



Philosopher in Residence Fellowship Program

Focus Group: Quantum Logic and the Second Quantum Revolution

Seminar Series Quantumness: from Logic to Engineering and back

The burgeoning research into quantum information and computation marks a significant milestone that can be dubbed "the second quantum revolution". The first quantum revolution of the 20th century deeply changed the fundamental concepts of physics and our understanding of the physical world. The second quantum revolution of the 21st century is leading to dramatic technological changes in our society and shaping new conceptual and logical paradigms. Munich Quantum Valley serves as an exemplary case, bringing together fundamental research and practical application.

Organized by Prof. Roberto Giuntini (Philosopher in Residence) and his hosts: Prof. Hans-Joachim Bungartz, Prof. Stefania Centrone, Prof. Klaus Mainzer

For further information, please contact: roberto.giuntini@tum.de

First Quantum Afternoon	December 6th 2023	IAS Faculty Club (fourth floor)	15:00 – 15:45	Prof. Robert Wille (TUM)
Committee		First Quantum Afternoon		Design Automation for Quantum Computing
Prof. Klaus Mainzer (TUM) Introduction to the Focus Group and to the Seminars Responsible Research and Innovation strategies Responsible Responsible Responsible Research and Innovation strategies Responsible Responsibl	14:30 – 14:45	Prof. Michael Molls (Director of TUM-IAS)	15:45 – 16:00	Coffee break
Introduction to the Focus Group and to the Seminars Responsible Research and innovation strategies		Opening speech	16:00 - 16:45	Dr. Fabienne Marco (TUM)
1515-16:00	14:45 – 15:15	Prof. Klaus Mainzer (TUM)		Pathways to quantum entanglement:
Prof. Roberto Giuntini (TUM-IAS, University of Cagliari) Cagliari) Cagnitum State Discrimination for Supervised Classification 17:30 - 18:15 Prof. Klaus Mainzer (TUM) From the Quantum National Prof. Christian Mendi (TUM) From the Quantum National Prof. Christian Mendi (TUM) From the Quantum Mondadology Prof. Roberto Giuntini (TUM-IAS, University of Cagliari) Aspects of Quantum Simulation by Digital Quantum Computer Roberto Giuntini (TUM-IAS, University of Cagliari) Aspects of Quantum Logic as a Logic Prof. Roberto Giuntini (TUM-IAS, University of Cagliari) From sharp to unsharp logic (i) Prof. Francesco Paoli (University of Cagliari) From sharp to unsharp logic (ii) Prof. Francesco Paoli (University of Cagliari) Prof. P		Introduction to the Focus Group and to the Seminars		Responsible Research and innovation strategies
Second Charles Prof. Klaus Mainzer (TUM) From the Quantum Monitor Quantum Al	15:15 – 16:00	Prof. Giuseppe Sergioli (University of Cagliari),	16:45 – 17:30	Prof. Maria Luisa Dalla Chiara (University of Florence)
Bool - 16:45 Prof. Christian Mendi (TUM) Aspects of Quantum Simulation by Digital Quantum Computer March 15th 2024 AS Room 0.004 (ground floor) Quantum Logic as a Logic		Prof. Roberto Giuntini (TUM-IAS, University of Cagliari)		Logics from quantum information and possible applications
Aspects of Quantum Simulation by Digital Quantum Computer May 2 fat 2024 AS Room 0.004 (ground floor) Quantum Logic as a Logic		Quantum State Discrimination for Supervised Classification	17:30 – 18:15	Prof. Klaus Mainzer (TUM)
March 15th 2024 AS Room 0.004 (ground floor) Capilari) Capil	16:00 – 16:45	Prof. Christian Mendl (TUM)		From the Quantum World to Quantum Al
March 15th 2024 AS Room 0.004 (ground floor) 14.30 – 15.15 Prof. Roberto Giuntii (University of Cagliari) 14.30 – 15.15 Prof. Roberto Giuntiin (TUM-IAS, University of Cagliari) 15.15 – 16.00 Prof. Roberto Giuntiin (TUM-IAS, University of Cagliari) 15.15 – 16.00 Prof. Roberto Giuntiin (TUM-IAS, University of Cagliari) 15.15 – 16.00 Prof. Prancesco Paoli (University of Cagliari) 15.00 – 16.00 Prof. Tobias Vogi (TUM) Implementing a single photon quantum logic at room temperature June 5th 2024 IAS Room 0.004 (ground floor) Foundations of Artificial Intelligence Prof. Fabios Roli (University of Genua and Cagliari) Prof. Fabios Roli (University of Genua and Cagliari) Prof. Fabios Roli (University of Genua and Cagliari) Historical and technical issues Prof. Fabios Roli (University of Genua and Cagliari) Prof. Stefania Centrone (TUM) Roli (University of Genua and Cagliari) Prof. Klaus Mainzer (TUM) Roli (University of Genua and Cagliari) Prof. Klaus Mainzer (TUM) Roli (University of Genua and Cagliari) Prof. Milchaels Molis (TUM-IAS) Prof. Milchaels Molis (TUM-IAS) Prof. Milchaels Molis (TUM-IAS) Prof. Milchaels Molis (TUM-IAS) Prof. Hans Bungartz (TUM) Prof. Hans Bungartz (TUM) Prof. Hans Bun		Aspects of Quantum Simulation by Digital Quantum Computer		
11:30 -12:45			May 21st 2024	IAS Room 0.004 (ground floor)
Computing systems: mathematical entitities or physical objects? April 10th 2024 April 10t	March 15th 2024	IAS Room 0.004 (ground floor)		Quantum Logic as a Logic
April 10th 2024 April 10th 2024 IAS Room 1.021 (first floor) Fron. Tobias Vogl (TUM) Implementing a single photon quantum logic at room temperature Implementing a single photon quantum logic at room temperature April 17th 2024 April 17th 2024 April 17th 2024 April 17th 2024 IAS Faculty Club (fourth floor) Applications of integrated High Performance Quantum Computing Dr. Luigi lapichino (Leibniz Supercomputing Centre – LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem 15:45 –16:30 Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) Comparison of HPC performance of simulators on representative QC use cases Is 15:45 –16:00 Apy 16th 2024 Apy 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I Prof. Hans Bungartz (TUM) Prof. Hans Bungartz (TUM) From sharp to unsharp logic (II) IAS Room 0.004 (ground floor) Applications of Artificial Intelligence Foundations of Artificial Intelligence Foundations of Artificial Intelligence From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and technical issues From known knowns to unknown unknowns in Al: Historical and tec	11:30 –12:45	Prof. Marco Giunti (University of Cagliari)	14:30 –15:15	Prof. Roberto Giuntini (TUM-IAS, University of Cagliari)
ASR Room 1.021 (first floor) From sharp to unsharp logic (iii)		Computing systems: mathematical entities or physical objects?		From sharp to unsharp logic (I)
15:00 - 16:00 Prof. Tobias Vogi (TUM) Implementing a single photon quantum logic at room temperature June 5th 2024 IAS Room 0.004 (ground floor) Foundations of Artificial Intelligence Foundations of Artificial Intelligence Foundations of Artificial Intelligence Foundations of Artificial Intelligence April 17th 2024 IAS Faculty Club (fourth floor) 14:30 - 15:15 Prof. Fabio Roli (University of Genua and Cagliari) From known knowns to unknown unknown in Al: Historical and technical issues Historical and technical issues Historical and technical issues Intelligence In			15:15 –16:00	Prof. Francesco Paoli (University of Cagliari)
Implementing a single photon quantum logic at room temperature Implementing a single photon quantum logic at room temperature Implementing a single photon quantum logic at room temperature Implementing a single photon quantum logic at room temperature Implementing a single photon quantum logic at room temperature Implementing a single photon quantum floor Implementing a factor floor Implementing a floor floor Implementing a floor floor Implementing a floor floor Implementing a floor floor floor floor floor floor Implementing a floor	April 10th 2024	IAS Room 1.021 (first floor)		From sharp to unsharp logic (II)
April 17th 2024 April 17th 2024 April 17th 2024 Applications of integrated High Performance Quantum Computing 15:00 -15:45 Dr. Luigi lapichino (Leibniz Supercomputing Centre - LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem Dr. Marco De Pascale (Leibniz Supercomputing Centre - LRZ)) Comparison of HPC performance of simulators on representative QC use cases Applications in the Quantum Supercomputing Centre - LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem June 7th 2024 IAS Room 0.004 (ground floor) Quantum Monadology Prof. Stefania Centrone (TUM) Monadology and Quantum Monadology Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Room 0.004 (ground floor) Applications in the Quantum Afternoon July 3rd 2024 IAS Room 0.004 (ground floor) Prof. Michaels Molls (TUM-IAS) Opening speech I Geometrical aspects of resources distribution in quantum random circuits	15:00 –16:00	Prof. Tobias Vogl (TUM)		
April 17th 2024 April 17th 2024 Applications of integrated High Performance Quantum Computing 15:00 -15:45 Dr. Luigi lapichino (Leibniz Supercomputing Centre - LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem Dr. Marco De Pascale (Leibniz Supercomputing Centre - LRZ)) Comparison of HPC performance of simulators on representative QC use cases May 16th 2024 IAS Room 0.004 (ground floor) Abonadology and Quantum Monadology Prof. Klaus Mainzer (TUM) Monadology and Quantum Monadology May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 -14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I Prof. Hans Bungartz (TUM) Frof. Hans Bungartz (TUM		Implementing a single photon quantum logic at room temperature	June 5th 2024	IAS Room 0.004 (ground floor)
Applications of integrated High Performance Quantum Computing 15:00 –15:45 Dr. Luigi lapichino (Leibniz Supercomputing Centre – LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) Comparison of HPC performance of simulators on representative QC use cases Ids: 15:15 –16:00 May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon IAS Auditorium (ground floor) Second Quantum Afternoon IAS Room 0.004 (ground floor) May 16th 2024 IAS Room 0.004 (ground floor)				Foundations of Artificial Intelligence
Ristorical and technical issues Historical and technical issues	April 17th 2024	IAS Faculty Club (fourth floor)	14:30 –15:15	Prof. Fabio Roli (University of Genua and Cagliari)
15:00 -15:45 Dr. Luigi lapichino (Leibniz Supercomputing Centre – LRZ)) Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) Comparison of HPC performance of simulators on representative QC use cases Quantum Monadology Monadology and Quantum Monadology Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 -14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 -14:45 Prof. Hans Bungartz (TUM) Frandom circuits IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum		Applications of integrated High Performance		From known knowns to unknown unknowns in Al:
Initial services and applications in the Quantum-accelerated Supercomputing Ecosystem 15:45 –16:30 Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) Comparison of HPC performance of simulators on representative QC use cases 15:15 –16:00 Prof. Klaus Mainzer (TUM) Monadology and Quantum Monadology Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 –14:45 Prof. Hans Bungartz (TUM) Frandom circuits IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum		Quantum Computing		Historical and technical issues
Supercomputing Ecosystem Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) 14:30 –15:15 Prof. Stefania Centrone (TUM) Monadology and Quantum Monadology QC use cases 15:15 –16:00 Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I Opening speech I Prof. Hans Bungartz (TUM) Geometrical aspects of resources distribution in quantum random circuits	15:00 –15:45	Dr. Luigi lapichino (Leibniz Supercomputing Centre – LRZ))		
15:45 –16:30 Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ)) Comparison of HPC performance of simulators on representative QC use cases In 15:15 –16:00 Prof. Klaus Mainzer (TUM) Monadology and Quantum Monadology Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon July 3rd 2024 IAS Room 0.004 (ground floor) 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 –14:45 Prof. Hans Bungartz (TUM) 14:30 –16:00 Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits		Initial services and applications in the Quantum-accelerated	June 7th 2024	IAS Room 0.004 (ground floor)
Comparison of HPC performance of simulators on representative QC use cases 15:15 -16:00 Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon July 3rd 2024 IAS Room 0.004 (ground floor) 14:15 -14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I Opening speech I Prof. Hans Bungartz (TUM) Prof. Hans Bungartz (TUM) Monadology and Quantum Monadology Monadology Monadology and Quantum Monadology Monadolog		Supercomputing Ecosystem		Quantum Monadology
QC use cases 15:15 –16:00 Prof. Klaus Mainzer (TUM) Monads, brains, and Quantum Computing May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon July 3rd 2024 IAS Room 0.004 (ground floor) 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 –14:45 Prof. Hans Bungartz (TUM) 15:15 –16:00 Prof. Klaus Mainzer (TUM) IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits	15:45 –16:30	Dr. Marco De Pascale (Leibniz Supercomputing Centre – LRZ))	14:30 –15:15	Prof. Stefania Centrone (TUM)
May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon 14:15 -14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 -14:45 Prof. Hans Bungartz (TUM) Monads, brains, and Quantum Computing IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits		Comparison of HPC performance of simulators on representative		Monadology and Quantum Monadology
May 16th 2024 IAS Auditorium (ground floor) Second Quantum Afternoon July 3rd 2024 IAS Room 0.004 (ground floor) 14:15 -14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 -14:45 Prof. Hans Bungartz (TUM) IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits		QC use cases	15:15 –16:00	Prof. Klaus Mainzer (TUM)
Second Quantum Afternoon 14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 –14:45 Prof. Hans Bungartz (TUM) 14:30 –14:45 IAS Room 0.004 (ground floor) Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits				Monads, brains, and Quantum Computing
14:15 –14:30 Prof. Michaels Molls (TUM-IAS) Opening speech I 14:30 –14:45 Prof. Hans Bungartz (TUM) 15:00 –16:00 Dr. Federico Holik (University of La Plata) Geometrical aspects of resources distribution in quantum random circuits	May 16th 2024	IAS Auditorium (ground floor)		
Opening speech I Geometrical aspects of resources distribution in quantum 14:30 –14:45 Prof. Hans Bungartz (TUM) random circuits		Second Quantum Afternoon	July 3rd 2024	IAS Room 0.004 (ground floor)
14:30 –14:45 Prof. Hans Bungartz (TUM) random circuits	14:15 –14:30	Prof. Michaels Molls (TUM-IAS)	15:00 –16:00	Dr. Federico Holik (University of La Plata)
		Opening speech I		Geometrical aspects of resources distribution in quantum
Opening speech II	14:30 –14:45	Prof. Hans Bungartz (TUM)		random circuits
		Opening speech II		
14:45 – 15:00 Prof. Urs Gasser (TUM) July 9rd 2024 IAS Room 0.004 (ground floor)	14:45 – 15:00	Prof. Urs Gasser (TUM)	July 9rd 2024	IAS Room 0.004 (ground floor)
Opening speech III 15:00 –16:00 Prof. Majid Khadiv (TUM)		Opening speech III	15:00 –16:00	Prof. Majid Khadiv (TUM)
Intelligent humanoid robots and potential ethical issues				Intelligent humanoid robots and potential ethical issues







