Summer School 2024

Correlated Quantum Materials & Solid State Quantum Systems

www.q-ms.org

September 23-27, 2024

Institute of Science and Technology Austria (ISTA), Klosterneuburg

www.tuwien.at

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SFB Q-M&S

Hopes are high that quantum computers will revolutionize conventional computation and data processing. Although they can already perform certain computations faster than conventional computers, more robust solid state quantum systems are needed to solve the problem of quantum error correction and fully exploit the potential of quantum computing. A currently disjunct field are correlated quantum materials. These are designer materials with properties due to quantum effects of strongly interacting electrons. They represent a highly active but particularly complex area of fundamental solid state physics.

The SFB Correlated Quantum Materials & Solid State Quantum Systems (Q-M&S) aims to connect both areas. Concepts and methods developed in the context of quantum information and computation will contribute to a better understanding of correlated quantum materials. For example, “entanglement meters” will be devised to unravel the mystery of the strange metal state. In turn, research will be conducted into how correlated quantum materials can be used for quantum applications. Correlated quantum materials with topological properties for instance could lead to very robust and well-controllable quantum devices in novel hybrid systems.

The Summer School 2024 on Correlated Quantum Materials & Solid State Quantum Systems is the second school of the SFB Q-M&S – a collaborative research project funded by the Austrian Science Fund (FWF) and the German Research Foundation (DFG), with 10 PIs hosted at 4 institutions in Austria and Germany. The school is an annual training event primarily designed to train the SFB’s PhD students and postdocs, but it is also open to other researchers.

FWF Österreichischer Wissenschaftsfonds

DFG Deutsche Forschungsgemeinschaft

School program

Join us via Zoom:
https://istaustria.zoom.us/j/61323716563?pwd=bzBWLzlsYm5qVG5tQjhQSzRSUVptQT09

	8:50	9:00-10:00	10:00-11:00		11:30-12:30		2:00-3:00	3:00-4:00		4:30-5:30	5:30-...
Mo, 23	Opening	Karsten Held (TU Wien)	Christoph Strunk (Univ. Regensburg)	Group photo and Coffee	Marta Pita-Vidal (QuTech / IBM Research Zurich)	Lunch	Maksym Serbyn (ISTA)	Posters	Coffee	Posters	5:30-6:00 - Walk 6:00-7:55 - Dinner 7:55-8:25 - Walk back
Tu, 24		Karsten Held (TU Wien)	Christoph Strunk (Univ. Regensburg)	Coffee	Marta Pita-Vidal (QuTech / IBM Research Zurich)	Lunch	Maksym Serbyn (ISTA)	Daria Shipilina (Uppsala Univ.)	Coffee	4:30-5:00 - SFB Q-M&S EB Meeting 5:00-6:00 - Mentoring 4:30-6:30 - Discussions	
We, 25		Carsten Rohr	Carsten Rohr	Coffee	Carsten Rohr	Lunch	Carsten Rohr	Carsten Rohr	Coffee	Carsten Rohr	5:00-5:45 - Lab Modic 5:45-6:30 - Lab Katsaros
Th, 26		Student talks for students	Srijit Goswami (QuTech, TU Delft)	Coffee	Valla Fatemi (Cornell Univ.)	Lunch	Manfred Fiebig (ETH Zurich)	Srijit Goswami (QuTech, TU Delft)	Coffee	4:30-6:30 - Posters	
Fr, 27		Student talks for students	Neven Barišić (TU Wien, Univ. Zagreb)	Coffee	Valla Fatemi (Cornell Univ.)	Lunch	Manfred Fiebig (ETH Zurich)	Neven Barišić (TU Wien, Univ. Zagreb)	Coffee	4:30-5:30 - Mentoring 4:30-6:30 - Discussions 6:30-6:40 - Closure	

Monday, September 23, 2024

Join us via Zoom:
https://istaustria.zoom.us/j/61323716563?pwd=bzBWLzlsYm5qVG5tQjhQSzRSUVptQT09

08:50-09:00	Opening by Silke Bühler-Paschen
Chair	Kimberly Modic
09:00-10:00 (45+15)	**Karsten Held**, Technische Universität Wien *Basic models of correlated electrons*
10:00-11:00 (45+15)	**Christoph Strunk**, University of Regensburg *Mesoscopic Josephson junctions and non-reciprocal superconductivity*
11:00-11:30	Group photo and coffee
11:30-12:30 (45+15)	**Marta Pita-Vidal**, QuTech / IBM Research Zurich *Andreev spin qubits: coherence*
12:30-14:00	Lunch at Cafeteria
Chair	Fakher Assaad
14:00-15:00 (45+15)	**Maksym Serbyn**, Institute of Science and Technology Austria *Engineering and probing the band structure of multilayer graphene (1)*
15:00-16:00	Poster session
16:00-16:30	Coffee
16:30-17:30	Poster session
17:30-18:00	Walk from ISTA to Redlingerhütte for dinner
18:00-19:55	Opening dinner at Redlingerhütte https://www.redlingerhuette.at/ 3400 Kierling
19:55-20:25	Walk from Redlingerhütte to ISTA
20:29-20:53	ISTA Shuttle Bus from Maria Gugging Am Campus to Vienna Heiligenstadt (U4)

Tuesday, September 24, 2024

Join us via Zoom:
https://istaustria.zoom.us/j/61323716563?pwd=bzBWLzlsYm5qVG5tQjhQSzRSUVptQT09

Chair	Fakher Assaad
09:00-10:00 (45+15)	**Karsten Held**, Technische Universität Wien *Dynamical mean field theory and beyond*
10:00-11:00 (45+15)	**Christoph Strunk**, University of Regensburg *Onset of resistance in a strictly 2D-superconductor*
11:00-11:30	Coffee
11:30-12:30 (45+15)	**Marta Pita-Vidal**, QuTech / IBM Research Zurich *Andreev spin qubits: coupling and scalability*
12:30-14:00	Lunch at Cafeteria
Chair	Elke Sheer
14:00-15:00	**Maksym Serbyn**, Institute of Science and Technology Austria *Engineering and probing the band structure of multilayer graphene (2)*
15:00-16:00	**Daria Shipilina**, Uppsala University *Impactful data visualization for scientists*
16:00-16:30	Coffee
16:30-17:00 17:00-18:00 16:30-18:30	SFB Q-M&S Executive Board Meeting (members only) Individual mentoring discussions If you are interested, please sign up by September 16, 2024, per email to angelika.bosak@tuwien.ac.at. Individual discussions
18:29-18:53 18:59-19:23 19:29-19:53 20:29-20:53	ISTA Shuttle Bus from Maria Gugging Am Campus to Vienna Heiligenstadt (U4)

Wednesday, September 25, 2024

Participation in person only (no livestreaming)	
Chair	Ronja Fischer-Süßlin
09:00-11:00	**Carsten Rohr**, www.carstenrohr.de *Presentation skills for scientists and researchers (1)*
11:00-11:15	Coffee
11:15-12:30	**Carsten Rohr**, www.carstenrohr.de *Presentation skills for scientists and researchers (2)*
12:30-14:00	Lunch at Cafeteria
14:00-16:00	**Carsten Rohr**, www.carstenrohr.de *Presentation skills for scientists and researchers (3)*
16:00-16:15	Coffee
16:15-17:00	**Carsten Rohr**, www.carstenrohr.de *Presentation skills for scientists and researchers (4)*
17:00-17:45	Lab Modic – lab tour guided by Muhammad Nauman (meeting point: Moonstone Building)
17:45-18:30	Lab Katsaros – lab tour guided by Georgios Katsaros (meeting point: Moonstone Building)
18:29-18:53 18:59-19:23 19:29-19:53 20:29-20:53	ISTA Shuttle Bus from Maria Gugging Am Campus to Vienna Heiligenstadt (U4)

Thursday, September 26, 2024

Join us via Zoom:
https://istaustria.zoom.us/j/61323716563?pwd=bzBWLzlsYm5qVG5tQjhQSzRSUVptQT09

Chair	Shiva Safari
09:00-10:00 (5x 8+4)	Student talks for students: 09:00-09:12 - Group Alpichshev (P2) - Chao Shen 09:12-09:24 - Group Assaad (P3) - Sounak Biswas 09:24-09:36 - Group Barišić (P4) - Petar Sačer 09:36-09:48 - Group Held (P5) - Frederic Bippus 09:48-10:00 - Group Paschen (P6) - Duc Phan
Chair	Georgios Katsaros
10:00-11:00 (45+15)	**Srijit Goswami**, QuTech, Delft University of Technology *Majorana bound states in artificial Kitaev chains (1)*
11:00-11:30	Coffee
11:30-12:30 (45+15)	**Valla Fatemi**, Cornell University *Josephson physics with internal degrees of freedom (1)*
12:30-14:00	Lunch at Cafeteria
Chair	Zhanybek Alpichshev
14:00-15:00	**Manfred Fiebig**, ETH Zurich *Probing strong correlations with nonlinear optics between THz and optical frequencies (1)*
15:00-16:00	**Srijit Goswami**, QuTech, Delft University of Technology *Majorana bound states in artificial Kitaev chains (2)*
16:00-16:30	Coffee
16:30-18:30	Poster session
18:29-18:53 18:59-19:23 19:29-19:53 20:29-20:53	ISTA Shuttle Bus from Maria Gugging Am Campus to Vienna Heiligenstadt (U4)

Friday, September 27, 2024

Join us via Zoom:
https://istaustria.zoom.us/j/61323716563?pwd=bzBWLzlsYm5qVG5tQjhQSzRSUVptQT09

Chair	Luka Akšamović
09:00-10:00 (5x 8+4)	Student talks for students: 09:00-09:12 - Group Katsaros (P7) - Maksim Borovkov 09:12-09:24 - Group Modic (P8) - Shiva Safari 09:24-09:36 - Group Paschen (P9) - Lukas Fischer, Gwenvredig Le Roy 09:36-09:48 - Group Scheer (P10) - Ronja Fischer-Süßlin 09:48-10:00 - Group Serbyn (P11) - Lucia Vigliotti
Chair	Kimberly Modic
10:00-11:00 (45+15)	**Neven Barišić**, Technische Universität Wien, University of Zagreb *Fifty and one shades of high temperature superconductors (1)*
11:00-11:30	Coffee
11:30-12:30 (45+15)	**Valla Fatemi**, Cornell University *Josephson physics with internal degrees of freedom (2)*
12:30-14:00	Lunch at Cafeteria
Chair	Georgios Katsaros
14:00-15:00 (45+15)	**Manfred Fiebig**, ETH Zurich *Probing strong correlations with nonlinear optics between THz and optical frequencies (2)*
15:00-16:00 (45+15)	**Neven Barišić**, Technische Universität Wien, University of Zagreb *Fifty and one shades of high temperature superconductors (2)*
16:00-16:30	Coffee
16:30-17:30 16:30-18:30	Individual mentoring discussions If you are interested, please sign up by September 16, 2024, per email to angelika.bosak@tuwien.ac.at. Individual discussions
18:30-18:40	Closure by Silke Bühler-Paschen
18:29-18:53 18:59-19:23 19:29-19:53 20:29-20:53	ISTA Shuttle Bus from Maria Gugging Am Campus to Vienna Heiligenstadt (U4)

Abstracts

Barišić, Neven (TU Wien, Univ. Zagreb)

Fifty and one shades of high temperature superconductors

The phenomenon of high-temperature superconductivity in cuprates remains one of the most exciting and thoroughly investigated yet unresolved problems in physics. The complexity of high-T_c systems, with their intricate material properties and phase diagrams, presents a significant challenge. The delicate balance between material-specific properties, disorder, and the superposition of multiple electronic phases makes it difficult to identify the leading interactions.

In the first lecture, we will revisit the fundamental concepts of metals and superconductors, followed by a brief historical overview of superconducting phenomena. We will then discuss experimental findings that reveal the universal properties of high-T_c cuprates, setting the stage for a deeper exploration of their phenomenology.

The second lecture will build on this foundation by addressing material-specific behaviors and examining how they fit within the established phenomenological framework. These behaviors are crucial for understanding the underlying mechanisms of superconductivity in these complex materials.

The key takeaway from these lectures will be two simple yet profound relations that fully capture the phenomenology of cuprates. The first is the charge conservation relation:

$$1 + p = n_{\mathrm{loc}} + n_{\mathrm{eff}}$$

where, p is the doping while n_{eff} is the carrier density and n_{loc} is the density of localized charge within a CuO_2 plaquette. Importantly, p, n_{eff} and n_{loc} are experimentally determined directly. The second relation is the expression for the superfluid density:

$$\rho_S = n_{\mathrm{eff}} \cdot (O_S\, n_{\mathrm{loc}}).$$

where O_S, is the compound-dependent constant fine-tuned by the local crystal structure. It arises from the p–d–p fluctuation by the Cu-localized holes visiting the neighboring planar–oxygen atoms. NMR measurements corroborate expected trends in the value of O_S between low- and high-temperature superconductors.

Fatemi, Valla (Cornell Univ.)

Josephson physics with internal degrees of freedom

The Josephson tunnel junction is typically considered as a monolithic object: a superconducting circuit element with a single, sinusoidal current-phase relation, or even more abstractly as simply a nonlinear inductor. This simplicity, and the development of high-quality device fabrication methods, enables the application of Josephson junctions in a multitude of fruitful ways. In this seminar, we consider a different case with internal degrees of freedom to the Josephson circuit, which are necessary for creating novel devices such as protected qubits, Josephson diodes, and analog quantum matter simulators. In a single junction, these are Andreev bound states, which are hosted in non-superconducting regions connected to superconducting reservoirs. These are an active area of research in mesoscopic quantum electronics because they enrich the junction with additional physics, including fermionic quasiparticle excitations and non-sinusoidal contributions to the current-phase relation. Alternatively, serial arrays of tunnel junctions can gainfully mimic many aspects of this physics, including in mathematically exact ways, which we can identify as arising from a similar tailoring of internal degrees of freedom. The superconducting qubit community takes this approach since it leverages the well-developed Josephson tunnel junction.

In this two-part talk, we will explore a unifying perspective to these two approaches to novel superconducting mesoscopic circuits, while also critically examining the key differences in both the basic physics and practical challenges.

Fiebig, Manfred (ETH Zurich)

Probing strong correlations with nonlinear optics between THz and optical frequencies

Systems with strong electronic correlations exhibit a multitude of many-particle phenomena that are not obtained within the single-electron approach describing semiconductors. Examples are magnetic, or otherwise ferroic and multiferroic order, superconductivity, insulator-metal transitions, or topological phases. Even though many of the associated materials are "black", that is, not transmitting optical radiation, light is a perfect tool to investigate such strongly correlated states because it offers characteristic optical degrees of freedom. These are (i) spectroscopy for selectively addressing the different sublattices of a material; (ii) spatial resolution for imaging inhomogeneous correlated states like domain patterns; (iii) temporal resolution for studying the evolution of dynamical processes like magnetic switching. I will give a survey of nonlinear optical, that is, multi-photon techniques between THz and visible frequencies for probing the light-matter interaction.

In Part 1, I will focus on static phenomena and discuss aspects like magnetoelectric correlations, domain formation, or phase transitions.

In Part 2, I will focus on dynamic phenomena like light-induced phase transitions, ultrafast nonequilibrium dynamics, or all-optical switching.

Goswami, Srijit (QuTech, TU Delft)

Majorana bound states in artificial Kitaev chains

Majorana bound states (MBSs) can be engineered in superconductor semiconductor-hybrids. In this series of two lectures I will first discuss an overview of different experimental efforts to detect MBSs and outline the current challenges. I will then introduce theoretically the Kitaev model, showing how MBSs emerge within this toy model. Finally, I will go over recent experimental efforts to engineer Kitaev chains in superconductor-quantum dot hybrid systems and discuss challenges and future prospects.

Held, Karsten (TU Wien)

Basic models of correlated electrons

The lecture gives an elementary introduction to the Hubbard and the periodic Anderson model. The physics of the Mott metal-insulator transition, quasiparticle renormalizations and the Kondo effect is discussed. We will hit the road to current research by explaining waterfalls observed experimentally in cuprates and nickelates.

Dynamical mean field theory and beyond

For calculating correlated materials, using dynamical mean-field theory (DMFT) combined with density functional theory is state-of-the-art. This lecture introduces DMFT, the local-correlation physics it describes, and outlines extensions such as the dynamical vertex approximation that are needed to describe spin fluctuations, pseudogaps, and superconductivity. As a test case, we consider infinite-layer nickelates.

Pita-Vidal, Marta (QuTech / IBM Research Zurich)

Andreev spin qubits: coherence

Andreev spin qubits (ASQs) have recently emerged as an alternative qubit platform with realizations in semiconductor-superconductor hybrid nanowire Josephson junctions. In these qubits, the spin degree of freedom is intrinsically coupled to the supercurrent across the junction, which facilitates fast, high-fidelity spin readout, fast manipulation and strong spin-spin coupling. In this talk, we will review the basic ingredients for ASQs: Josephson junctions and spin-orbit interaction. We will then discuss experimental implementations in InAs nanowires, both with weak-link Josephson junctions as well as with quantum dot Josephson junctions. We will furthermore see how the qubit frequency can be tuned either with flux or with a magnetic field and how the spin state can be manipulated either indirectly via a Raman scheme or directly via the electric dipole spin resonance mechanism.

Andreev spin qubits: coupling and scalability

In this talk, we will discuss different methods for coupling ASQs to other qubits. We will first see how an ASQ can be coherently coupled to a transmon qubit. We will furthermore discuss measurements of strong supercurrent-mediated longitudinal coupling between two distant Andreev spin qubits. The qubit-qubit interaction is both gate- and flux-tunable and it can be switched off on demand using a magnetic flux. Finally, we will discuss the scalability of Andreev spin qubits as a platform for quantum computing and simulation.

Serbyn, Maksym (ISTA)

Engineering and probing the band structure of multilayer graphene

In these pedagogical lectures, I will provide a basic introduction to the physics of multilayer graphene.

We will begin with a review of the tight-binding description of the band structure and the classification of singularities in the density of states in two dimensions. Following this, we will discuss both analytical and numerical approaches to the band structure of multilayer graphene and review relevant experiments.

In the second lecture, I will focus on the Landau level physics that emerges when graphene is subjected to a perpendicular magnetic field. I will demonstrate that Landau levels offer an extremely sensitive experimental probe of the band structure, and, time permitting, explore the effect of interactions.

Strunk, Christoph (Univ. Regensburg)

Mesoscopic Josephson junctions and non-reciprocal superconductivity

The recent discovery of intrinsic supercurrent diode effect [1], and its prompt observation in a rich variety of systems, has shown that nonreciprocal supercurrents naturally emerge when both space- and time-inversion symmetries are broken. I will report on both dc and ac-manifestations of the Josephson diode effect in the non-linear inductance in planar Josephson junctions, based on a ballistic Al/InAs-heterostructure that is exposed to an in-plane magnetic field B_{ip} [2].

At low B_{ip} a non-reciprocal term is found in the inductance that is linear in B_{ip}. At higher B_{ip} a sign reversal of the magnetochiral term is observed that can be traced back to a 0-π-like transition in the current-phase relation [3]. Different avenues for a theoretical interpretation are discussed. As pronounced date tunability of both the φ_0 shift and the diode efficiency in an asymmetric SQUID device demonstrates that Rashba spin-orbit interaction provides a substantial contribution to the Josephson diode effect [4].

[1] F. Ando et al., Nature **584**, 373 (2020).
[2] C. Baumgartner et al., Nature Nanotech. **17**, 39 (2022).
[3] C. Baumgartner et al., Nature Nanotech. **18**, 1266 (2023).
[4] S. Reinhardt et al., Nature Commun. **15**, 4413 (2024).

Onset of resistance in a strictly 2D-superconductor

In the 2D limit, the resistive transition towards superconductivity is governed by amplitude and phase fluctuations of the superconducting order parameter. Moreover, the transition can be broadened by inhomogeneities of the materials [1,2]. Investigating ultra-thin disordered NbN-films, we observe an intrinsically sharp Berezinskii-Kosterlitz-Thouless (BKT) transition in both DC- and AC transport properties [3]. Four independent observables allow for an independent and consistent determination of the mean-field and BKT transition temperatures, as well as the superfluid stiffness.

In NbN strips with a width of less than 3 µm, a foot appears in the resistive transition, consistent with expectations from finite size scaling.

When the sheet resistance of the films is gradually increased towards e^2/h, a paradigmatic quantum phase transition is approached: the superconductor-insulator transition. We follow the evolution of the superfluid stiffness down to BKT-transition temperatures of 250mK. The transition remains sharp and still agrees well for the resistive and the inductive transition. In our samples, we find no evidence for a discontinuous drop of the stiffness at the transition in the low-T limit [4].

[1] M. Mondal, et al., Phys. Rev. Lett. **106**, 047001 (2011); Phys. Rev. Lett. **107**, 217003 (2011).
[2] J. Yong, et al., Phys. Rev. B **87**, 184505 (2013).
[3] A. Weitzel et al., Phys. Rev. Lett. **131**, 186002 (2023).
[4] T. Charpentier et al., arXiv:2404.09855.

Soft skills training

Rohr, Carsten (www.carstenrohr.de)

Presentation skills for scientists and researchers

Presenting your research is an essential part of your academic career: in a group seminar, at a conference, when defending your PhD, or speaking to general public. In this workshop, you will learn how to present your research, results, or academic ideas clearly and confidently:

- How to plan and structure your presentation
- How to engage your audience: memorable start and finish
- Visual communication and slide design, graphs and figures
- Verbal and non-verbal communication: (lack of) enthusiasm in your language, voice, body
- Dealing with difficult situations and questions

Please bring your laptop if possible and your own old or upcoming presentations to use in the exercises.

Shipilina, Daria (Uppsala Univ.)

Impactful data visualization for scientists

Clear, accurate, and visually appealing data visualizations make your scientific discoveries more understandable and memorable. However, in academia, we often learn how to use visualization tools without understanding the principles behind effective visual communication. While we are proficient in changing label size, line color, and other visual elements, we often do not know how to use them effectively to make our scientific graphs and presentations stand out. This presentation aims to bridge that gap by exploring the science and fundamental principles of visual communication. By understanding these concepts, you'll be empowered to create effective data visualizations for both written and visual presentations, regardless of your field or preferred tools and programming languages. Join this session to unlock the secrets of impactful data presentation and elevate your research communication.

Student talks for students

Bippus, Frederic (TU Wien, Group Held, P5)
Entanglement in the Hubbard Model

Biswas, Sounak (Univ. Würzburg, Group Assaad, P3)
Investigations of Kondo breakdown using SU(N)-symmetric models

Borovkov, Maksim (ISTA, Group Katsaros, P7)
Towards Hybrid Quantum Devices with Germanium Spin Qubits

Fischer, Lukas and Le Roy, Gwenvredig (TU Wien, Group Paschen, P6)
Setting up an entanglement measurement in YRS using a bipartite fluctuations method

Fischer-Süßlin, Ronja (Univ. Konstanz, Group Scheer, P10)
Spatially-resolved transport spectroscopy of quantum matter

Phan, Duc (TU Wien, Group Paschen, P9)
Towards Weyl-Kondo nonlinear Hall effect in the microwave regime

Sačer, Petar (Univ. Zagreb, Group Barišić, P4)
Quantum oscillations and Fermi level in Topological insulators BST2S

Safari, Shiva (ISTA, Group Modic, P8)
Resonant torsion magnetometry in quantum materials

Shen, Chao (ISTA, Group Alpichshev, P2)
Propagating soft-mode polaritons mimic transient symmetry breaking in quantum paraelectric $KTaO_3$

Vigliotti, Lucia (ISTA, Group Serbyn, P11)
Photon decay in a Josephson junction chain

Posters

Monday, September 23, 2024

Akšamović, Luka (TU Wien)
High-Tc Cuprates: Fabrication of 2D devices

Bubis, Anton (ISTA)
Photonic kinetics in Josephson junction chains

Fischer-Süßlin, Ronja (Univ. Konstanz)
Josephson diode effect in $Ce_3Bi_4Pd_3$

Jacob, Eric (TU Wien)
Superconductivity in cuprates: Dynamical Vertex Approximation for the Emery model

Le Roy, Gwenvredig (TU Wien)
Field-dependent thermal conductivity measurements of the quantum critical compound $Ce_3Pd_{20}Si_6$

Phan, Duc (TU Wien)
Title TBC

Roósz, Gergö (Wigner Research Centre for Physics)
Electron-phonon entanglement

Safari, Shiva (ISTA)
Resonant torsion magnetometry on $BaCo_2(AsO_4)_2$

Strohmeier, Marcel (Univ. Konstanz)
Tunneling spectroscopy on superconducting thin films of non-centrosymmetric niobium rhenium

Zambra, Valeska (ISTA)
Resonant torsion magnetometry on $Tb_2Ti_2O_7$

Thursday, September 26, 2024

Bippus, Frederic (TU Wien)
Entanglement in the Hubbard Model

Eßl, Herbert (TU Wien)
Breakdown of self-consistent perturbation expansion: New perspectives and algorithmic implications

Fischer, Lukas and Le Roy, Gwenvredig (TU Wien)
Title TBC

Kulkarni, Vinayak M. (Jawaharlal Nehru Centre for Advanced Scientific Research)
A New State of Laser Driven Interacting Impurities and Dirac Electrons

Nagarajan, Vikram (Univ. California, Berkeley)
Resonant torsion magnetometry measurements on polytypes of TaS_2

Rein, Gabriel (Univ. Würzburg)
Hubbard and Heisenberg models on hyperbolic lattices

Saez Mollejo, Jaime (ISTA)
Microwave driven spin qubit in planar Ge

Shen, Chao (ISTA)
Two-Photon Excitation of Antiferrodistortive Raman Phonons in $SrTiO_3$ Revealed by Two-Dimensional Terahertz Spectroscopy

Vigliotti, Lucia (ISTA)
Investigation of plasma modes in a Josephson junction chain

School location

Moonstone Building

Institute of Science and Technology Austria (ISTA)
Am Campus 1, 3400 Klosterneuburg

Institute of Science and Technology Austria

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