

TENTATIVE PROGRAM (as of 08/05/2024)

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Monday (06/05/2024)

Topological Matter Tutorials

Chair : Juan Sierra (ICN2, Spain)

13:30 – 14:30: **Athanasios Dimoulas** (NCSR-D, Greece) T

MBE growth of 2D topological quantum materials

14:30 – 15:30: **Tomas Jungwirth** (Czech Academy of Sciences, Czech Republic) T

Altermagnets: An unconventional magnetic class

15:30 – 16:00: *Coffee Break*

Chair : Stephan Roche (ICN2, Spain)

16:00 – 17:00: **Maia García Vergniory** (Max Planck for Chemical Physics of Solids, Germany & DIPC, Spain) T

Topological Quantum Chemistry

17:00 – 18:00: **Ramon Aguado** (ICMM-CSIC, Spain) T

From Majorana to Andreev and back



Tuesday (07/05/2024)

Plenary Session

Chair : Ricardo Díez Muiño (DIPC & Ikerbasque, Spain)

08:00 – 08:45: Registration

08:45 – 09:00: Welcome ceremony

09:10 – 09:50: **Ignacio Cirac** (Max Planck Institute of Quantum Optics, Germany) P

Quantum Computing and Simulation in the NISQ era

09:50 – 10:20: **Susanne Yelin** (Harvard University, USA) I

Quantum Simulation of Molecules and Materials with present-day Reconfigurable Quantum Processors

10:20– 11:00: *Coffee Break / Poster Session / Exhibition*

Chair : Silvano de Franceschi (CEA/UGA, France)

11:00 – 11:30: **Amir Yacoby** (Harvard University, USA) K

Quantum Sensing of Quantum Matter

11:30 – 12:00: **Philippe Bouyer** (University of Amsterdam/Quantum Delta NL, The Netherlands) I

From matter waves to quantum sensors

12:00 – 12:15: **Pascal Degiovanni** (CNRS - ENS Lyon, France) O

Single electron interferometric sensing of quantum electromagnetic noise

12:15 – 12:30: **María José Martínez-Pérez** (INMA, CSIC-University of Zaragoza, Spain) O

Integration of Magnons into Superconducting Circuits for Sensing Applications

12:30 – 13:00: **Poster Session I**

13:00 – 14:00: *Cocktail Lunch*

Chair : Gloria Platero Coello (ICMM-CSIC, Spain)

14:00 – 14:30: **Michelle Simmons** (University of New South Wales, Australia) K

Atomic Electronics – building qubits in silicon with atomic precision

14:30 – 15:00: **Deung-Jang Choi** (CFM-CSIC, UPV/EHU, Spain) I

Quantum Control at the Atomic Scale: From Ångstrom-Scale Qubit Platforms to Topological Superconductivity

15:00 – 15:15: **Martin Hayhurst Appel** (University of Cambridge, UK) O

A Spin Qubit Coupled to a Collective Nuclear Quantum Register

15:15 – 15:30: **Benjamin Brock** (Yale University, USA) O

Controlling a High-Q Cavity with a Kerr-cat Qubit

15:30 – 15:45: **Soeren Wengerowsky** (ICFO, Spain) O

Cavity-Enhanced on-demand Spin-Wave Solid State Quantum Memory

15:45 – 16:00: **Alessandro Crippa** (NEST, CNR-Istituto Nanoscienze and Scuola Normale Superiore, Italy) O

A gate tunable transmon qubit in planar Ge

16:00 – 17:00: *Coffee Break / Poster Session / Exhibition*

Chair : Ramon Aguado (ICMM-CSIC, Spain)

17:00 – 17:30: **Leo Kouwenhoven** (Delft University of Technology, The Netherlands) K

Andreev and Majorana bound states in nanoscale devices

17:30 – 17:45: **Ilan Rosen** (MIT, USA) O

Generating highly entangled states and synthetic gauge fields on a superconducting processor



Wednesday (08/05/2024)

//Workshop 01: Topological Quantum Matter: materials growth, characterization & theory

Chair Sophie Gueron (Université Paris Saclay - LPS, France)

09:00 – 09:30: **Carmen Rubio Verdú** (ICFO, Spain) I

Universal moiré nematic phase in twisted graphene

09:30 – 09:45: **Paritosh Karnatak** (University of Basel, Switzerland) O

Large tunable kinetic inductance in a twisted graphene superconductor

09:45 – 10:00: **Marc Vila** (LBNL and University of California, Berkeley, USA) O

Giant Resistance Switch in Twisted Transition Metal Dichalcogenide Tunnel Junctions

10:00 – 10:30: **Dmitri Efetov** (LMU, Germany) I

Thermodynamic measurements of the correlated states in Magic Angle Twisted Bilayer Graphene

10:30– 11:30: *Coffee Break / Poster Session / Exhibition*

Chair Adolfo G. Grushin (Institut Néel / CNRS, France)

11:30 – 12:00: **Sophie Gueron** (Université Paris Saclay - LPS, France) I

Evidence of helical states in bismuth

12:00 – 12:15: **Tanweer Ahmed** (CIC Nanogune, Spain) O

Role of Lifshitz transitions and Berry curvature dipole on nonlinear Hall effect in low symmetry Bilayer graphene

12:15 – 12:30: **Borislav Polovnikov** (LMU, Germany) O

Implementation of the Bilayer Hubbard Model in a Moiré Heterostructure

12:30 – 12:45: **Enrique Diez** (Universidad de Salamanca, Spain) O

Hydrodynamic electron flow in graphene

12:45 – 15:00: *Lunch Break*

Chair Maia Vergniory (Max Planck for Chemical Physics of Solids – DIPC, Germany/Spain)

15:00 – 15:15: **Pascal Gehring** (UCLouvain, Belgium) O

Large Anomalous Ettingshausen effect in a micron-sized magnetic Weyl semimetal on-chip cooler

15:15 – 15:30: **Giovanni Vignale** (National University of Singapore, Singapore) O

Theory of non-conserved density accumulations in the anomalous Hall effects

15:30 – 15:45: **Luis Canonico** (Institut Catala de Nanociencia i Nanotecnologia (ICN2), Spain) O

Orbital origin of hidden spin textures in centrosymmetric PtSe₂ monolayer and their proximity applications

15:45 – 16:00: **Pierre Capiod** (JUNIA-ISEN, France) O

Artificial quantum systems based on semi-conducting quantum dots chains: towards quantum simulations in a SSH chain.

16:00 – 16:15: **Nicetu Tibau Vidal** (University of Hong Kong, Hong Kong SAR) O

Annihilation operators for 2D non-abelian anyons

16:15– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair Stephan Roche (ICN2, Spain)

17:00 – 17:30: **Adolfo G. Grushin** (Institut Néel / CNRS, France) I

Amorphous topological metals

17:30 – 17:45: **Johan Christensen** (IMDEA Materials, Spain) O

Topological sonic defects

17:45 – 18:00: **Giacomo Rebola** (École Normale Supérieure de Lyon, France) 0
Tunable Edge Magnetoplasmon Resonator

//Workshop 02: Quantum Information theory, algorithms, networks & protocols

Chair Luca Tagliacozzo (IFF CSIC, Spain)

09:00 – 09:30: **Antonio Acin** (ICFO, Spain) I
Security proof of discrete-modulated continuous-variable quantum key distribution
09:30 – 09:45: **Maryam Afsary** (University of Warsaw, Poland) O
Secure key rate improvement methods in DI-QKD protocols
09:45 – 10:00: **Piotr Grochowski** (University of Innsbruck & IQOQI Innsbruck, Austria) O
Quantum control of continuous systems via nonharmonic potential modulation
10:00 – 10:15: **Manuel Gessner** (Universidad de Valencia, Spain) O
Hierarchies of quantum metrology bounds beyond Cramér-Rao
10:15 – 10:30: **Esperanza Lopez** (Instituto de Fisica Teorica, Spain) O
Comparative study of quantum error correction strategies for the heavy-hexagonal lattice

10:30– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair Antonio Acin (ICFO, Spain)

11:15 – 11:45: **Mikel Sanz** (NQUIRE Center - UPV/EHU, Spain) I
Training embedding quantum kernels with quantum neural networks
11:45 – 12:00: **Vanio Markov** (Wells Fargo, USA) O
Quantum Time Series Similarity Measures and Quantum Temporal Kernels
12:00 – 12:15: **Germán Rodrigo** (IFIC UV-CSIC, Spain) O
Quantum algorithms in collider particle physics
12:15 – 12:30: **Raphael Seidel** (Fraunhofer Institute For Open Communication Systems, Germany) O
Quantum Backtracking in Qrisp applied to Sudoku Problems
12:30 – 12:45: **Alessandro Tosini** (University of Pavia, Italy) O
Causal influence versus signalling for interacting quantum channels
12:45 – 13:00: **Geza Toth** (University of the Basque Country UPV/EHU, Spain) O
Quantum Wasserstein distance based on an optimization over separable states
13:00 – 13:30: **Matteo Ippoliti** (The University of Texas at Austin, USA) I
Phases of quantum information on a noisy quantum processor

13:30 – 15:00: *Lunch Break*

Chair Mikel Sanz (NQUIRE Center - UPV/EHU, Spain)

15:00 – 15:15: **Julia Mathe** (TU Wien, Austria) O
Estimation of entanglement monotones in spin systems
15:15 – 15:30: **Teemu Ojanen** (Tampere University, Finland) O
Avoiding exponential bottlenecks in measurement-induced entanglement phase transitions
15:30 – 15:45: **Yariv Yanay** (University of Maryland, USA) O
Detecting Measurement-Induced Entanglement Transitions With Unitary Mirror Circuits
15:45 – 16:00: **Javier Osca** (University of the Balearic Islands, Spain) O
Stochastic Optical Quantum Circuit Simulator: model, design and implementation
16:00 – 16:15: **German Sierra** (Instituto de Física Teórica UAM-CSIC, Spain) O
Photonic Implementation of the Quantum Morra Game

16:15– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair Matteo Ippoliti (The University of Texas at Austin, USA)

17:00 – 17:30: **Barbara Kraus** (Technical University of Munich, Germany) I
Testing and verifying quantum computations and simulations
17:30 – 17:45: **Daniel Bultrini** (University of Heidelberg, Germany) O
Mixed quantum-classical dynamics for near term quantum computers

- 17:45 – 18:00: **Baptiste Anselme Martin** (Eviden (Quantum Lab), France) O
Combining Matrix Product States and Noisy Quantum Computers for Quantum Simulation
- 18:00-18:15: **Gergeley Zarand** (Budapest Univ. Technology and Economics, Hungary) O
Quantum information jet in the infinite temperature Hubbard model

//Workshop 03: Growth and characterization of quantum materials for quantum technologies

Chair Athanasios Dimoulas (NCSR, Greece)

- 09:00 – 09:30: **Nicola Poccia** (IFW Dresden & University of Naples Federico II, Germany/Italia) I
Cuprate Twistronics for a New Generation of Macroscopic Quantum Hardwares
- 09:30 – 09:45: **Diana Serrano** (CNRS - Institut de Recherche de Chimie Paris, France) O
Long optical coherence in EuxLa_{1-x}PO₄ crystals, a new synthetic material for quantum technologies
- 09:45 – 10:00: **Philippe Goldner** (Chimie ParisTech PSL, France) O
Rare Earth-Diamond Hybrid Structures for Optical Quantum Technologies
- 10:00 – 10:15: **Robert Chapman** (ETH Zurich, Switzerland) O
Lithium niobate-on-insulator integrated photonics for linear optical quantum computing
- 10:15 – 10:30: **Davide Costa** (QuTech, The Netherlands) O
Record carrier mobility in group IV semiconductor materials

10:30– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair Javad Shabani (New York University, USA)

- 11:15 – 11:45: **Sonia Conesa Boj** (Delft University, The Netherlands) I
Towards a New Generation of van der Waals Materials for Quantum Technologies
- 11:45 – 12:00: **Malcolm Connolly** (Imperial College London, UK) O
Nanomagnet-induced Synthetic Spin-Orbit Coupling in a Superconductor-Semiconductor Nanowire
- 12:00 – 12:15: **Nilanthy Balakrishnan** (Keele University, UK) O
Growth of Iron selenide layers via salt-assisted chemical vapour deposition
- 12:15 – 12:30: **Taylor Stock** (University College London, UK) O
Single-Atom Control of Arsenic Incorporation in Silicon for Quantum Materials Fabrication
- 12:30 – 12:45: **Iván Martínez Ibarburu** (UAM, Spain) O
Unveiling the interlayer interaction in a 1H/1T TaS₂ van der Waals heterostructure
- 12:45 – 13:00: **Senthil Kumar Karuppanan** (Inst. of Materials Research and Engineering, A-Star, Singapore) O
Role of interface in quantum device
- 13:00 – 13:30: **Nitin Samarth** (Penn State University, USA) I
Epitaxially engineered quantum materials for quantum technologies: interfacing topology, magnetism, and superconductivity

13:30 – 15:00: *Lunch Break*

Chair Sonia Conesa Boj (Delft University, The Netherlands)

- 15:00 – 15:15: **Rosa Diaz** (Purdue University, USA) O
Understanding Inherent Structural Defects and Chemical Distribution at Topological Superconductor-Semiconductor Interfaces and Heterostructures Using Advance Electron Microscopy
- 15:15 – 15:30: **Ivan Pinto Huguet** (Institut Catala de Nanociencia i Nanotecnologia (ICN2), Spain) O
Automatic detection of vacancies in WS₂ for Quantum Materials studies using HAADF-STEM Imaging
- 15:30 – 15:45: **Deep Lall** (National Physical Laboratory, UK) O
Characterising frequency fluctuations in superconducting qubits
- 15:45 – 16:00: **Giovanni Oakes** (Quantum Motion, UK) O
High-fidelity dispersive spin readout in a scalable unit cell of silicon quantum dots
- 16:00 – 16:15: **Tobias Schulli** (The European Synchrotron ESRF, France) O
Strain control, imaging and tuning developed for SiGe qubit devices

16:30– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair : Nitin Samarth (Penn State University , USA)

- 17:00 – 17:30: **Javad Shabani** (New York University, USA) I
Understanding of disorder for enhancement of superconducting topological gap
- 17:30 – 17:45: **Andreas K. Hüttel** (University of Regensburg, Germany) O
Adiós flatland - Quantum transport in MoS₂ nanotube and nanoribbon quantum dots
- 17:45 – 18:00: **Artem Denisov** (ETH Zurich, Switzerland) O
Ultra-long relaxation of a Kramers qubit formed in a bilayer graphene quantum dot
- 18:00 – 18:15: **Hongguang Wang** (Max Planck Institute for Solid State Research, Germany) O
Quantum nanostructures of correlated metal oxides

//Workshop 04: Devices & Technologies for Quantum Computing

Chair Giorgios Katsaros (IST, Austria)

- 09:00 – 09:30: **Silvia Zorzetti** (Fermilab, USA) I
Unlocking the Quantum Internet: Advancements in High-Efficiency Microwave-Optical Transduction
- 09:30 – 09:45: **Chien-An Wang** (QuTech, Delft University of Technology, The Netherlands) O
Operating semiconductor quantum processors with hopping spins
- 09:45 – 10:00: **Maxim De Smet** (QuTech, TU Delft, The Netherlands) O
High-fidelity spin shuttling in silicon quantum dots
- 10:00 – 10:15: **Robert Starek** (Palacky University, Czech Republic) O
Storage and retrieval of quantum operations – an experimental test
- 10:15 – 10:30: **Mykhailo Moskalets** (IFISC (CSIC-UIB), Spain) O
Single-particle emission from the Andreev's level

10:30– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair Mikko Möttönen (Aalto University, Finland)

- 11:15 – 11:30: **Tahereh Niknejad** (Qblox BV, The Netherlands) O
Qblox Quantum Control Stacks: Accelerating Experiments, Reducing Error, and Enabling Large-Scale Quantum Computing
- 11:30 – 11:45: **Aamir Mohammed Ali** (Chalmers University of Technology, Sweden) O
Thermally driven quantum refrigerator autonomously resets superconducting qubit
- 11:45 – 12:00: **Ramon Szmuk** (Quantum Machines, Israel) O
A scalable local addressing system for optically addressable qubits using integrated photonics
- 12:00 – 12:15: **Larysa Trypuzhenko** (QuTech and Netherlands Organisation for Applied Scientific Research (TNO), The Netherlands) O
Interconnect Properties of Spin Qubit Devices
- 12:15 – 12:30: **Brendan Rhyno** (University of Illinois at Urbana-Champaign, USA) O
Exploring noisy quantum Kibble-Zurek physics with superconducting transmon qubits
- 12:30 – 12:45: **Anastasiia Nikolaeva** (International Center for Quantum Optics & Quantum Technologies LLC, Russia) O
Quantum computing with qubits embedded in trapped-ion qudits
- 12:45 – 13:00: **Victor Champain** (CEA, France) O
Parametric longitudinal coupling between a semiconductor charge qubit and a RF resonator
- 13:00 – 13:15: **Pino Caballero-Gil** (University of La Laguna, Spain) O
Oblivious Transfer and Bit Commitment Based on Quantum Communication

13:15 – 15:00: *Lunch Break*

Chair Silvia Zorzetti (Fermilab, USA)

- 15:00 – 15:30: **Audrey Bienfait** (ENS Lyon, France) I
Implementing a quantum memory with a frequency and bandwidth-tuneable superconducting resonator
- 15:30 – 15:45: **Daniel Margineda** (CIC nanoGUNE, Spain) O
Gate-controlled metallic superconductors and superconducting diodes
- 15:45 – 16:00: **Jorge Huamani Correa** (AGH University of Krakow, Poland) O
Theory of Superconducting Diode effect in Multiterminal Josephson junctions
- 16:00 – 16:15: **Samuel D. Escribano** (Weizmann Institute of Science, Israel) O
Poor's man Majorana with superconducting phase control

16:15– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair Audrey Bienfait (ENS Lyon, France)

17:00 – 17:30: **Visa Vesterinen** (VTT, Finland)

Enabling technologies for large-scale cryogenic quantum computers: parametric amplifiers

17:30 – 17:45: **Yannic Rath** (National Physical Laboratory, UK)

Integrating tensor networks with quantum computing for simulations of strongly correlated materials

17:45 – 18:00: **Benedikt Fauseweh** (TU Dortmund University, Germany)

Digital Quantum Simulation of Quantum Many-Body Dynamics on NISQ Devices

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//Workshop 05: Quantum Simulation Technologies

Chair Enrique Rico (UPV-EHU, Spain)

09:00 – 09:30: **Magdalena Stobinska** (Warsaw University, Poland)

Enhancing free space DI QKD via employing NPA hierarchy method

09:30 – 09:45: **Oles Shtanko** (IBM Quantum, USA)

Experimental Reconstruction of Local Integrals of Motion for Quantum Many-Body Dynamics

09:45 – 10:00: **Ayaka Usui** (Universitat Autònoma de Barcelona, Spain)

Simplifying the simulation of local Hamiltonian dynamics

10:00 – 10:15: **Matthias Werner** (Qilimanjaro Quantum Tech / University of Barcelona, Spain)

Quantum simulation of 1D-fermionic systems with Ising Hamiltonians

10:15 – 10:30: **Dong-Ling Deng** (Tsinghua University, China)

Digital simulation of non-Abelian anyons with superconducting qubits

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10:30– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair Maryam Afsary (Warsaw University, Poland)

11:15 – 11:45: **Karl Jansen** (Deutsches Elektronen-Synchrotron DESY, Germany)

The Center for Quantum Technology and Applications: activities and use cases

11:45 – 12:15: **Sofia Vallecorsa** (CERN, Switzerland)

Quantum Technology Initiative at CERN

12:15 – 12:30: **Rebekka Garreis** (Silicon Quantum Computing, UNSW, Australia)

A quantum materials simulator based on Coulomb-confined quantum dots

12:30 – 12:45: **Tobias Grass** (DIPC, Spain)

Cold atoms with flat bands – from synthetic bilayers to flat band Bose-Einstein condensates

12:45 – 13:00: **Manfred Mark** (Universität Innsbruck - Institut für Experimentalphysik, Austria)

Observation of vortices in dipolar quantum gases

13:00 – 13:15: **Zhi-Yuan Wei** (Max Planck Institute for Quantum Optics, Germany)

Kondo Impurity in an attractive Hubbard Bath

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13:15 – 15:00: *Lunch Break*

Chair Matti Silveri (University of Oulu, Finland)

15:00 – 15:15: **Joris Kattemölle** (University of Konstanz, Germany)

Optimal quantum circuits for the quantum simulation of quantum matter

15:15 – 15:30: **Tzu-Kan Hsiao** (National Tsing Hua University, Taiwan)

Towards quantum simulation of spin wave modes in quantum dot arrays

15:30 – 15:45: **David Zueco** (CSIC, Spain)

Neural Network simulations of quantum long range models

15:45 – 16:00: **Nikodem Szpak** (University of Duisburg-Essen, Germany)

Quantum simulation of strong field phenomena and curved spaces in deformed optical lattices

16:00 – 16:15: **Yijia Zhou** (Shanghai Qi Zhi Institute, China)

Neutral Atoms with Rydberg Interactions for Many-Body Physics and Quantum Simulations

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16:15– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair Alfredo Levy Yeyati (IFIMAC / UAM, Spain)

- 17:00 – 17:30: **Matti Silveri** (University of Oulu, Finland) I
Dynamics beyond two-level approximation in transmon arrays
- 17:30 – 17:45: **Jesús Cobos Jiménez** (Basque Country University, Spain) O
Noise-aware variational eigensolvers: A dissipative approach for lattice gauge theories
- 17:45 – 18:00: **Javier del Pino** (University of Konstanz, Germany) O
Dynamical Gauge Fields with Bosonic Codes in Nonlinear Resonators
- 18:00 – 18:15: **Simone Gasparinetti** (Chalmers University of Technology, Sweden) O
Universal control of a bosonic mode via drive-activated native cubic interaction

//Workshop 06: Devices & Technologies for Quantum Sensing**Chair Jorge Casanova (EHU/UPV, Spain)**

- 09:00 – 09:30: **Joseph Dufouleur** (IFW Dresden, Germany) I
Non-Hermitian topology in multi-terminal devices: from fundamental to applications
- 09:30 – 09:45: **Matteo Wauters** (University of Trento, Italy) O
Weak-measurement protection in quantum simulations of lattice gauge theories
- 09:45 – 10:00: **Sona Najafi** (IBM, USA) O
Measuring central charge from local measurements
- 10:00 – 10:15: **Viktor Könye** (University of Amsterdam, The Netherlands) O
Non-Hermitian physics without gain or loss: the skin effect of reflected waves

*10:15– 11:15: Coffee Break / Poster Session / Exhibition***Chair Joseph Dufouleur (IFW Dresden, Germany)**

- 11:15 – 11:45: **Jorge Casanova** (EHU/UPV, Spain) I
High-Field NMR with Solid-state Quantum Sensors
- 11:45 – 12:00: **Debarghya Dutta** (University of Basel, Switzerland) O
Investigating Phase Transitions in Van Der Waals Magnets using a Quantum Sensor
- 12:00 – 12:15: **Stephanie Matern** (Pitaevskii BEC Center, CNR-INO and Università di Trento, Italy) O
Quantum coherence-assisted sensing with parallel quantum dots
- 12:15 – 12:30: **Kalid Ulas** (University of Cambridge, UK) O
Charge sensing using a single-electron double-box in a silicon quantum dot array
- 12:30 – 12:45: **Viktor Ivády** (Eötvös Loránd University, Hungary) O
Electronic structure and decoherence of the VB center in hexagonal boron nitride for sensing in low dimensions

*13:15 – 15:00: Lunch Break***Chair Juan Sierra (ICN2, Spain)**

- 15:00 – 15:15: **Yelko del Castillo Hernández** ((INL, Portugal) O
Probing spin fractionalization with ESR-STM absolute magnetometry
- 15:15 – 15:30: **Simone Eizaguirre Barker** (University of Cambridge, UK) O
Optically detected electronic spin resonance of single emitters in hexagonal boron nitride under an angle-resolved magnetic field at room temperature
- 15:30 – 15:45: **Vincent Jouanny** (EPFL, Switzerland) O
High-kinetic inductance coupled cavity arrays for analog quantum simulation
- 15:45 – 16:00: **Kilian Seibold** (University of Konstanz, Germany) O
Quantum dynamics of Dissipative Kerr solitons

*16:00– 17:00: Coffee Break / Poster Session / Exhibition***Chair : Ruben Estban (Centro de Física de Materiales, Spain)**

- 17:00 – 17:15: **Francesco Hoch** (Sapienza University of Rome, Italy) O
Teleportation of a genuine single-rail vacuum/one-photon qubit generated via a quantum dot source
- 17:15 – 17:30: **Adrian Juan-Delgado** (Centro de Física de Materiales (CSIC-UPV/EHU), Spain) O
Engineering Photon Sources with Interacting Quantum Emitters

17:30 – 17:45: **Nicolas Fabre** (Telecom Paris, France) O
Time-frequency quantum metrology

//Workshop 07: Topological Magnetism

Chair Olivier Boulle (CEA, France)

09:00 – 09:30: **Jairo Sinova** (Johannes Gutenberg University Mainz, Germany) I
Unconventional magnetism: the emergence of altermagnetism and its new variants

09:30 – 09:45: **Amilcar Bedoya Pinto** (University of Valencia, Spain) O

Connecting Fermi-surface topology and spin-orbit torques in Weyl Semimetal/Ferromagnet Heterostructures

09:45 – 10:00: **Yu Liu** (Niels Bohr Institute, University of Copenhagen, Denmark) O

Ferromagnetic hybrid nanostructure and its zero-field application

10:00 – 10:15: **Ryuji Fujita** (University of Oxford, UK) O

Real-space evidence for 2D-XY ordering in a van der Waals ferromagnet

10:15– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair Juan Sierra (ICN2, Spain)

11:15 – 11:45: **Frédéric Bonell** (Spintec, France) I

Epitaxial van der Waals heterostructures for magnetism and spin-charge conversion

11:45 – 12:00: **Sergio Barquero** (University of Amsterdam, The Netherlands) O

Magnetism meets Topology: Electronic structure of the candidate FM-TI $Mn_{1+x}Sb_{2-x}Te_4$ by ARPES

12:00 – 12:15: **Sara Catalano** (Materials Physics Center, Spain) O

Tunnelling spectroscopy and Josephson coupling through EuS/Al interfaces.

12:15 – 12:30: **Thorsten Hesjedal** (University of Oxford, UK) O

Exploration of Topological Magnetic Objects at Interfaces using Resonant Elastic X-Ray Scattering

12:30 – 13:00: **Olivier Boulle** (CEA, France) I

Manipulation of magnetic skyrmions for memory and logic applications

13:00 – 15:00: *Lunch Break*

Chair Frédéric Bonell (Spintec, France)

15:00 – 15:30: **Marie-Blandine Martin** (CNRS-Thales, France) I

Towards a topology-based compact neuromorphic component

15:30 – 15:45: **Mehmet Cengiz Onbasli** (Koc University, Turkey) O

Topologically protected spin chirality beyond room temperature

15:45 – 16:00: **Bo Peng** (University of Cambridge, UK) O

Photo-induced electronic and spin topological phase transitions in monolayer single-element ferroelectrics

16:00– 17:00: *Coffee Break / Poster Session / Exhibition*

Chair Fernando Luis (UNIZAR, Spain)

17:00 – 17:15: **Wei Wu** (University College London, UK) O

Exploring the spin-bearing molecular network for quantum materials and quantum computing

17:15 – 17:30: **Carmen Gomez Carbonell** (ICN2, Spain) O

Magnetic properties of MBE-grown $MnSb_2Te$

17:30 – 17:45: **Pablo Cova Fariña** (QuTech, The Netherlands) O

Observation of magnon dynamics in a quantum dot ladder

Industrial Forum

Chair James S. Clarke (Intel, USA)

09:00 – 09:30: Artur Ekert (University of Oxford, UK)	K
The Age of Computation is yet to Come	
09:30 – 09:50: Roman Orus (Multiverse Computing & DIPC, Spain)	I
Multiverse Computing: Quantum and Quantum-Inspired AI and Beyond	
09:50 – 10:10: Jelena Trbovic (QuantrolOx, Finland)	I
Accelerating the Development of Quantum Computers through Automation	
10:10 – 10:30: Felice Francesco Tafuri (Keysight Technologies, USA)	I
Accelerating the Quantum Workflow from Design to Experiments	
10:30– 11:00: <i>Coffee Break / Poster Session / Exhibition</i>	

Chair Roman Orus (Multiverse Computing & DIPC, Spain)

11:00 – 11:30: James S. Clarke (Intel, USA)	K
Spin Qubits produced with a 300mm fabrication line: An update on Intel Si/SiGe devices	
11:30 – 11:45: Gertjan Eenink (QuTech and Netherlands Organisation for Applied Scientific Research (TNO), The Netherlands)	O
Scaling spin qubit devices: vertical interconnects through Al ₂ O ₃	
11:45 – 12:00: Nikolai Drobotun (Delft Circuits B.V., The Netherlands)	O
Flexible stripline I/O with embedded filtering: scalable signal delivery platform with proven qubit performance	
12:00 – 12:15: Alexia Salavrakos (Quandela, France)	O
SPOQC: a Spin-Optical Quantum Computing architecture	
12:15 – 12:30: Miguel Fernando Gonzalez-Zalba (Quantum Motion, UK)	O
Coherent control and large-scale characterisation of silicon quantum devices fabricated using 300-mm wafer processes	
12:30 – 12:45: Samira Nik (European Innovation Council (EIC), Belgium)	I
EIC Quantum Tech Portfolio and Activities	
12:45 – 13:30: Round Table	
Tackling Investment in Quantum Technologies; European Innovation Council/Private Investment	
<ul style="list-style-type: none">• Samira Nik (EIC, Belgium): moderator• Enrique Lizaso (Multiverse Computing, Spain)• Olivier Tonneau (Quantonation, France)• Nikolay Dimov (EIB, Luxembourg)	

13:30 – 15:00: *Lunch Break*

Chair Silvano de Franceschi (CEA/UGA, France)

15:00 – 15:15: Fabio Ansaloni (Quantum Machines, Denmark)	O
Hermetic packaging for cryogenic experiments	
15:15 – 15:35: Pau Jorba (Kiutra, Germany)	I
ADR based sub-Kelvin cryostats for applied quantum technologies	
15:35 – 15:55: Yemliha Bilal Kalyoncu (Qblox BV, The Netherlands)	I
Integrated and Scalable Quantum Control	
15:55 – 16:15: Yonatan Cohen (Quantum Machines, Israel)	I
Quantum advantage via Classical Control	
16:15 – 17:00: <i>Coffee Break / Poster Session / Exhibition</i>	

Chair Javier Aizpurua (DIPC & Ikerbasque, Spain)

17:00 – 17:20: Claudius Riek (Zurich Instruments, Switzerland)	I
Enabling Quantum Technology - from individual devices to 100s of qubits	
17:20 – 17:40: Alexandre Dauphin (PASQAL, France)	I
Exploring quantum materials with a neutral atom processor	
17:40 – 18:00: Anurag Saha Roy (Qruise, Germany)	I
Improving flux-based gates in superconducting QPUs through model learning of qubit and control stack parameters	
18:00 – 18:15: Pasquale Cilibrizzi (Heriot-Watt University, UK)	O
Ultra-narrow inhomogeneous spectral distribution of telecom-wavelength vanadium centres in isotopically enriched silicon carbide	

18:15 – 18:30: **Izaskun Oregui Bravo** (TECNALIA, Spain) O
 Quantum for Logistics: solving real-world bin packing and package delivery routing problems using quantum annealers
 18:30 – 18:45: **Hans Werner Schumacher** (Physikalisch-Technische Bundesanstalt, Germany) O
 Optimized semiconductor single electron pumps for metrology and quantum technology
 20:00 – 22:30: **Conference dinner - Restaurant PETRITEGI SAGARDOTE** Petritegi Bidea, 8; Astigarraga, 20115, Gipuzkoa - [more info](#) / [Google Maps](#) - Shuttle transfer info provided onsite



Thursday (09/05/2024)

Plenary Session

Chair Mohammad Hafezi (University of Maryland, USA)

09:00 – 09:30: **Peter Lodahl** (University of Copenhagen, Denmark) I
 Deterministic single-photon hardware for scalable quantum-information processing
 09:30 – 09:45: **David Perconte** (Neel institute/ CNRS, France) O
 Evidence for chiral supercurrent in quantum Hall Josephson junctions
 09:45 – 10:00: **Alfredo Levy Yeyati** (Universidad Autónoma de Madrid, Spain) O
 Photonic heat transport and the Schmid transition in Josephson junctions
 10:00 – 10:15: **Zeila Zanolli** (Utrecht University, The Netherlands) O
 Quantum Materials optoelectronics

10:15– 11:15: *Coffee Break / Poster Session / Exhibition*

Chair: Stephan Roche (ICN2, Spain)

11:15 – 11:30: **Gabriel Araneda** (University of Oxford, UK) O
 A network of trapped-ion quantum computers
 11:30 – 11:45: **Abhishek Banerjee** (Harvard University, USA) O
 Superfluid stiffness of twisted graphene
 11:45 – 12:15: **Mohammad Hafezi** (University of Maryland, USA) I
 Strongly interacting bosonic physics in layered two-dimensional van der Waals materials
 12:15 – 12:45: **Anatoly Kulikov** (ETH Zurich, Switzerland) I
 Device-independent algorithms with superconducting circuits

12:45 – 14:00: *Cocktail lunch*

14:00 – 14:30: **Poster Session II**

“QUANTUM MATTER” Parallel session - PhD Students

Chair: Deung-Jang Choi (CFM-CSIC, UPV/EHU, Spain)

14:30 – 14:40: **Timon Baltisberger** (University of Basel, Switzerland) O
 Fast optical-manipulation of a coherent hole-spin in an open microcavity
 14:40 – 14:50: **Jaime Saez-Mollejo** (ISTA, Austria) O
 Microwave-driven two-hole spin qubits
 14:50 – 15:00: **Marcos Rubín Osanz** (INMA - CSIC - Universidad de Zaragoza), Spain) O
 Dispersive readout of molecular spin qubits
 15:00 – 15:10: **Joaquin Medina Dueñas** (Institut Catala de Nanociencia i Nanotecnologia (ICN2), Spain) O
 Optimal Charge-to-Spin Conversion Tuned by Intraparticle Entanglement
 15:10 – 15:20: **Josef Svetlik** (Catalan Institute of Nanoscience and Nanotechnology (ICN2), Spain) O
 Proximity Induced Magnetism and Spin-orbit Coupling in Graphene/VxW1-xSe2 Heterostructure
 15:20 – 15:30: **Pablo Moles** (Universidad Complutense de Madrid, Spain) O
 Impact of vacancies on the transport in twisted bilayer graphene quantum point contacts

15:30 – 15:40: **Marc Botifoll** (Institut Catala de Nanociencia i Nanotecnologia (ICN2), Spain) O
 Generalisation of a novel routine for band gap mapping at sub-nanometric resolution

- 15:40 – 15:50: **Andrés Bejarano** (DIPC, Spain) 0
 Statistical properties of light emission in current-driven single-molecule STM-junctions
- 15:50 – 16:00: **Martina Soldini** (University of Zurich, Switzerland) 0
 Charge-4e superconductivity in a Hubbard model

“QUANTUM INFO & COMPUTING” Parallel session - PhD Students

Chair: **Silvano de Franceschi** (CEA/UGA, France)

- 14:30 – 14:40: **Josefine Enkner** (ETH Zürich, Switzerland) 0
 In situ modification of the Quantum Hall effect with cavity vacuum fields
- 14:40 – 14:50: **Laurin Fischer** (IBM Quantum, Switzerland) 0
 Dual frame optimization for informationally complete quantum measurements
- 14:50 – 15:00: **Gian Gentinetta** (École polytechnique fédérale de Lausanne, Switzerland) 0
 Overhead-constrained circuit knitting for variational quantum dynamics
- 15:00 – 15:10: **Noah Goss** (University of California, Berkeley, USA) 0
 Empowering Qudit Quantum Computing by Traversing the Dual Bosonic Ladder
- 15:10 – 15:20: **Xanda Kolesnikow** (The University of Sydney, Australia) 0
 Gottesman-Kitaev-Preskill State Preparation Using Periodic Driving
- 15:20 – 15:30: **Frederik Pfeiffer** (Technical University of Munich & Walther-Meißner-Institut, Germany) 0
 Efficient decoupling of a non-linear qubit mode from its environment
- 15:30 – 15:40: **Daniel Michel Pino González** (Materials Science Institute of Madrid (ICMM-CSIC), Spain) 0
 Minimal Kitaev-transmon qubit based on double quantum dots
- 15:40 – 15:50: **Cristian Tabares López** (Institute of Fundamental Physics (IFF-CSIC), Spain) 0
 A variational toolbox for analog quantum simulators
- 15:50 – 16:00: **Ian Yang** (Austrian Academy of Sciences, Austria) 0
 Hot Schrödinger Cat States

“QUANTUM TECH” Parallel session - PhD Students

Chair **Daniel Sanchez-Portal** (CFM, Spain)

- 14:30 – 14:40: **Marta Cagetti** (ICFO, Spain) 0
 Quantum simulator based on electromechanically coupled carbon nanotube
- 14:40 – 14:50: **Carolina del Río Bueno** (INMA (CSIC-UZ), Spain) 0
 Remote spin-spin interactions mediated by superconducting circuits for quantum applications.
- 14:50 – 15:00: **Marta Irene Garcia Cid** (INDRA/Universidad Politecnica de Madrid, Spain) 0
 Experimental Realization of a Quantum Zero-Knowledge Proof
- 15:00 – 15:10: **Jonas Grammel** (Karlsruhe Institute of Technology, Germany) 0
 Telecom O-band quantum dots in an open access fiber-based microcavity
- 15:10 – 15:20: **Stefanie Grotowski** (Walter Schottky Institute Technical University of Munich, Germany) 0
 Superconducting MoSi Thin Films for Single-Photon Detection
- 15:20 – 15:30: **Valentin Guichard** (C2N - CNRS, France) 0
 Controlling the generation of large cluster states with residual visibility measurements
- 15:30 – 15:40: **Vidul Joshi** (Yale University, USA) 0
 Quantum Zeno effect: preventing a photon from exiting a cavity.
- 15:40 – 15:50: **Axel Leblanc** (CEA, France) 0
 Tunable charge-4e supercurrent in Ge-based JoFET
- 15:50 – 16:00: **David Rower** (MIT, USA) 0
 Circularly Polarized Driving and Commensurate Pulses for Fast Single-Qubit Gates with Fluxonium
- 16:00 – 16:10: **Noah Shofer** (University of Cambridge, UK) 0
 Tuning the coherent interaction of an electron qubit and a many-body register

Industrial Forum

Chair Gianni Casonato (EUMETSAT, Germany)

- 09:00 – 09:15: **Alessandro Laneve** (Sapienza University of Rome, Italy) O
Polarization-wavevector correlation in entangled photons from cavity-embedded quantum dots
- 09:15 – 09:30: **Andreas Fyrrillas** (Quandela, France) O
High-Fidelity Quantum Information with Machine Learning-Characterized SiN Photonic Circuits
- 09:30 – 09:45: **Alexandra Bernasconi** (QphoX, The Netherlands) O
An integrated microwave-to-optics interface for scalable quantum computing
- 09:45 – 10:00: **Arnau Riera** (Qilimanjaro Quantum Tech, Spain) O
Variational diabatic annealing schedules with Landau-Zener-Stückelberg interference
- 10:00 – 10:15: **Oscar Gargiulo** (Kiutra GmbH, Germany) O
Accelerating resonator spectroscopy using microwave pulses
- 10:15 – 10:30: **Nadia Belabas** (CNRS - C2N, France) O
A frequency network through parallel processing of frequency-bin entangled photons from a 21 GHz SOI micro-resonator

10:30– 11:00: *Coffee Break / Poster Session / Exhibition*

Chair Ricardo Díez Muiño (DIPC & Ikerbasque, Spain)

- 11:00 – 11:30: **Jay M. Gambetta** (IBM, USA) K
Quantum Computing at the Utility Scale and Beyond
- 11:30 – 11:45: **Mathias Pont** (Quandela, France) O
A versatile single-photon-based quantum computing platform
- 11:45 – 12:00: **Carlos Kuchkovsky** (Qcentroid, Spain) O
Quantum Operations and Business Innovation: Leveraging Sustainability and Energy Efficiency for Accelerated Impact
- 12:00-12:15: **Thijs Stavenga** (Quantware, The Netherlands) O
Look-up table based fast tune-up of superconducting quantum processors
- 12:15 – 12:30: **Gianni Casonato** (EUMETSAT, Germany) O
Pseudo-Qubit Modelling - Enabling Large Scale Application Simulations
- 12:30 – 12:45: **Sorin Bolos** (Transilvania Quantum, Romania) O
Vulnerabilities of the Reset Operation on Superconducting Qubits

13:00 – 14:00: *Cocktail Lunch*

14:00 – 14:30: **Poster Session II**

Industrial Forum (BasQ/IBM Session)

Chair Jay M. Gambetta (IBM, USA)

- 14:30 – 14:45: **Nicolas Lorente** (Materials Physics Center, Spain) O
Localisation, Thermalisation and Time Crystals: Quantum Simulations of Disorder
- 14:45 – 15:00: **Sergiy Zhuk** (IBM Quantum, IBM Research Europe -Dublin, Ireland) O
Trotter error bounds and dynamic multi-product formulas for Hamiltonian simulation
- 15:00 – 15:15: **Eric Switzer** (Donostia International Physics Center, Spain) O
Quasi-2D Time Crystals on NISQ Hardware: Challenges & Opportunities
- 15:15 – 15:30: **Niall Robertson** (IBM Quantum, Ireland) O
Approximate Quantum Compiling for Quantum Simulation: A Tensor network based approach
- 15:30 – 15:45: **Rubén Esteban Llorente** (Centro de Física de Materiales, Spain) O
Quantum computation of the dynamics of the Jaynes-Cummings Hamiltonian for nanophotonics
- 15:45 – 16:00: **Nathan Keenan** (IBM Dublin, Ireland) O
Evidence of Kardar-Parisi-Zhang scaling on a digital quantum simulator

16:00 – 16:30: *Coffee Break / Poster Session / Exhibition*

Chair Javier Aizpurua (DIPC & Ikerbasque, Spain)

- 16:30 – 16:45: **David Casanova** (DIPC, Spain) O
Physically motivated enhancements of variational quantum eigensolvers for quantum chemistry
- 16:45 – 17:00: **William Kirby** (IBM Quantum, USA) O
Diagonalizing large many-body systems on a quantum processor using quantum Krylov

17:00 – 17:15: Antonio Mezzacapo (IBM, USA) Chemistry Beyond the Reach of Exact Solutions of the Schroedinger Equation on a Quantum-centric Supercomputer	O
17:15 – 17:30: Josu Etxezarreta Martinez (Tecnun - University of Navarra, Spain) Projected Lindblad dynamics via Hamiltonian symmetries for Quantum Error Mitigation	O
17:30 – 17:45: Juan Borge (Mondragon University, Spain) Error estimation in current noisy quantum computers	O
17:45 – 18:00: Elisa Bäumer (IBM Research Zurich, Switzerland) Quantum Fourier Transform using Dynamic Circuits	O
18:00 – 18:15: Francesco Di Marcantonio (University of the Basque Country UPV/EHU, Spain) Quantum Many-Body phase diagram characterization using Fidelity-based Kernels	O
18:15 – 18:30: Roman Orus (Multiverse Computing & DIPC, Spain) News on Variational Quantum Machine Learning	O



Friday (10/05/2024)

Plenary Session

Chair Celia Rogero (CFM/CSIC - UPV/EHU, Spain)

09:00 – 09:30: Jens Eisert (Freie Universität Berlin, Germany) Potential and limitations of near-term quantum computing	I
09:30 – 09:45: Ting Rei Tan (The University of Sydney, Australia) Analog quantum simulation of quantum chemical dynamics with a trapped-ion system	O
09:45 – 10:00: Felix Hoffet (ICFO - The Institute of Photonic Science, Spain) Ultra-high indistinguishability of two dissimilar and independent cold-atomic quantum nodes	O
10:00 – 10:30: Angela Kou (University of Illinois Urbana-Champaign, USA) Driving the fluxonium qubit	I

10:30– 11:00: Coffee Break

Chair To be defined

11:00 – 11:40: Claudia Felser (Max-Planck-Gesellschaft, Germany) Chirality and Topology	P
11:40 – 12:10: Yulia Maximenko (Colorado State University, USA) Unconventional quantum phases and their visualization with atomic resolution	I
12:10 – 12:40: Ana Asenjo-Garcia (Columbia University in the city of New York, USA) Universal scaling laws for correlated decay of many-body quantum systems	I
12:40 – 13:10: Francesca Ferlino (University of Innsbruck & IQOQI, Austria) Advancing Many-Body Quantum Physics with Dipolar Quantum Gases	I

13:10: **Closing & QUANTUMatter2025 announcement.**