

Foundations of Quantum Mechanics and Technology (FQMT)

International conference devoted to quantum theory, experiment and technology
June 12-15, 2017

Program of the Conference

Arranged by ICMC - International Centre for Mathematical Modeling in Physics,
Engineering and Cognitive Sciences; Linnaeus University, Sweden

See: <https://lnu.se/fqmt>

Organization committee, QB:

- A. Cabello (University of Seville, Spain)
- G. M. D'Ariano (University of Pavia, Italy)
- A. de Barros (San Francisco State University, USA)
- E. Dzhafarov (Purdue University, USA)
- E. Haven (Leicester University, UK)
- A. Khrennikov (Linnaeus University, Växjö, Sweden)
- M. Padgett (University of Glasgow, UK)
- S. Ramelow (University of Vienna, Austria)

Local organizing committee:

- Andrei Khrennikov, Linnaeus University, Växjö, Sweden
E-mail: andrei.khrennikov@lnu.se
- Ekaterina Yurova Axelsson, Linnaeus University, Växjö, Sweden
E-mail: ekaterina.yurova@lnu.se

Special Sessions:

- **Quantum contextuality**
Organizers: A. Cabello and E. Dzhafarov
- **Photonic quantum technology**
Organizers: M. Padgett and S. Ramelow
- **Quantum-like models from cognition to economics and finances**
Organizers: A. de Barros and E. Haven
- **Quantum-like access to big data**
Organizers: A. Khrennikov and M. Melucci

Main conference auditorium:

Wicksell, main building H, Linnaeus University, Växjö

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| 8.20-8.45 | Registration: outside the main conference room Wicksell | |
| 08.45-9.00 | Opening Ceremony: Andrei Khrennikov | |
| Wicksell | Chairman: A. Plotnitsky | |
| 9.00-9.30 | P. Perinotti (Università di Pavia, Italy) | Quantum Cellular Automata in Operational Probabilistic Theories |
| 9.30-10.00 | M. D'Ariano (University of Pavia, Italy) | Lorentz Transformations from Quantum Walks |
| 10.00-10.30 | A. Elitzur (Iyar, Israel) | Nonlocal Position Changes of a Particle Under Special Pre- and Post-Selection, Revealed by Strong Measurements and Proved by Bell's Theorem |
| 10.30-11.00 | Coffee break | |
| | SPECIAL SESSION: Quantum contextuality, organizers A. Cabello and E. Dzhafarov | |
| Wicksell | Chairman: G. Chiribella | |
| 11.00-11.30 | A. Cabello (University of Seville, Spain) | Why (Bell-Kochen-Specker) Quantum Contextuality? |
| 11.30-12.00 | E. Dzhafarov (Purdue University, USA) | Canonical Representations of Quantum Measurements for Contextuality Analysis |
| 12.00-12.30 | S. Abramsky (University of Oxford, UK) | Contextuality and Quantum Advantage |
| 12.30-13.00 | P. Kurzynsky (Adam Mickiewicz University, Poland) | On the Problem of Entanglement and Contextuality of Classical Light Fields |
| 13.00-14.30 | Lunch: at Restaurant Kristina | |
| | Continuation of SPECIAL SESSION: Quantum contextuality, organizers A. Cabello and E. Dzhafarov | |
| Wicksell | Chairman: E. Dzhafarov | |
| 14.30-15.00 | R. Raussendorf (University of Vancouver, Canada) | Topological Proofs of Contextuality in Quantum Mechanics |
| 15.00-15.30 | D. Kazlikowski (National University of Singapore, Singapore) | Algorithmic Approach to Quantum Contextuality |
| 15.30-16.00 | Y.-C. Liang (National Cheng Kung University, Taiwan) | Taming Finite Statistics for the Device-Independent Approach to Physics |
| 16.00-16.30 | Coffee Break | |
| 16.30-18.15 | PARALLEL SESSIONS | Session 1: K1040 Session 2: K1043 Session 3: K1046 Session 4: K1050 |
| Session 1: K1040 | Chairman: M. D'Ariano | |
| 16.30-16.50 | T. Galley (University College London, UK) | Classification of all Alternatives to the Born Rule in terms of Informational Properties |
| 16.50-17.10 | N. Sánchez-Kuntz (UNAM, Mexico) | Quantum States: their Ontological, Informational and Local Aspects |
| 17.10-17.30 | A. Melikh (Ural Federal University, Russia) | Quantum Field Theory, Entanglement and Measurement Problem in Quantum Mechanics |
| 17.35-17.55 | F. Moldoveanu (UMCP, USA) | Derivation of Quantum Mechanics Algebraic Structure from Invariance of the Laws of Nature under System Composition and Time Evolution |
| 17.55-18.15 | J. Sharp (University of Alberta, Canada) | The Emergence of Quantum Mechanics from a Non-local Reinterpretation of Relativistic Spacetime |

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| Session 2: K1043 | Chairman: K. Svozil | |
| 16.30-16.50 | O. C. Stoica (Horia Hulubei National Institute for R&D, Romania) | Conservation Laws and Wavefunction collapse |
| 16.50-17.10 | S. Iriyama (Tokyo University of Science, Japan) | Efficient Energy Transferring Process in Photosynthesis |
| 17.10-17.30 | K. Okamura (Nagoya University, Japan) | Uncertainty Relations in General Quantum Systems |
| 17.35-17.55 | L. Loveridge (Utrecht University, The Netherlands) | Absolute and Relative in Quantum Theory |

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| Session 3: K1046 | Chairman: A. Elitzur | |
| 16.30-16.50 | S. Rashkovskiy (Russian Academy of Sciences, Russia) | EPRB Gedanken Experiment and Entanglement without Photons |
| 16.50-17.10 | K. Piscicchia (Italian National Institute for Nuclear Physics, Italy) | Foundations of Quantum Mechanics at test in experiments at Gran Sasso underground laboratory |
| 17.10-17.30 | P. Kruit (Delft University of Technology, The Netherlands) | Interaction-Free Measurements in the Electron Microscope |
| 17.35-17.55 | P. Arve (Sweden) | Three Problems of Many-Worlds Interpretation Solved |
| 17.55-18.15 | H. V. Lepage (University of Cambridge, UK) | GPU-Accelerated Simulations of SAW-driven Single Electron Transport |

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| Session 4: K1050 | Chairman: F. Buscemi | |
| 16.30-16.50 | D. Spector (Hobart and William Smith Colleges, USA) | Set Theory, Genericity, and the Foundations of Quantum Mechanics |
| 16.50-17.10 | R. Salazar (University of Gdansk, Poland) | Games and Monogamy in the Relativistic Causality Paradigm |
| 17.10-17.30 | A. P. Alodjants (ITMO University, Russia) | Quantum Metrology with Bright Matter Wave Solitons |
| 17.35-17.55 | P. Raynal (National University of Singapore, Singapore) | Simple Derivation of the Weyl and Dirac Quantum Cellular Automata |
| 17.55-18.15 | H. Ouerdiane (University of Tunis El Manar, Tunis) | Infinite Dimensional Functionals Solutions of Quantum Heat Equation |

| POSTER SESSION | |
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| A. Chaturvedi (University of Gdansk, Poland) | Complementarity of Genuine Multipartite Non-locality |
| L. Curcuraci (University of Trieste, Italy) | Non-commutative Kinematics for a Point-like Particle |
| J. Skilling (Cambridge University, UK) | Measure, Probability and Quantum |
| A. Lebedev (Moscow State University, Russia) | Mathematical Models of Hybrid (Quantum-Classical) Systems |
| R. Salazar (University of Gdansk, Poland) | Games and Monogamy in the Relativistic Causality Paradigm |
| J. Sharp (University of Alberta, Canada) | The Emergence of Quantum Mechanics from a Non-local Reinterpretation of Relativistic Spacetime |
| R. Sen (Ben-Gurion University of the Negev, Israel) | What can Electron-Electron Scattering at Low Energies Tell Us |
| G. Adenier (INRiM, Italy) | Test of the No-Signaling Principle in the Hensen Loophole-free CHSH Experiment |

| Wicksell | | Chairman: L. Vaidman |
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| 8.45-9.15 | N. Gisin (University of Geneva, Switzerland) | The Quantum Measurement Problem |
| 9.15-9.45 | I. Bengtsson (Stockholms Universitet, Sweden) | Mass, and other Non-local Concepts |
| 9.45-10.15 | K. Svozil (Vienna University of Technology, Austria) | TBA |
| 10.15-10.45 | T. Palmer (Oxford University, UK) | Local Reality, Non-computability and the Invariant Set Postulate |
| 10.45-11.15 | Coffee break | |

| Wicksell | | Chairman: I. Bengtsson |
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| 11.15-11.45 | G. Jaeger (Boston University, USA) | Quantum Potentiality Reconsidered |
| 11.45-12.15 | L. Vaidman (Tel Aviv University, Israel) | The Controversy about the Past of a Quantum Particle |
| 12.15-12.45 | E. Cohen (University of Bristol, UK) | On the Local Consistency of Nonlocality |
| 12.45-13.15 | J.-Å. Larsson (Linköpings Universitet, Sweden) | Realization of Shor's algorithm at Room Temperature |
| 13.15-14.30 | Lunch: at Restaurant Kristina | |

| SPECIAL SESSION: Photonic quantum technology, organizers: M. Padgett and S. Ramelow | | |
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| Wicksell | | Chairman: S. Polyakov |
| 14.30-15.00 | D. Faccio (Herriot Watt University, Scotland) | Single-photon Counting Cameras: Fundamentals and Applications |
| 15.00-15.30 | H.-A. Bachor (Australian National University, Australia) | Quantum Inspired Imaging |
| 15.30-16.00 | S. Ramelow (Humboldt University Berlin, Germany) | A Large Effective $\chi(2)$ Nonlinearity on a Si ₃ N ₄ -Chip |
| 16.00-16.30 | M. Padgett (Glasgow University, Scotland) | Resolution Limits of Ghost Imaging |
| 16.30-16.50 | Coffee Break | |

| Wicksell | | Chairman: S. Abramsky |
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| 16.50-17.10 | D. Saha (University of Gdansk, Poland) | State Independent Contextuality Advances One-way Communication |
| 17.10-17.30 | R. Sen (Ben-Gurion University of the Negev, Israel) | What can Electron-Electron Scattering at Low Energies Tell Us |
| 17.30-17.50 | V. Kuz'menko (MXTI, Russia) | On the Experimental Proofs of Strong Time Reversal Noninvariance in Nonlinear Optics |
| 17.55-18.15 | R. Silva (University of Geneva, Switzerland) | Autonomous Quantum Clocks: Does Thermodynamics Limit Our Ability to Measure Time? |
| 18.15-18.35 | R. S. Barbosa (University of Oxford, UK) | The Contextual Fraction and Contextuality as a Resource |

Wednesday, 14th of June 2017

| Myrdal | | Chairman: F. De Martini |
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| 9.00-9.30 | B. Hiesmayr (University of Vienna, Austria) | Quantum Information from Positron-Emission Tomography (PET)-new Quantum Medical Imaging |
| 9.30-10.00 | S. Glancy (National Institute of Standards and Technology, USA) | Chained Bell Inequality Experiment with High-Efficiency Measurements |
| 10.00-10.30 | S. Polyakov (National Institute of Standards and Technology, USA) | Nonclassicality of Bright States of Light |
| 10.30-11.00 | Coffee break | |

| Myrdal | | Chairman: M. Kupczynski |
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| 11.00-11.30 | P. Grangier (Quantum Optics, Lab. Charles Fabry, France) | Recovering the Quantum Formalism from Physically Realist Axioms |
| 11.30-12.00 | F. De Martini (Accademia dei Lincei, Italy) | Inflation, Higgs Field and the Resolution of the Cosmological Constant Paradox in the Weyl-Geometrical Universe |
| 12.00-12.30 | H.-T. Elze (Universita di Pisa, Italy) | Do Hamiltonian Cellular Automata Allow for Ontological Prequantum States? |
| 12.30-13.00 | A. Plotnitsky (Purdue University, USA) | On the Concept of Quantum State, Physical and Mathematical: From Bohr's Atom to Quantum Automata |
| 13.00-14.30 | Lunch: at Restaurant Kristina | |

| Myrdal | | Chairman: E. Loubenets |
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| 14.30-15.00 | K. Knuth (University at Albany (SUNY), USA) | Making Inferences about Quantum Measurement Sequences |
| 15.00-15.30 | M. Kupczynski (Université du Québec en Outaouais (UQO), Canada) | Bell Inequalities, Bayes Theorem and a Free Will |
| 15.30-16.00 | E. Loubenets (National Research University Higher School of Economics, Russia) | On Full Locality of a Noisy State for $N \geq 3$ Nonlocally Entangled Qudits |
| 16.00-16.20 | Coffee break | |

| Myrdal | | Chairman: K. Knuth |
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| 16.20-16.50 | B. Coecke (Oxford University, UK) | The Time-Reverse of any Causal Theory is Eternal Noise |
| 16.50-17.20 | F. Buscemi (Nagoya University, Japan) | "Semiquantum Games" to Verify Quantum Correlations (in Space and Time) |
| 16.20-17.50 | M. Appleby (University of Sydney, Australia) | Concerning the Empirical Equivalence of Finite and Infinite Dimensional Quantum Mechanics |
| 17.50-18.20 | D. Chruscinski (Nicolaus Copernicus University, Poland) | On Memory Kernel Master Equations |

Conference dinner at Teleborg Castel
Time: 19.00-22.00

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| | SPECIAL SESSION: Quantum-like access to big data, organizers: A. Khrennikov and M. Melucci | |
| Wicksell | Chairman: R. Hawkins | |
| 09.00-09.30 | N. Watanabe (Tokyo University Of Science, Japan) | Note on Entropy for Quantum Dynamical Systems |
| 09.30-10.00 | A. Khrennikov (Linnaeus University, Sweden) | Quantum Information Laser: Technologies for Modeling of Behavior of Big Social Systems |
| 10.00-10.30 | M. Melucci (University of Padua, Italy) | Issues of Quantum-Inspired Information Access and Retrieval |
| 10.30-10.45 | Coffee break | |

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| | SPECIAL SESSION: Quantum-like models from cognition to economics and finances, organizers: A. de Barros and E. Haven | |
| Wicksell | Chairman: P. Khrennikova | |
| 10.45-11.15 | A. de Barros (San Francisco State University, USA) | A Quantum Model of Learning |
| 11.15-11.45 | R. Hawkins (University of California-Berkeley, USA) | Information Extremization and Quantization in Temporal Discounting |
| 11.45-12.15 | E. Haven (University of Leicester, UK) | Interpreting Two Types of Potential Functions from Financial Commodities Data: Some Empirical Results |
| 12.15-12.45 | F. Holik (National University of La Plata, Argentina) | Foundations of Non-Kolmogorovian Probability Theory |
| 12.45-13.15 | P. Pylkkänen (University of Skövde, Sweden) | The Quantum-like Mind and Bohm's Active Information |
| 13.20-14.20 | Lunch: at Restaurant Kristina | |

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| 14.20-15.40 | PARALLEL SESSIONS | Session 1: Wicksell Session 2: Weber |
| Session 1: Wicksell | Chairman: P. Grangier | |
| 14.20-14.40 | O. Andersson (Stockholm University, Sweden) | Self-Testing Properties of the Elegant Bell Inequality and Optimal Local Randomness Generation |
| 14.40-15.00 | I. Dumitru (Stockholm University, Sweden) | SIC-POVMs in Special Dimensions |
| 15.00-15.20 | M. Farkas (University of Gdańsk, Poland) | QRAC Strategies and an Extension of the MUB Condition |
| 15.20-15.40 | D. Arvidsson-Shukur (University of Cambridge, UK) | Information Measure of Counterfactuality in Communication Protocols |
| 15.40-16.00 | Coffee break | |

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| | Continuation of SPECIAL SESSION: Quantum-like models from cognition to economics and finances, organizers: A. de Barros and E. Haven | |
| Session 2: Weber | | Chairman: F. Holik |
| 14.20-14.40 | P. Khrennikova (University of Leicester, UK) | Dynamics of Competition and Cooperation between Political Parties: the Quantum Coalition and Non-Coalition Equilibrium Model |
| 14.40-15.00 | C. Gallus (University of Applied Science, Germany) | QDT Modelling for Financial Markets |
| 15.40-16.00 | Coffee break | |

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| Wicksell | | Chairman: J.-Å. Larsson |
| 16.00-16.20 | A. I. Vistnes (University of Oslo, Norway) | Numerical Modelling of the Hanbury-Brown and Twiss Effect may Contribute to Improved Physical Understanding of the Phenomenon |
| 16.20-16.40 | M. Versteegh (KTH, Sweden) | Violation of Bell's Inequality with Deterministic Photon Pairs from a Quantum Dot in a Tapered Nanowire Waveguide |
| 16.40-17.00 | G. Xavier (Linköping University, Sweden) | Post-selection Loophole-Free Automated Energy-Time Bell Test Fed with Human-Generated Inputs |
| 17.00-17.20 | T. Kauten (University of Innsbruck, Austria) | Observation of Genuine Three-Photon Interference |

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| 17.20-17.35 | <i>Conference closing ceremony at Wicksell</i> | |
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