connecticut, Storrs, USA**
Autocatakinetics, the 4th Law of Thermodynamics (LMEP), and the Rise, Development...

Tuesday afternoon, June 23 – 15:15 – 17:30 (Time in Boston, USA) REGISTER HERE

SESSION T10: CLASSICAL THERMODYNAMICS: THERMODYNAMICS 1.0

Chair: Erald Kolasi

3:15 pm  **Elijah Thimsen, Washington University in Saint Louis, Missouri, USA**
Experimental Evaluation of Entropy Generation Extrema in Low Temperature Plasma...

3:35 pm  **MD Shafiquil Islam, Bangladesh University of Engineering and Technology**
Mathematics of the 2nd Law of Thermodynamics

3:55 pm  **Eduardo González-Mora, Universidad Autónoma del Estado de México, México**
Maximum Thermodynamic Efficiency Evaluation of a Conceptual Direct Steam Generation..

SESSION T12: EVOLUTION II

Chair: Themis Matsoukas

4:15 pm  **W.F. Lawless, Paine College, Augusta, GA, USA**
The Thermodynamics of Autonomous Human-Machine Teams (A-HMT): Control...

4:35 pm  **Ashwin Vaidya, Montclair State University, Montclair, NJ, USA**
Network Thermodynamic Analysis of Protein Aggregation

4:55 pm  **Gábor Balázsí, Stony Brook University, USA**
Evolutionary Loss and Regain of Gene Network Function
Tuesday afternoon, June 23 – 15:15 – 17:30 (Time in Boston, USA) REGISTER HERE

SESSION T11: SOCIAL AND POLITICAL THERMODYNAMICS

Chair: Blair Fix

3:15 pm  Nathaniel Umukoro, *Edo University, Nigeria*
Managing Violent Conflicts in Africa: Insights from the Principles of Thermodynamics

3:35 pm  Mirza Arshad Ali Beg, *Karachi, Pakistan*
Socio-Physicochemical Theory on Terror & Terrorism

3:55 pm  Michael Francis McCullough, *Brooklyn College (retired), Brooklyn, New York, USA*
The American Civil Rights Movement and Speculations on Political Thermodynamics

SESSION T13: MONEY, CAPITAL, AND THERMODYNAMICS LAWS

Chair: Carey W. King

4:15 pm  Marcin Jedrzejczyk, *Cracow University of Economics, Cracow, Poland*
Capital, Work and Economic Value in the Context of the First and the Second Law...

4:45 pm  Jurij Renkas, *Cracow University of Economics, Poland*
Thermodynamic Laws for Measuring Human Capital and Determining Fair Remuneration

5:05 pm  Mieczyslaw Dobija, *Cracow University of Economics, Cracow, Poland*
A Physical Basis of Economics

Tuesday afternoon, June 23 – 17:45 – 18:30 (Time in Boston, USA) REGISTER HERE

5:45 pm  IAISAE General Meeting
General Assembly: Organization and Planning Ahead
**Thermodynamics 2.0 | 2022**
Day 3 program: Wednesday, June 24

Wednesday morning, June 24 – 8:30 – 10:30 (Time in Boston, USA) REGISTER HERE

Chair: Bruce Boghosian

8:30 am  **Keynote: Giovanni Gallavotti, Universita’ di Roma La Sapienza**
A Path from Equilibrium to Nonequilibrium Thermodynamics

9:15 am  **G.P. Gladyshev, Institute of Chemical Physics of Academy of Sciences of Russia**
Living Universe and Hierarchical Thermodynamics

9:45 am  **Germano S. Iannacchione, Worcester Polytechnic Institute, USA**
Emergence of Order and Disorder Far-from-Equilibrium: A Fundamental Frontier....

Wednesday morning, June 24 – 10:30 – 11:30 (Time in Boston, USA) REGISTER HERE

SESSION T14: THEORETICAL ADVANCES III

Chair: Gábor Balázi

10:45 am  **Alec Groysman, Israel Institute of Technology, Haifa, Israel**
Thermodynamics, Humanities, and Art

11:05 am  **Ashok Sengupta, Institute for Holistic Sustainability, Kolkata, India**
Is Nature Ill-posed Complex Holistic or Well-posed Quantum Reductionist?

11:25 am  **Shamit Shrivastava, University of Oxford, UK**
Spike Based Computing on Self Assembled Lipid Monolayers

11:45 am  **D. Bernal-Casas, University of Barcelona, Catalonia, Spain**
Exponential tails of Covid-19 cases are modulated by daylight hours

SESSION T16: EQUATION OF MOTION: CHANGE | TRANSFORMATION

Chair: Ashwin Vaidya

12:00 pm  **Cemal Basaran, University at Buffalo, SUNY, USA**
Unified Mechanics Theory: Unification of Thermodynamics and Newtonian Mechanics

12:20 pm  **Gian Paolo Beretta, Brescia State University, Brescia, Italy**
The Fourth Law of Thermodynamics: The Irreversible Component of Nonequilibrium Time...

12:40 pm  **Miroslav Grmela, École Polytechnique de Montréal, Canada**
Multiscale Thermodynamics: A Theory of Relations Among Mesoscopic Dynamical Models..
Wednesday morning, June 24 – 10:30 – 13:00 (Time in Boston, USA) REGISTER HERE

SESSION T15: ECONOPHYSICS | SOCIOPHYSICS

Chair: Emmanuel Haven

10:45 am  Cal Abel, Signal Power and Light, Inc., Atlanta, GA, USA
Generalizing Statistical Mechanics

11:05 am  Bruce Boghosian, Tufts University, USA
New developments in agent-based models of wealth distribution

11:25 am  Bikas K Chakrabarti, Saha Institute of Nuclear Physics, Kolkata, India
Development of Econophysics & Its Timeline

11:45 am  Mirza Arshad Ali Beg, Karachi, Pakistan
Social Entropy of Wealth Accumulation and Resource Impoverishment

SESSION T17: BIOPHYSICAL ECONOMICS

Chair: Jurij Renkas

12:00 pm  Carey W. King, University of Texas at Austin, USA
HARMONEY: A Biophysical And Economic Growth Model

12:20 pm  Garvin H Boyle, Orrery Software, Richmond, Ontario, Canada
Proposed principles of economics: Bio-symmetry and hierarchic symmetry

12:40 pm  Shabnam Mousavi, Max Planck Institute for Human Development, Berlin, Germany
Framing Human Behavior in Physics Before Biology and Social Science

Wednesday morning, June 24 – 13:00 – 13:30 (Time in Boston, USA) REGISTER HERE

CLOSING AND IAISAE HONORS

Chair:

1:00 pm  IAISAE Awards and Acknowledgments

1:15 pm  Thermodynamics 2.0 | 2022 and Conference and Election Committee

1:20 pm  Closing Remarks

1:30 pm  End of Thermodynamics 2.0 | 2020 International Conference.

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