

NYX Hotel Erfurt  
Sep 24 – 26, 2025



# CT.QMAT

Cluster Retreat 2025  
on Complexity and Topology  
in Quantum Matter

## Conference Booklet

Valid as of September 3 - for all updates please visit [www.ctqmat.de/en/events/erfurt25](http://www.ctqmat.de/en/events/erfurt25) from September 22!



# Preface

Dear Participants,

We welcome you to the Cluster Retreat 2025 in Erfurt. This year's retreat marks a special occasion: it's the final joint event of ct.qmat's very successful first funding period. Since 2019, we've accomplished a remarkable amount together – more than 1,600 publications, eight patents, and numerous pioneering findings that have advanced our understanding of quantum materials. These are achievements of which we can all be justly proud.

At the same time, this retreat opens a new chapter. With the renewal of our cluster under the new name ctd.qmat – Complexity, Topology and Dynamics in Quantum Matter, we're now embarking on a second funding period with an expanded focus on quantum dynamics and exciting challenges ahead.

The program before you combines inspiring scientific talks with the informal encounters – coffee breaks, poster sessions, and evening events – that so often spark new ideas and collaborations. This week will also lay the organizational foundations for the coming years. On Wednesday, the members will elect the new spokespersons, the Steering Committee, and the Flex Fund Selection Committee. Meanwhile, the Quantum Matter Academy will vote for its two representatives on the Steering Committee, and two more on the Flex Fund Selection Committee. On Thursday, the newly elected Steering Committee will convene for the first time. We look forward to stimulating discussions, fruitful networking, and a retreat that will energize our joint journey into the second funding period.

Ralph Claessen and Matthias Vojta  
Spokespersons of the Cluster of Excellence ct.qmat

# Program Overview

Wednesday Sep 24, 2025	Thursday Sep 25, 2025	Friday Sep 26, 2025
12:00 Arrival	 <b>Breakfast</b>	
	Session 2 – Flat bands	Session 5 – Topology
	09:00 Bing Liu	09:00 Michael Ruck
	09:20 Lennart Klebl	09:20 Begmuhammet Geldiyev
	09:40 Shuai Chen	09:40 Hanns Zimmermann
	10:00 Ludovica Zullo	10:00 Andreas Pfenning
		10:20 Dominik Horneber
		Check-out (until 12:00)
	 <b>Coffee break</b>	
	10:40 – 12:40 Social activity - guided city tour Erfurt	Session 6 – Dynamics
		11:20 Tatiana A. Uaman Svetikova
		11:40 Simon Widmann
	11:20 – 12:40 Steering committee meeting	12:00 Christian Mayer
		12:20 Tobias Müller
	 <b>Lunch</b>	
13:00 Welcome	Session 3 – Superconductivity	Session 7 – Correlations
13:10 WomenInQuantumTech Martina Erlemann	14:00 Fabian Jakubczyk	14:00 Anika Götz
	14:20 Kristian Maeland	14:20 Coraline Bacq
Session 1 – Transport	14:40 Susmita Changdar	14:40 Manuel Weber
13:30 Subhankar Khatua	15:00 Xiaochun Huang	15:00 Mark Potts
13:50 Lorenzo Del Re	15:20 Group foto & drone video	15:20 – 15:40 Closing remarks & best poster award
14:10 Pavlo Pyshkin	15:50 Poster session II & coffee 	
14:30 Wouter Beugeling	Session 4 – Magnetism	Departure
14:50 Nathaniel Gallop	17:00 Aparajita Singha	
15:10 Poster session I & coffee 	17:20 Olga Shevtsova	
16:20 – 18:40 Members' assembly & QMA meeting	17:40 Ricardo J. P. Román	
	18:00 Jonathan Karl	
	18:20 Fabian Köhler	
	 <b>Dinner</b>	
20:10 Poster session I (continued)	20:10 Poster session II (continued)	

# Program

## Wednesday, Sep 24, 2025

until 12:00	Arrival
	<b>Lunch</b>
13:00 – 13:10	Welcome
13:10 – 13:30	WomenInQuantumTech – Martina Erlemann
13:30 – 15:10	<b>TRANSPORT</b> _____ Session 1
13:30 – 13:50	Subhankar Khatua Topological magnons in an altermagnet
13:50 – 14:10	Lorenzo Del Re Tunable spin transport in bilayer altermagnetic Mott insulators
14:10 – 14:30	Pavlo Pyshkin Modelling of (quasi-) ballistic transport in two-dimensional electron systems
14:30 – 14:50	Wouter Beugeling Transport signatures of parity symmetry breaking in a three-dimensional topological insulator
14:50 – 15:10	Nathaniel Gallop Phonon coherences and controlling electron-phonon coupling effects in two-dimensional hybrid perovskites
15:10 – 16:20	Poster session I
	<b>Coffee break / Hotel Check-in</b>
16:20 – 18:40	Members' assembly & QMA meeting
	<b>Dinner</b>
20:10 – 00:00	Poster session I (continued)

## Thursday, Sep 25, 2025

	<b>Breakfast</b>
09:00 – 10:20	<b>FLAT BANDS</b> _____ Session 2
09:00 – 09:20	Bing Liu Substrate-engineered breathing instability in a monolayer kagome lattice
09:20 – 09:40	Lennart Klebl Exact downfolding and its perturbative approximation
09:40 – 10:00	Shuai Chen Generalized Peierls substitution for Wannier obstructions
10:00 – 10:20	Ludovica Zullo Flat band evolution in multi-orbital charge density wave lattices
	<b>Coffee break</b>
10:40 – 12:40	<b>Social activity - guided city tour Erfurt</b>
11:20 – 12:40	<b>Steering committee meeting</b>
	<b>Lunch</b>
14:00 – 15:20	<b>SUPERCONDUCTIVITY</b> _____ Session 3
14:00 – 14:20	Fabian Jakubczyk Composite superconducting orders and magnetism in $\text{CeRh}_2\text{As}_2$
14:20 – 14:40	Kristian Mæland Phonon-mediated intrinsic topological superconductivity in Fermi arcs

# Program

## Thursday , Sep 25, 2025

- 14:40 – 15:00 Susmita Changdar  
Nodal superconductivity on the Fermi arcs of  $\text{PtBi}_2$
- 15:00 – 15:20 Xiaochun Huang  
Sizeable superconducting gap and anisotropic chiral topological superconductivity in the Weyl semimetal  $\text{PtBi}_2$
- 15:20 – 15:50 [Group foto & drone video](#)
- 15:50 – 17:00 [Poster session II](#)
-  [Coffee break](#)
- 17:00 – 18:40 [MAGNETISM](#) \_\_\_\_\_ [Session 4](#)
- 17:00 – 17:20 Aparajita Singha  
Non-invasive NV-magnetometry as a nanoscale spatially resolved technique: opportunities and challenges
- 17:20 – 17:40 Olga Shevtsova  
On-surface spin characterisation of isolated molecules using room temperature NV magnetometry
- 17:40 – 18:00 Ricardo Javier Peña Román  
Quantum sensing of a multilayered synthetic antiferromagnet
- 18:00 – 18:20 Jonathan Karl  
Discrete holography
- 18:20 – 18:40 Fabian Köhler  
Frustration and spin liquids in classical hyperbolic antiferromagnets
-  [Dinner](#)
- 20:10 – 00:00 [Poster session II \(continued\)](#)

## Friday , Sep 26, 2025

-  [Breakfast](#)
- 09:00 – 10:40 [TOPOLOGY](#) \_\_\_\_\_ [Session 5](#)
- 09:00 – 09:20 Michael Ruck  
New weak topological insulators and semimetals
- 09:20 – 09:40 Begmuhammet Geldiyev  
One-dimensional domain boundary states at tellurium-metal interfaces
- 09:40 – 10:00 Hanns Zimmermann  
Exploring topological effects in thin-film x-ray cavities
- 10:00 – 10:20 Andreas Pfenning  
Topological protection of quantum-photonic states
- 10:20 – 10:40 Dominik Horneber  
Organic microcavity systems
-  [Coffee break](#)
- 10:40 – 11:10 [Check-out \(until 12:00\)](#)
- 11:20 – 12:40 [DYNAMICS](#) \_\_\_\_\_ [Session 6](#)
- 11:20 – 11:40 Tatiana Aureliia Uaman Svetikova  
Nonlinear terahertz dynamics in Dirac materials
- 11:40 – 12:00 Simon Widmann  
Observation of Kardar-Parisi-Zhang universal scaling in two dimensions
- 12:00 – 12:20 Christian Mayer  
Towards applicable topological vertical-cavity laser arrays
- 12:20 – 12:40 Tobias Müller  
Computing dynamical responses in quantum

# Program

## Friday , Sep 26, 2025



### Lunch

14:00 – 15:20

**CORRELATIONS** \_\_\_\_\_ *Session 7*

14:00 – 14:20

**Anika Götz**

Hubbard and Heisenberg models on hyperbolic lattices

14:20 – 14:40

**Coraline Bacq**

Realizing anti-de Sitter spacetime dynamics with optical waveguide arrays

14:40 – 15:00

**Manuel Weber**

Retardation-induced intermediate phase and exotic criticality in the one-dimensional Hubbard-Holstein model

15:00 – 15:20

**Mark Potts**

Signatures of spinon dynamics and phase structure of dipolar-octupolar quantum spin ices in two-dimensional coherent spectroscopy

15:20 – 15:40

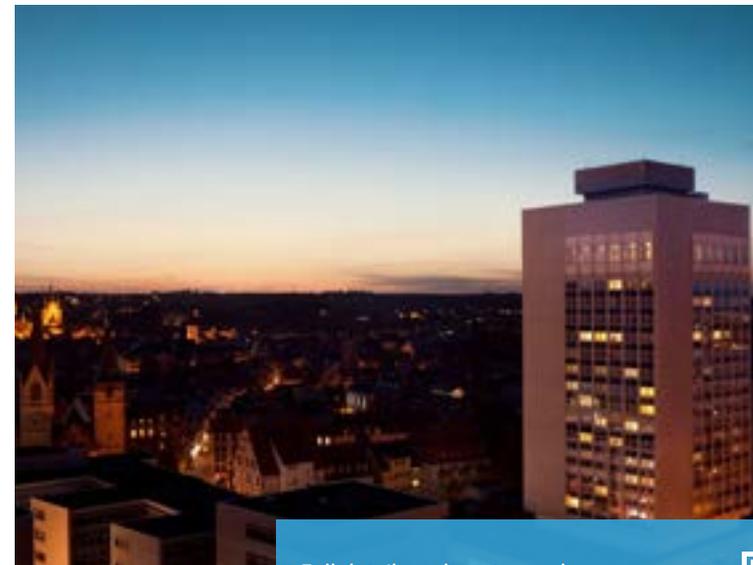
**Closing remarks & best poster award**

15:40 – 16:30

**Departure**

# Hotel

Our cluster retreat takes us to Erfurt, a city whose medieval streets, cathedral, and iconic Krämerbrücke (Merchants' bridge) radiate history while remaining vibrant and full of life. At the city's tallest building, the NYX Hotel, we'll enjoy not only the best views of Erfurt, but also a welcoming setting to come together and look ahead to our second funding period.



Full details on how to reach the venue can be found under [www.nyx-hotels.de/erfurt/](http://www.nyx-hotels.de/erfurt/)  
nyx-hotel-erfurt



**NYX Hotel Erfurt**

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