THURSDAY, OCTOBER 3rd 2013 — *FESTSAAL*

Opening Event: »The Future of Quantum Mechanics«

19:00–21:00

Presentations by and Plenary Discussion with Stephen L. Adler, Gerard 't Hooft, Masanao Ozawa

Quantum Mechanics is the most successful theory of all time for describing physical reality. However, after 100 years – despite its success – foundational principles for Quantum Mechanics still remain unknown. Will future developments in Quantum Mechanics reveal such principles in coming years? Three distinguished scholars will consider the future of Quantum Mechanics, and address topics such as quantum nonlocality, entanglement, and a possible sub-quantum mechanics.

Stephen Adler
Professor emeritus and former Albert Einstein Professor (Institute of Advanced Study, Princeton).
Winner of the Dirac Medal in Theoretical Physics. He has developed a model which identifies "quantum theory as an emergent phenomenon".

Gerard 't Hooft
Distinguished Professor (Utrecht University).
Winner of the Wolf Prize, and a Nobel Laureate in physics. His many scientific interests include the exploration of a deterministic foundation for quantum mechanics.

Masanao Ozawa
Professor (Nagoya University & National Institute of Informatics).
He has proposed a "universally valid reformulation of the Heisenberg Uncertainty Principle", which would indicate the necessity to modify the standard view of Quantum Mechanics.

FRIDAY, OCTOBER 4th 2013 — *THEATERSAAL*

SESSION 1: POSSIBLE BACKGROUNDS FOR AN EMERGENT QUANTUM MECHANICS

9:00 Welcome address

Chair: Gerhard Grössing

9:15–10:00 KEYNOTE LECTURE
Gerard 't Hooft *Spinoza Institute and Utrecht University, NL*
Physics on the Boundary between Classical and Quantum Mechanics

10:00–10:30 **Hans-Thomas Elze** *University of Pisa, IT*
An Action Principle for Cellular Automata and the Linearity of Quantum Mechanics

10:30–11:00 **Dieter Schuch** *J. W. Goethe Universität, Frankfurt a. M., DE*
Is Quantum Mechanics Emerging from a Nonlinear Theory?

11:00–11:15 Coffee break

11:15–11:45 **Yves Couder** *Université Paris Diderot, CNRS, FR*
Observable Macroscopic Eigenstates

11:45–12:15 **Gerhard Grössing** *Austrian Institute for Nonlinear Studies, AT*
Relational Causality and Classical Probability: Grounding Quantum Phenomenology in a Superclassical Theory

12:15–14:00 Lunch break

Chair: GianCarlo Ghirardi

14:00–14:45 KEYNOTE LECTURE
Stephen Adler *Institute for Advanced Study, Princeton, USA* Incorporating Gravity into Trace Dynamics: The Induced Gravitational Action

14:45–15:15 **Ana María Cetto** *Universidad Nacional Autónoma de México, MX*
Quantum Emergence and Role of the Zero-Point Field

15:15–15:45 **Theo Nieuwenhuizen** *University of Amsterdam, NL*
A Sub-Quantum Arrow of Time

15:45–16:00 Coffee break

Chair: Yuji Hasegawa

16:00–16:30 **Ariel Caticha** *University at Albany, USA*
Entropic Dynamics: An Inference Approach to Time and Quantum Theory

16:30–17:00 **Manfried Faber** *Vienna University of Technology, AT*
Spin and Charge from Space and Time

17:00–17:30 **Garnet Ord** *Ryerson University, Toronto, CA*
Which Comes First, Time or the Clock that Measures it?

17:30–17:45 Coffee break

Chair: Hans-Thomas Elze

17:45–18:15 **Petr Jizba** *Czech Technical University, Prague, CZ*
Cooperative Dynamical Processes: The Emergence of Relativistic Quantum Theory

18:15–18:45 **Edward Nelson** *Princeton University, USA*
Stochastic Mechanics applied to Relativistic Fields

19:00 Departure for Excursion to »Heurigen« Dinner

SATURDAY, OCTOBER 5th 2013 — *THEATERSAAL*

SESSION 2: NONLOCALITY AND THE QUANTUM-CLASSICAL TRANSISION

Chair: Gregor Weihs

9:00–9:30 **Caslav Brukner** *University of Vienna, AT*
Quantum Indefiniteness of Causal Relations

9:30–10:00 **Werner Hofer** *University of Liverpool, UK*
Elements of a Physics for the 21st Century

10:00–10:30 **Marian Kupczynski** *Université du Québec en Outaouais, CA*
Causality and Local Determinism versus Quantum Nonlocality

10:30–11:00 **Jan Walleczek** *Phenoscience Laboratories, Berlin, DE*
Does Epistemic Non-Signalling Allow the Peaceful Co-Existence of Special Relativity and Quantum Nonlocality?

11:00–11:15 Coffee break

SESSION 3: NEW EXPERIMENTS IN QUANTUM FOUNDATIONS

Chair: Bei-Lok Hu

11:15–11:45 **Basil Hiley** *University of London, UK*
Non-Commutative Probability, Conditional Expectation Values as Weak Values

11:45–12:15 **Robert Flack** *University College London, UK*
Weak Measurement and its Experimental Realization with Non-Zero Mass

12:15–14:00 Lunch break

Chair: Kristel Michielsen

14:00–14:30 **Helmut Rauch** *Vienna University of Technology, AT*
Non-Locality and Destructive Interference of Matter Waves

14:30–15:00 **Sabine Hossenfelder** *NORDITA and Stockholm University, SE*
Testing Superdeterministic Conspiracy

15:00–15:30 **Andrei Khrennikov** *Linnaeus University, Växjö, SE*
To Quantum Probabilities from Classical Random Fields and Detectors of the Threshold Type

15:30–16:00 **Gregor Weihs** *University of Innsbruck, AT*
Precision Tests of Quantum Interference

16:00–16:15 Coffee break

Chair: Andrei Khrennikov

16:15–16:45 **Lajos Diósi** *Wigner Center for Physics Research, Budapest, HU*
Newton Force from Wave Function Collapse: Speculations and Test

16:45–17:15 **Bei-Lok Hu** *Unversity of Maryland, College Park, USA*
Gravitational Decoherence and Alternative Quantum Theories

17:15–17:30 Coffee break

Chair: Theo Nieuwenhuizen

17:30–18:00 **GianCarlo Ghirardi** *Abdus Salam ICTP and University of Trieste, IT*
Probing the Superposition Principle at the Macroscopic Level

18:00–18:30 **Angelo Bassi** *University of Trieste, IT*
Collapse Models: From Theoretical Foundations to Experimental Verifications

18:30–19:00 **Markus Arndt** *University of Vienna, AT*
Experimental Explorations of Quantum Macroscopicity

20:00 Conference Dinner at *Gerstner Beletage*

SUNDAY, OCTOBER 6th 2013 — *THEATERSAAL*

SESSION 4: RECONSIDERING HEISENBERG'S UNCERTAINTY PRINCIPLE

Chair: Markus Arndt

9:00–9:45 KEYNOTE LECTURE
Masanao Ozawa *Nagoya University, JP*
Heisenberg's Uncertainty Relation: Violation and Reformulation

9:45–10:15 **Yuji Hasegawa** *Vienna University of Technology, AT*
Neutron Optical Studies of Fundamental Phenomena of Quantum Mechanics

10:15–10:45 **Kristel Michielsen** *Jülich Supercomputing Centre, DE*
Event-by-Event Simulation of Single Neutron Experiments

10:45–11:00 Coffee break

SESSION 5: BOHM-TYPE TRAJECTORIES AND RELATED THEORIES

Chair: Basil Hiley

11:00–11:30 **Maurice de Gosson** *University of Vienna, AT*
Short-Time Behavior of Bohmian Trajectories

11:30–12:00 **Bill Poirier** *Texas Tech University, Lubbock, USA*
Trajectory-Based Theory of Relativistic Quantum Particles

12:00–12:30 **Samuel Colin** *Clemson University, USA*
Mechanism for the Suppression of Quantum Noise at Large Scales on Expanding Space

12:30–14:00 Lunch break

Chair: Dieter Schuch

14:00–14:30 **Ángel Sanz** *Instituto de Física Fundamental, CSIC, Madrid, ES*
Particles, Waves and Trajectories: 210 Years after Young's Experiment

14:30–15:00 **Howard Wiseman** *Griffith University, Brisbane, AU*
Weak Values, Bohmian Mechanics, and Many Worlds

15:00–15:15 Coffee break

SESSION 6: WEAK VALUES AND MEASUREMENTS

Chair: Jan Walleczek

15:15–15:45 **Boris Braverman** *Massachusetts Inst. of Tech., Cambridge, USA*
Probing the Sub-Quantum with Weak Measurements

15:45–16:30 **Jeff Tollaksen** *Chapman University, California, USA*
The Time-Symmetric Formulation of Quantum Mechanics, Weak Values and the Classical Limit of Quantum Mechanics

16:30–17:00 KEYNOTE LECTURE
Aephraim Steinberg *University of Toronto, CA*
Experimental Information Tradeoffs: Weak Measurement, Uncertainty Relationships, et alia

Closing of Conference