

Dr. Berthold Jäck

Department of Physics, Room 4435, The Hong Kong University of Science and Technology
Clear Water Bay, Kowloon, Hong Kong SAR

Phone: (852) 2358-7495 • Email: bjaeck@ust.hk • <https://www.nanoscale.ninja>

EDUCATION AND TRAINING

Universität Würzburg, GER	Diploma Engineer Nanotechnology	2011
EPFL, CH	Dr. sc.	2015
Princeton University	Postdoctoral Research Fellow	2016-2020

<i>Graduate Thesis Advisor</i>	Prof. Klaus Kern
<i>Postdoctoral Mentor</i>	Prof. Ali Yazdani

PROFESSIONAL APPOINTMENTS

Assistant Professor	Hong Kong University of Science and Technology, HK SAR	Since 01/2021
Visiting Scientist	Max-Planck-institute, GER	2020
Postdoctoral Research Fellow	Princeton University	2016-2020
Graduate Research Assistant	Max-Planck-institute, GER	2011-2015

HONORS AND AWARDS

Crouched Talk Wah Mak Innovation Award	2022
Humboldt Foundation return fellowship	2020
Postdoctoral Fellow of the Alexander von Humboldt Foundation	2016
University diploma degree with distinction	2011
Undergraduate Fellow of the German Academic Exchange Association at UC Berkeley	2008

PUBLICATIONS (*notable publication, †corresponding author)

- (1) ‘Visualizing the localized electrons of a kagome flat band’ C. Chen, J. Zheng, R.-P. Yu, S. Sankar, H.C. Po, K.T. Law, **B. Jäck**[†]
Phys. Rev. Research **5**, 043269 (2023)
- (2) *‘Experimental evidence for Berry curvature multipoles in antiferromagnets’ S. Sankar, R. Liu, X.-J. Gao, Q.-F. Li, C. Chen, C.-P. Zhang, J. Zheng, Y.-H. Lin, K. Qian, R. Yu, X. Zhang, Z.Y. Meng, K.T. Law, Q. Shao, and **B. Jäck**[†]
under review, arXiv:2303.03274 [cond-mat.mes-hall] (2023)
- (3) ‘Grain size in low loss superconducting Ta thin films on c-axis sapphire’
S.G. Jones, N. Materise, K.W. Leung, X. Chen, J. Zheng, A. Gyenis, **B. Jäck**[†], C.R.H. McRae,
Journal of Applied Physics **134**, 144402 (2023)
- (4) ‘Evidence for Isotropic s-Wave Superconductivity in High-Entropy Alloys’ C.K.W. Leung, X. Zhang, F. von Rohr, R.W. Lortz, and **B. Jäck**[†], *Scientific Reports* **12**, 12773 (2022)

- (5) *‘Evidence for a Monolayer Excitonic Insulator’ Y. Jia, P. Wang, C.-L. Chiu, Z. Song, G. Yu, **B. Jäck**, S. Lei, S. Klemenž, F.A. Cevallos, M. Onyszczak, N. Fishchenko, X. Liu, G. Farahi, F. Xie, Y. Xu, K. Watanabe, T. Taniguchi, B.A. Bernevig, R.J. Cava, L.M. Schoop, A. Yazdani, S. Wu, *Nature Physics* **18**, 87-93 (2022)
- (6) *‘Detecting and Distinguishing Majorana Zero Modes with the Scanning Tunnelling Microscope’ **B. Jäck**[†], Y. Xie, A. Yazdani, *Nature Reviews Physics* **3**, 541-554 (2021)
- (7) ‘Microscopic Relaxation Channels in Materials for Superconducting Qubits’ A. Premkumar, C. Weiland, S. Hwang, **B. Jäck**, A.P.M. Place, I. Waluyo, A. Hunt, V. Bisogni, J. Pellicari, A. Barbour, M.S. Miller, P. Russo, F. Camino, K. Kisslinger, X. Tong, M.S. Hybertsen, A.A. Houck, I. Jarrige, *Nature Communications Materials* **2**, 72 (2021)
- (8) ‘New material platform for superconducting transmon qubits with coherence times exceeding 0.3 milliseconds’ A.P.M. Place, L.V.H. Rodgers, P. Mundada, B.M. Smitham, M. Fitzpatrick, Z. Leng, A. Premkumar, J. Bryon, S. Sussman, G. Cheng, T. Madhavan, H.K. Babla, **B. Jäck**, A.Gyenis, N. Yao, R.J. Cava, N.P. de Leon, A.A. Houck, *Nature Communications* **12**, 1779 (2021)
- (9) *‘Visualizing the multifractal wavefunctions of a disordered two-dimensional electron gas’ **B. Jäck**[†], F. Zinser, E.J. König, S.N.P. Wissing, A.B. Schmidt, M. Donath, K. Kern, C.R. Ast, *Phys. Rev. Research* **3**, 013022 (2021)
- (10) *‘Tunneling spectroscopy of quantum spin liquids’ E.J. König, M.T. Randeria, **B. Jäck**[†], *Phys. Rev. Lett.* **125**, 267206 (2020)
- (11) ‘Visualizing dissipative transport dynamics at the nanoscale with superconducting charge qubit microscopy’ **B. Jäck**[†], *Phys. Rev. Research* **2**, 043031 (2020)
- (12) *‘Observation of backscattering induced by magnetism in a topological edge state’ **B. Jäck**, Y. Xie, B.A. Bernevig, A. Yazdani, *PNAS* **117**, 16214-16218 (2020)
- (13) * ‘Spectroscopic signatures of many-body correlations in magic angle twisted bilayer graphene’ Y. Xie, B. Lian, **B. Jäck**, X. Liu, C.-L. Chiu, K. Watanabe, T. Taniguchi, B.A. Bernevig, A. Yazdani, *Nature* **572**, 101–105 (2019)
- (14) * ‘Observation of a Majorana zero mode in a topologically protected edge channel’ **B. Jäck**, Y. Xie, J. Li, S. Jeon, B.A. Bernevig, A. Yazdani, *Science* **364**, 1255-1259 (2019)
- (15) ‘Mapping of Yu-Shiba-Rusinov states from an extended scatterer’ *submitted* (2018), M. Etzkorn, M. Eltschka, **B. Jäck**, C.R. Ast and K. Kern
- (16) * ‘Quantum Brownian motion at strong dissipation probed by superconducting tunnel junctions’ **B. Jäck**[†], J. Senkpiel, M. Etzkorn, J. Ankerhold, C.R. Ast and K. Kern, *Phys. Rev. Lett.* **119**, 147702, (2017)
- (17) * ‘Sensing the quantum limit in scanning tunneling spectroscopy’ C.R. Ast, **B. Jäck**, J. Senkpiel, M. Eltschka, M. Etzkorn and K. Kern, *Nature Commun.* **7**, 13009 (2016)
- (18) ‘Josephson Critical Current in the Dynamical Coulomb Blockade Regime’ **B. Jäck**[†], E. Eltschka M. Assig, M. Etzkorn, C.R. Ast and K. Kern, *Phys. Rev. B Rap. Commun.* **93**, 020504 (2016)

- (19) ‘The Josephson Tunneling at the Atomic Scale - The Josephson Effect as a Local Probe’
B. Jäck, *Thesis No. 6750*, EPFL (2015)
- (20) ‘Superconducting STM tip in a Magnetic Field: Geometrically-Controlled Order of the Phase Transition’ M. Eltschka, **B. Jäck**, M. Assig, O.V. Kondrashov, M.A. Skvortsov, M. Etzkorn, C.R. Ast and K. Kern, *Appl. Phys. Lett.* **107**, 122601 (2015)
- (21) ‘A Nanoscale Gigahertz Source Realized with Josephson Scanning Tunneling Microscopy’ **B. Jäck**[†], E. Eltschka M. Assig, M. Etzkorn, C.R. Ast and K. Kern, *Appl. Phys. Lett.* **106**, 013109 (2015)
- (22) ‘Probing Absolute Spin Polarization at the Nanoscale’ M. Eltschka, **B. Jäck**, M. Assig, O.V. Kondrashov, M.A. Skvortsov, M. Etzkorn, C.R. Ast and K. Kern, *Nano Lett.* **14**, 7171 (2014)
- (23) ‘Exciton Dynamics in low Band Gap Donor-Acceptor Copolymers and Blends’ B. Giesecking, **B. Jäck**, E. Preis, S. Jung, M. Forster, U. Scherf, C. Deibel and V. Dyakonov, *Adv. Energy Mat.* **2**, 1477 (2012)

AWARDED RESEARCH GRANTS (1USD=7.75HKD, *including matching fund)

Leading as Principal Investigator/Project Coordinator

- (1) RGC Collaborative Research Fund (No. C6033-22GF)
01.04.2023-31.03.2026
715,000 USD
- (2) RGC General Research Fund (No. 16302422)
01.01.2023-31.12.2024
74,000 USD
- (1) Croucher Innovation Award
01.07.2022-30.06.2027
1,410,000 USD*
- (2) HKUST Research Equipment Competition 2021 (No. REC21SCR10)
30,000 USD
- (3) RGC Early Career Scheme Grant (No. 26304221)
01.09.2021-31.08.2024
92,000 USD
- (4) HKUST Start-up Grant
01.01.2021-31.12.2026
1,300,000 USD

Participating as Co-Principal Investigator

- (1) RGC Collaborative Research Fund (No. C7037-22GF)
dates TBD
698,000 USD

INVITED TALKS

- (1) Institute for Quantum Nano Science, Seoul, *January 2024, Seminar*
- (2) HKUST UoS Workshop on Quantum Technologies, *December 2023, Workshop*
- (3) CAS IoP Fall Session, *November 2023, Conference*
- (4) Atomic Scale Quantum Materials Colloquium, *November 2023, online Colloquium*
- (5) Würzburg University, *July 2023, Seminar*
- (6) Max-Planck-Institute for Solid State Research, Germany, *July 2023, Seminar*
- (7) RIKEN, Japan, *April 2023, Seminar*
- (8) Fudan University, *November 2022, Seminar*
- (9) ALC'22, Okinawa, *October 2022, Conference*
- (10) Karlsruhe Institute of Technology, *July 2022, Seminar*
- (11) City University, Hong Kong, *December 2021, Colloquium*
- (12) Tata Institute of Fundamental Research, *April 2021, Zoom Seminar*
- (13) Stony Brook University, *September 2020, Zoom Seminar*
- (14) University of California Los Angeles, *March 2020, Seminar*
- (15) University of Notre Dame, *February 2020, Colloquium*
- (16) Hongkong University of Science and Technology, *November 2019, Seminar*
- (17) Universität Basel, *November 2019, Seminar*
- (18) ICFO Barcelona, *November 2019, Seminar*
- (19) Young Research Leaders in Topological Materials and Beyond, *Flatiron Institute, September 2019, Conference*
- (20) GRC on Topological and Correlated Matter, *Hong Kong, June 2019, Conference*
- (21) PRISM Research Symposium, *Princeton University, March 2019, Conference*
- (22) Universität Würzburg, *January 2019, Colloquium*
- (23) Universität Zürich, *January 2019, Seminar*
- (24) Max-Planck-Institute for Solid State Research, *January 2019, Seminar*
- (25) Universität Ulm, *January 2019, Seminar*
- (26) Seoul National University, *June 2018, Seminar*
- (27) Center for Quantum Nanoscience, Korea, *June 2018, Seminar*
- (28) Max-Planck-Institute for Solid State Research, *October 2017, Seminar*
- (29) Brookhaven National Laboratory, *October 2015, Seminar*
- (30) Princeton University, *October 2015, Seminar*
- (31) Collège de France, *July 2015, Seminar*

- (32) IBM Almaden, *July 2014, Seminar*
- (33) Columbia University, *July 2014, Seminar*
- (34) CEA Saclay, *June 2014, Seminar*

INTERNAL ACADEMIC SERVICE

- School of Science Representative at the HKUST University Senate, since 01.01.2024
- Member of the Research Committee of the University Senate, since 01.01.2024
- Member of the University advisory board for research building 3, since 01.09.2023
- Mentor for the year 1 students of the IRE track, since 01.09.2023
- Member of Committee for International Student Admission, since 01.09.2021
- Department Representative at JUPAS admission panel, since 01.02.2022

EXTERNAL ACADEMIC SERVICE

- Referee for Nature, Nature Physics, Nature Materials, Nature Communications, Science Advances, Physical Review X, Physical Review Letter, Physical Review B, Physical Review Materials, Communications Physics
- Postdoctoral Council of PCCM at Princeton University, Board Member, 2016-2018

ORGANIZING ACTIVITIES

- WHE Physics School '*Next Generation Quantum Materials: Correlations and Magnetism Meet Topology*', Germany, Co-Organizer, to be held in September 2025
- IAS focused program '*Young Research Leaders in Topological Materials and Beyond*', Hong Kong, Lead Organizer, to be held in June 2024
- Croucher Symposium, Hong Kong, Co-Organizer, December 2024
- IAS CQT Workshop, Hong Kong, Co-Organizer, July 2021
- Condensed Matter Physics Seminar, HKUST Department of Physics, Lead Organizer, since spring 2021
- Princeton Physics March Meeting, USA, Lead Organizer, March 2020

TEACHING ACTIVITIES

- (1) PHYS4191, Capstone Project
Fall 2023
HKUST
- (2) PHYS1314, Honors General Physics
Spring 2023, Spring 2024
HKUST
- (3) PHYS1003, Energy and Environmental Issues
Spring, 2021, Fall 2021, Fall 2022, Fall 2023
HKUST

- (4) PHYS2090, Directed Studies in Physics
Fall 2022, Spring 2024
HKUST
- (5) PHYS3090, Directed Studies in Physics
Fall 2021, Fall 2023
HKUST
- (6) SCIE4500, IRE Research Project II
Fall 2021
HKUST
- (7) Undergraduate Research Opportunity,
Summer 2021, Summer 2022, Summer 2023, Spring 2024
HKUST
- (8) SCIE2500, Guided study on research II
Spring 2021, Spring 2022, Spring 2024
HKUST
- (9) SCIE1500, Guided study on research I
Spring 2021
HKUST
- (10) Introduction to quantum mechanics, tutor
Fall 2010
Universität Würzburg, GER
- (11) Physics Undergraduate Lab, tutor
2009-2010
Universität Würzburg, GER

MENTORING ACTIVITIES

- (1) Supervision of postdoctoral scientists (2) since 2021
HKUST
- (2) Supervision of postgraduate students (4) since 2021
HKUST
- (3) Supervision of undergraduate research assistants (7) since 2021
HKUST
- (4) Supervision of visiting undergraduate research assistants (2) since 2022
HKUST
- (5) Supervision of REU undergraduate students (2) 2017-2019
Princeton University
- (6) Mentoring of graduate students (2) 2016-2020
Princeton University
- (7) Mentoring of master students (2) 2012-2014
Max-Planck-Institute, GER

PUBLIC SERVICE

December 2023

Civil service man of the German federal government
School for Handicapped Children Karlsbad, GER

2004-2005

December 2023