

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/>

Program at Glance: Sessions and Time Table*

International Conference on Thermodynamics 2.0						
Date→	21-Jun	22-Jun	23-Jun	24-Jun	←Date	
Time↓	Sunday	Monday	Tuesday	Wednesday	Time↓	
8:30		Registration Opens	Keynote and Plenary (III) Keen, Yakovenko, Stanley	Keynote and Plenary (V) Gallavotti, Gladyshev, Iannacchione	8:30	
8:45					8:45	
9:00		Welcome and Opening Remarks			9:00	
9:15					9:15	
9:30					9:30	
9:45					9:45	
10:00		Keynote and Plenary (I) Bejan, Ván, Ao			10:00	
10:15					10:15	
10:30			Coffee Break	Networking Break	10:30	
10:45					10:45	
11:00			Session T07	Session T14	11:00	
11:15			Session T08/T09	Session T15	11:15	
11:30		Invited Talk: Bernard GUY			11:30	
11:45					11:45	
12:00		Lunch Break	Lunch Break		12:00	
12:15		Lunch talk: Why is there life?	Organizers' Brown Bag: What is Thermodynamics 2.0?	Session T16	12:15	
12:30				Session T17	12:30	
12:45					12:45	
13:00			Keynote and Plenary (IV) Martinas, Haddad, Swenson	IAISAE Awards	13:00	
13:15		Session T01		Adjournment	13:15	
13:30		Session T02			13:30	
13:45					13:45	
14:00					14:00	
14:15		Session T03	Session T04		14:15	
14:30					14:30	
14:45					14:45	
15:00		Coffee Break	Coffee Break		15:00	
15:15					15:15	
15:30		Session T05	Session T06	Session T10	15:30	
15:45				Session T11	15:45	
16:00					16:00	
16:15		Networking Break			16:15	
16:30	Registration Opens	Keynote and Plenary (II) Deacon, Kondepudi, Annala	Session T12	Session T13	16:30	
16:45					16:45	
17:00					17:00	
17:15	Opening Introduction				17:15	
17:30			Networking Break		17:30	
17:45	Network Meeting		IAISAE General Meeting		17:45	
18:00			Thermodynamics 2.0 2022		18:00	
18:15					18:15	

* Time in Boston, Massachusetts, United States: Eastern Daylight Time (EDT), UTC – 4 hrs. <https://time.is/Boston>

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Program

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...

Keynote

Adrian Bejan
Duke University



Plenary Speakers



Peter Ván
HUNGARY



Ping Ao
CHINA

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 Park, 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

DAY 1: MONDAY, JUNE 22

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 Teleodynamics 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

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

SESSION T06: SOCIAL DYNAMICS: POPULATION, POWER AND NETWORK

- 3:15 pm Chair: Michael Francis McCullough
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

Monday afternoon, June 22 – 16:30 – 18:30 (Time in Boston, USA) REGISTER HERE

- 4:30 pm Chair: Klaus Jaffe
Keynote: Terrence Deacon, *University of California Berkeley*
Teleodynamics: Specifying the Dynamical Principles of Intrinsic
- 5:15 pm **Dilip Kondepudi**, *Wake Forest University, USA*
Why are Organisms so Different from Machines?
- 5:45 pm **Arto Annala**, *University of Helsinki, Finland*
The Origin of Ubiquitous Patterns



The graphic is a vertical rectangular box with a blue header and footer. The header contains the word "Keynote" in white. Below it is a circular portrait of Terrence Deacon, with his name and affiliation "Terrence Deacon, University of California Berkeley" written below the portrait. A blue horizontal bar with the text "Plenary Speakers" in white separates the keynote from the plenary speakers. Below this bar are two circular portraits. The left one is of Dilip Kondepudi, with his name and "USA" below it. The right one is of Arto Annala, with his name and "FINLAND" below it.

Keynote

Terrence Deacon
University of California Berkeley

Plenary Speakers

Dilip Kondepudi
USA

Arto Annala
FINLAND

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

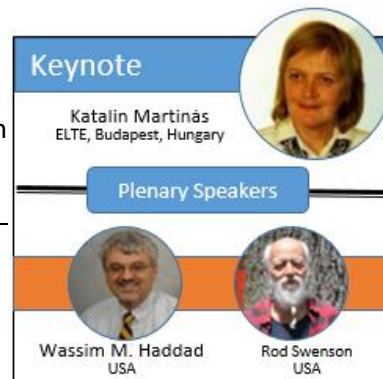
Tuesday afternoon, June 23 – 12:15 – 15:00 (Time in Boston, USA) REGISTER HERE

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

1:00 pm Chair: Todd Hylton
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

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

3:35 pm **MD Shafiqul 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

4:15 pm Chair: Themis Matsoukas
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 Balázs, Stony Brook University, USA**
Evolutionary Loss and Regain of Gene Network Function

DAY 2: TUESDAY, JUNE 22

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 Balázs
- 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.
