



Curriculum Vitae – Prof. Dr. Dmitri K. Efetov

Birthday: 05.09.1980 **Citizenship:** Germany **ORCID:** 0000-0001-5862-0462

Email: Dmitri.Efetov@lmu.de

Website: <https://www.quantummatter.physik.lmu.de>

Address: Ludwig-Maximilians-Universität München, Fakultät für Physik
Room N103, Geschwister-Scholl-Platz 1, 80539 München, Germany

Research Interests

- Graphene and 2D Materials • Van der Waals Heterostructures • Moiré Materials • Strongly Correlated Electrons • Topological systems • Low-dimensional Superconductivity • 2D Magnetism • Quantum Sensing •

I am interested in engineering exotic quantum effects in the emerging class of 2D moiré materials, and exploring the transport and optical properties of their correlated, superconducting, magnetic and topological phases at low temperatures (10mK), high magnetic fields (35T) and on ultra-fast time-scales (ps).

Education

- 2014 **PhD in Physics (also MA and MPhil)**, Department of Physics, **Columbia University, USA**
Supervisor: **Prof. Philip Kim**
- 2007 **Diploma (MSc) in Physics**, Department of Physics, **ETH Zurich, CH**
Supervisor: **Prof. Philip Kim** (thesis at Columbia University)
(Vordiplom: 2001 – 2003 Ruhr-Universität Bochum)

Academic Positions

- 2021 – **Full Professor (W3) and Chair of Experimental Solid State Physics**, **LMU Munich, GER**
- 2017 – 2022 **Assistant Professor/Group Leader**, **ICFO Barcelona, SP**
- 2014 – 2017 **Postdoctoral Researcher**, Group of Prof. Dirk Englund, **MIT, USA**
- 2007 – 2014 **Graduate Researcher**, Group of Prof. Philip Kim, **Columbia University, USA**

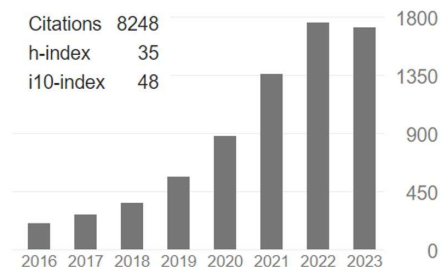
Awards and Honors

- 2022 **IUPAP Early Career Scientist Prize**, International Union of Pure and Applied Physics
- 2020 **Finalist of the LaVanguardia Science Prize**, SP
- 2020 **ERC Starting Grant “SuperTwist”**, EU
- 2018 **Junior Leader Fellowship**, Obra Social “laCaixa”, SP
- 2012 **Charles H. Townes Fellow Award**, Columbia University, NY, USA
- 2007 **Faculty PhD Fellowship**, Columbia University, USA

Publications and Invited Presentations Summary

> 68 publications with > 8300 citations, h-index > 35 in Nature/Science (5x), PRL, Nature Phys./Nano./Mat. (19x) etc. and were covered by news outlets like The New York Times, Le Monde, Physics Today, Physik Journal etc.

> 170 invited seminars/colloquia including MIT, Harvard, Princeton, Yale, Stanford, Caltech, ETH, Cambridge, Weizmann, Gordon Conference, Aspen, KITP, APS, DPG etc.



Leadership and Responsibilities

- 2022 – Board member, Center of Nano Systems (CeNS), **LMU Munich, GER**
- 2022 – Head, Quantum Technology Park cleanroom of Munich Quantum Valley, **LMU Munich, GER**
- 2018 – 2022 Spokesperson, **EU Quantum Flagship project “2D-SIPC”**.
- 2018 – 2022 Board member of the Science and Engineering Board (SEB), **EU Quantum Flagship**.
- 2017 – Coordinated > 5 national and international research projects including DFG, ERC, EU etc.
- 2017 – Referee for > 5 national and international faculty hiring committees.
- 2014 – Refereed continuously for international scientific journals - Nature, Science, PNAS, PRL, etc.
- 2000 – 2001 Military Service at “Lebenshilfe Bochum eV”- attendant in a home for the mentally disabled.

Organization of Conferences and Scientific Meetings

- 2023 Member international advisory committee EP2DS 2023 conference, **Grenoble, FR**
- 2023 Organizer CeNS Venice workshop, **Venice International University, IT**
- 2023 Organizer/session chair at the European Physical Society (EPS) meeting, **Milan, IT**
- 2022 Organizer/session chair at the Materials Research Society (MRS) meeting, **Honolulu, USA**
- 2020 Organizer/session chair at the European Physical Society (EPS) meeting, **Madrid, SP**
- 2020 Organizer of ICFO&MIT school on "Moiré materials" (>1200 participants), **ICFO, SP**
- 2018 – 2022 Organizer of the 2D-SIPC Quantum Flagship project meetings (3x), **ICFO, SP**
- 2017 – Conference session chair – APS March meeting, CLEO Europe, Graphene 2022 etc.
- 2010 Organizer of the Gotham-Metro meetings, **New York Academy of Sciences, USA**

Member of Academic Societies

- 2023 – Member of German Physical Society DPG, **GER**
- 2022 – Member of Center of Nano Systems (CeNS), **LMU Munich, GER**
- 2021 – Member of Munich Quantum Valley (MQV), **LMU Munich, GER**
- 2021 – Member of Munich Center of Quantum Science and Technology (MCQST), **LMU Munich, GER**
- 2008 – Member of American Physical Society APS, **USA**

Supporting Young Researchers

I have supervised > 15 BSc and MSc students, > 7 PhD students and > 8 postdocs. Since 2017, from the young researchers working in my group 1 received a PhD and 4 became professors in internationally recognized institutions - Prof. Dr. X. Lu (Beijing University, China), Prof. Dr. P. Stepanov (University of Notre Dame, USA), Prof. Dr. P. Seifert (Universität der Bundeswehr, Germany), Prof. Dr. S. Yang (SUSTECH, China).

Major Scientific Collaborations

- Prof. A. B. Bernevig, theory of topology in twistrionic materials, **Princeton, USA**
- Prof. L. Levitov, theory of scattering mechanisms in twistrionic materials, **MIT, USA**
- Prof. A. MacDonald, theory of superconductivity in graphene, **UT Austin, USA**
- Prof. A. Vishvanath, theory of correlated states in twistrionic materials, **Harvard, USA**
- Prof. P. Kim, thermal transport in magic angle graphene, **Harvard, USA**
- Prof. A. Yacoby, scanning SET of magic angle graphene, **Harvard, USA**
- Prof. P. Törma, quantum geometry, **Aalto, FIN**
- Prof. M. Allan, STM of moiré materials, **LMU Munich, GER**
- Prof. E. Zeldov, scanning probe of graphene, **Weizmann, IL**
- Prof. S. Ganichev, THz spectroscopy of moiré materials, **Regensburg, GER**
- Dr. K. C. Fong, microwave and quantum circuits, **BBN Raytheon and Harvard, USA**
- Dr. B. Piot, high magnetic field transport of hetero-structures, **Grenoble, FR**

Brief Research Summary

Dmitri Efetov has been one of the pioneers in the research field of strongly correlated quantum phases in two-dimensional materials, which was recently realized in the form of “magic” angle twisted bilayer graphene. He has initiated this research direction during his PhD Thesis: “Towards inducing superconductivity into graphene”, and ever since he has been at the forefront of the key development in this field, where he holds a leading position in Europe. His group is credited to have developed ultra-clean fabrication protocols for magic angle twisted bilayer graphene, and is recognized to produce devices with the most homogeneous and precise twist-angles. Low temperature transport studies of these systems led to the discovery of a multitude of novel superconducting and correlated insulator phases. Further milestones in the research of this materials platform were the demonstration of tuned electronic correlations via dielectric engineering, the discovery of an unconventional sequence of topologically non-trivial Chern insulators and orbital magnets and the demonstration of a strange metal phase. Dmitri Efetov also tackled an enduring problem in the fields of radio astronomy and quantum computation, where a lack of sensitive photo-detectors for long wavelength light significantly slowed scientific development, where he led the development of ultrasensitive graphene Josephson junction based photo-detectors that can detect single light quanta even at very low photon energies.

Major Scientific Achievements (Short List)

- First group in Europe (third worldwide) to observe superconductivity in magic angle graphene. **Nature, 574, 653 (2019).**
- Demonstration of independent insulating and superconducting orders in magic-angle graphene. **Nature, 583, 375–378 (2020).**
- Observation of symmetry-broken Chern insulators in magic-angle bilayer graphene. **Nature Physics, 17, 710 (2021).**
- Observation of quantum-critical behavior in magic-angle twisted bilayer graphene. **Nature Physics, 18, 633 (2022).**
- Demonstration of Dirac spectroscopy and strongly correlated phases in twisted trilayer graphene. **Nature Materials, 22, 336 (2023).**
- First realization of a GHz and mid-IR single photon detectors in graphene Josephson junctions. **Nature 586, 42–46 (2020), Science, 372, 6540 (2021).**
- Established a novel and highly multidisciplinary technique, which combines mK sensitive microwave thermometry of a nano-scale electron ensemble with fs fast laser excitation, resulting in the first measurements of electronic specific heat and entropy measurements of nano-scale materials. **Nature Nanotechnology, 13, 797–801 (2018), Nano Letters, 21, 12, 5330 (2021).**
- First experimental demonstration of specular interband Andreev reflections. **Nature Physics, 12, 328–332 (2016).**
- Pioneering electrolytic gates of 2D materials and demonstration of Bloch-Grüneisen behaviour. **Physical Review Letters, 105 (25), 256805 (2010).**

Group Alumni

Postdocs

2017 – 2020	Dr. Aamir Ali - now Postdoc Chalmers University, SWE
2017 – 2020	Prof. Dr. Xiaobo Lu - now Assistant Professor Peking University, CN
2018 – 2020	Dr. Nicholas Moore - now Postdoc Tohoku University, JAP
2018 – 2020	Prof. Dr. Petr Stepanov - now Assistant Professor University of Notre Dame, USA
2018 – 2021	Prof. Dr. Paul Seifert - now Junior Professor Bundeswehr Universität, GER
2019 – 2020	Dr. Jose Ramon Duran Retamal - now Postdoc ICN2, SP
2020 – 2022	Dr. Cheng Shen - now Postdoc EPFL, CH
2020 – 2022	Prof. Dr. Shuoying Yang - now Assistant Professor SUSTECH, CN
2020 – 2023	Dr. Alexandre Jaoui - now researcher Chipiron, FR

PhD Students

2023	Dr. Ipsita Das – “Investigation of the Interaction Driven Quantum Phases in Magic-Angle Twisted Bilayer Graphene” - now Postdoc LMU Munich, GER
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Teaching Activities

2023 – **Professor, LMU Munich, GER**

- WS 23/24 - “Advanced Solid State Physics” (4+2h)
- WS 23/24 - “Advanced topics in the Physics of Quantum-Materials” (2h)
- SS 23 - “Introduction to Graphene and 2D Materials” (2+2h)
- SS 23 - “Advanced topics in the Physics of Quantum-Materials” (2h)
- SS 23 - “International Seminar on Quantum-Materials” (2h)

2015 **Substitute Lecturer, MIT, USA**

- 6.602 Fundamentals of Photonics (1 semester)

2007 – 2012 **Teaching Assistant/Instructor/Lecturer, Columbia University, USA**

- G4051 Advanced Laboratory Work (2 semesters)
- W1291 General Physics Lab I/II (4 semesters)
- C1493 Experimental Physics Lab (4 semesters)

2005 – 2006 **Teaching Assistant, ETH Zurich, CH**

- General Physics Lab I/II (2 semesters)

All On-Going and Past Research Grants

2023	DFG large equipment grant, 50% Dill. Fridge with vector magnet, 418.500€.
2023	DFG large equipment grant, 50% Dill. Fridge with 14T magnet, 414.000€.
2023 – 2027	SuperC, Keele Foundation Grant (Private Donation), 315.000€.
2023 – 2027	FLATS, EU EIC Pathfinder Grant (EU), Ref: 101099139, 656.750€.
2022 – 2025	Core-member MCQST (GER), Ref: 390814868, 77.000€/year.
2021 – 2026	MQV Quantum Technology Park (GER), Ref: 1705414, 8.831.894€.
2020 – 2025	SuperTwist, ERC Starting Grant (EU), Ref: 852927, 1.780.000€.
2018 – 2022	2D-SIPC, EU Horizon 2020 Quantum Flagship (EU), Ref: 820378, 530.000€.
2018 – 2021	2DSC, LaCaixa foundation Junior Leaders fellowship (SP), 305.700€.

Full Publication List Dmitri K. Efetov:

- 68.** Umklapp scattering assisted temperature dependent resistivity in twisted bilayer graphene
A. Jaoui, K. Watanabe, T. Taniguchi and **D. K. Efetov**
In preparation.
- 67.** Review: Strong correlations and non-trivial topology in 2D moiré materials
B. A. Bernevig, X. Xu, A. MacDonald and **D. K. Efetov**
In preparation – (invited review article by Reviews of Modern Physics).
- 66.** Ultra-clean fabrication protocols of twisted bilayer graphene devices
J. Diez, I. Das, G. DiBattista, A. Diez and **D. K. Efetov**
In preparation.
- 65.** Signatures of heavy fermion bands in the photo-thermoelectric response of magic-angle bilayer graphene pn-junctions
R. Luque, D. Calugaru, H. Hu, B. A. Bernevig, **D. K. Efetov**
submitted.
- 64.** Infrared single-photon detection with superconducting magic-angle twisted bilayer graphene
G. DiBattista, K. C. Fong, A. Díez Carlón, C. Shen, K. Watanabe, T. Taniguchi and **D. K. Efetov**
submitted.
- 63.** The thermoelectric effect in twisted bilayer graphene in the heavy fermion picture
D. Calugaru, H. Hu, **D. K. Efetov**, B. A. Bernevig
submitted.
- 62.** Chirality probe of twisted bilayer graphene in the linear transport regime
D. A. Bahamon, G. Gómez-Santos, **D. K. Efetov**, T. Stauber
arXiv:2307.03779.
- 61.** Ultrafast Umklapp-assisted electron-phonon cooling in magic-angle twisted bilayer graphene
J. D. Mehew, R. Luque Merino, H. Ishizuka, A. Block, J. Díez-Mérida, A. Díez-Carlón, K. Watanabe, T. Taniguchi, L. S. Levitov, **D. K. Efetov**, K.-J. Tielrooij
Science Advances – in press (arXiv:2301.13742) (2023).
- 60.** 2D flat bands in flat lands
B. A. Bernevig and **D.K. Efetov**
Physics Today – in press (2023).
- 59.** Energy dissipation on magic angle twisted bilayer graphene
A. Ollier, M. Kisiel, M. Poggio, U. Gysin, X. Lu, **D.K. Efetov**, E. Meyer
Communications Physics – in press (arXiv:2301.13742)(2023).
- 58.** Materials and devices for fundamental quantum science and quantum technologies
M. Polini, F. Giazotto, K. C. Fong, I. M. Pop, C. Schuck, T. Boccali, G. Signorelli, M. D’Elia, R. H. Hadfield, V. Giovannetti, D. Rossini, A. Tredicucci, **D. K. Efetov**, F. H. L. Koppens, P. Jarillo-Herrero, A. Grassellino, D. Pisignano
Nature Reviews Materials - in press (arXiv:2201.09260v1)(2023).
- 57.** Realizing attosecond core-level X-ray spectroscopy for the investigation of condensed matter systems
A. M. Summers, S. Severino, M. Reduzzi, T. P. H. Sidiropoulos, D. Rivas, N. Di Palo, H.-W. Sun, Y.-H. Chien, I. León, B. Buades, S. Cousin, S.M. Teichmann, T. Mey, K. Mann, B. Keitel, E. Plönjes, **D. K. Efetov**, H. Schwörer, J. Biegert
Ultrafast Science, 3, 0004 (2023).

56. Plethora of many body ground states in magic angle twisted bilayer graphene
S. Y. Yang, A. Díez-Carlón, J. Díez-Mérida, A. Jaoui, I. Das, G. Di Battista, R. Luque-Merino, R. Mech and **D. K. Efetov**
Low Temperature Physics/Fizyka Nizkikh Temperatur, **49**, 6 (2023).
55. ϕ_0 -Josephson junction in twisted bilayer graphene induced by a valley-polarized state
Y.-M. Xie, **D. K. Efetov** and K. T. Law
Physical Review Research, **5**, 023029 (2023).
54. Symmetry Broken Josephson Junctions and Superconducting Diodes in Magic Angle Twisted Bilayer Graphene
J. Díez-Mérida, A. Díez-Carlón, S. Y. Yang, Y.-M. Xie, X.-J. Gao, K. Watanabe, T. Taniguchi, X. Lu, K. T. Law and **D. K. Efetov**
Nature Communications, **14**, 2396 (2023).
53. Two-dimensional cuprate nanodetector with single photon sensitivity at $T = 20$ K
R. Luque Merino, P. Seifert, J. Duran Retamal, R. Mech, T. Taniguchi, K. Watanabe, K. Kadowaki, R. H. Hadfield, **D. K. Efetov**
2D Materials, **10**, 2 (2023).
News : Nature Nanotechnology News & Views;
52. Dirac spectroscopy of strongly correlated phases in twisted trilayer graphene
C. Shen, P. J. Ledwith, K. Watanabe, T. Taniguchi, E. Khalaf, A. Vishwanath and **D. K. Efetov**
Nature Materials, **22**, 336 (2023).
(<https://doi.org/10.1038/s41563-022-01428-6>)
News : Nature Materials News & Views;
51. Infrared photoresistance as a sensitive probe of electronic transport in twisted bilayer graphene
S. Hubmann, G. Di Battista, I. A. Dmitriev, K. Watanabe, T. Taniguchi, **D. K. Efetov**, S. D. Ganichev
2D Materials, **10**, 1 (2022).
50. Revealing the thermal properties of superconducting magic-angle twisted bilayer graphene
G. Di Battista, P. Seifert, K. Watanabe, T. Taniguchi, K.C. Fong, A. Principi and **D. K. Efetov**
Nano Letters, **22**, 6465 (2022).
49. Reentrant correlated insulators in twisted bilayer graphene at 25T (2π flux)
J. Herzog-Arbeitman, A. Chew, **D. K. Efetov** and B. A. Bernevig
Physical Review Letters, **129**, 076401 (2022).
48. Chern mosaic and Berry-curvature magnetism in magic angle graphene
S. Grover, M. Bocarsly, A. Uri, P. Stepanov, G. Di Battista, I. Roy, J. Xiao, A. Y. Meltzer, Y. Myasoedov, K. Pareek, K. Watanabe, T. Taniguchi, B. Yan, A. Stern, E. Berg, **D. K. Efetov** and E. Zeldov
Nature Physics, **18**, 885 (2022).
47. Observation of re-entrant correlated insulators and interaction driven Fermi surface reconstructions at one magnetic flux quantum per moiré unit cell in magic-angle twisted bilayer graphene
I. Das, C. Shen, A. Jaoui, J. Herzog-Arbeitman, A. Chew, C.-W. Cho, T. Taniguchi, K. Watanabe, B. Piot, B. A. Bernevig and **D. K. Efetov**
Physical Review Letters, **128**, 217701 (2022).
46. Quantum-critical behavior in magic-angle twisted bilayer graphene
A. Jaoui, I. Das, G. Di Battista, J. Díez-Mérida, X. Lu, K. Watanabe, T. Taniguchi, H. Ishizuka, L. Levitov and **D. K. Efetov**
Nature Physics, **18**, 633 (2022).
(<https://doi.org/10.1038/s41567-022-01556-5>)
News: Nature Physics News & Views; Journal Club of Condensed Matter Physics;

45. Nonlinear intensity dependence of photogalvanics and photoconductance induced by terahertz laser radiation in twisted bilayer graphene close to magic angle
S. Hubmann, P. Soul, G. Di Battista, M. Hild, K. Watanabe, T. Taniguchi, **D. K. Efetov** and S. D. Ganichev
Physical Review Materials, **6**, 024003 (2022).
44. Competing zero-field Chern insulators in superconducting twisted bilayer graphene
P. Stepanov, M. Xie, K. Watanabe, T. Taniguchi, X. Lu, A. H. MacDonald, B. A. Bernevig and **D. K. Efetov**
Physical Review Letters, **127**, 197701 (2021).
43. Observation of interband collective excitations in twisted bilayer graphene
N. C. H. Hesp, I. Torre, D. Rodan-Legrain, P. Novelli, Y. Cao, S. Carr, S. Fang, P. Stepanov, D. Barcons-Ruiz, H. Herzig-Sheinfux, K. Watanabe, T. Taniguchi, **D. K. Efetov**, E. Kaxiras, P. Jarillo-Herrero, M. Polini and F. H. L. Koppens
Nature Physics, **17**, 1162–1168 (2021).
42. Multiple flat bands and topological Hofstadter butterfly in twisted bilayer graphene close to the second magic angle
X. Lu*, B. Lian*, G. Chaudhary*, G. Romagnoli, B. A. Piot, K. Watanabe, T. Taniguchi, M. Poggio, A. H. MacDonald, B. A. Bernevig and **D. K. Efetov**
PNAS, **118**, 30 (2021).
41. Ultra-sensitive calorimetric measurements of the electronic heat capacity of graphene
M. A. Aamir*, J. N. Moore*, X. Lu, P. Seifert, D. Englund, K. C. Fong and **D. K. Efetov**
Nano Letters, **21**, 12, 5330 (2021).
40. A high-T_c van der Waals superconductor based photodetector with ultra-high responsivity and nanosecond relaxation time
P. Seifert*, J. R. Durán Retamal*, R. Luque, H. Herzig Sheinfux, J. N. Moore, M. A. Aamir, T. Taniguchi, K. Watanabe, K. Kadowaki, M. Artiglia, M. Romagnoli and **D. K. Efetov**
2D Materials, **8** 035053 (2021).
39. Twisted bilayer graphene. IV. Exact insulator ground states and phase diagram
B. Lian, Z.-D. Song, N. Regnault, **D. K. Efetov**, A. Yazdani and B. A. Bernevig
Physical Review B, **103**, 205414 (2021).
38. Josephson junction infrared single-photon detector
E. D. Walsh, W. Jung, G.-H. Lee, **D. K. Efetov**, B.-I. Wu, K.-F. Huang, T. A. Ohki, T. Taniguchi, K. Watanabe, P. Kim, D. Englund and K. C. Fong
Science, **372**, 6540 (2021).
[News: PhysOrg;](#)
37. Symmetry broken Chern insulators and Rashba-like Landau level crossings in magic angle bilayer graphene
I. Das*, X. Lu*, J. Herzog-Arbeitman, Z.-D. Song, K. Watanabe, T. Taniguchi, B. A. Bernevig and **D. K. Efetov**
Nature Physics, **17**, 710 (2021).
(<https://doi.org/10.1038/s41567-021-01186-3>)
[News: PhysOrg;](#)
36. The marvels of moiré materials
E. Y. Andrei, **D. K. Efetov**, P. Jarillo-Herrero, A. H. MacDonald, K. F. Mak, T. Senthil, E. Tutuc, A. Yazdani and A. F. Young
Nature Reviews Materials, **6**, 201 (2021) – (Invited Viewpoint Article).
(<https://doi.org/10.1038/s41578-021-00284-1>)
[Editorial: Moiré magic three years on – Nature Reviews Materials](#), **6**, 191 (2021);

35. Effektvolle Drehung

D. K. Efetov

Physik Journal, 03, 28 (2021) - (Invited Overview – main journal German Research Foundation).

[Cover: Physik Journal](#);

34. Measuring local moiré lattice heterogeneity of twisted bilayer graphene

T. Benschop*, T. de Jong*, P. Stepanov*, X. Lu, V. Stalman, S. J. van der Molen, D. K. Efetov and M. Allan

Physical Review Research, 3, 013153 (2021).

33. Giant enhancement of third-harmonic generation in graphene-metal heterostructures

L. Rozema, D. Alcaraz Iranzo, A. Trenti, J. Cox, A. Kumar, H. Bieliaiev, S. Nanot, C. Peng, D. K. Efetov, J. Y. Hong, J. Kong, D. Englund, F. J. García de Abajo, F. H. L. Koppens and P. Walther

Nature Nanotechnology, 16, 318 (2021).

[News: EurekaAlert](#); [ProPhysik](#);

32. Observation of flat bands in twisted bilayer graphene

S. Lisi, X. Lu, T. Benschop, T. de Jong, P. Stepanov, F. Margot, I. Cucchi, E. Cappelli, A. Hunter, A. Tamai, V. Kandyba, A. Giampietri, A. Barinov, J. Jobst, V. Stalman, M. Leeuwenhoek, K. Watanabe, T. Taniguchi, L. Rademaker, S. J. van der Molen, M. Allan, D. K. Efetov and F. Baumberger

Nature Physics, 17, 189 (2021).

[News: PhysOrg](#);

31. Nuevos estados en el grafeno “mágico”

D. K. Efetov

Investigación y Ciencia (Scientific American Spain) (2020) – (Invited Panorama Article).

30. Graphene-based Josephson junction microwave bolometer

G.-H. Lee, D. K. Efetov, L. Ranzani, E. Walsh, J. Crossno, T. A. Ohki, T. Taniguchi, K. Watanabe, Kim, D. Englund and K. C. Fong

Nature 586, 42–46 (2020).

<https://doi.org/10.1038/s41586-020-2752-4>

[News: PhysOrg](#); [NanoWerk](#);

29. Terahertz photogalvanics in twisted bilayer graphene close to the second magic angle

M. Otteneder*, S. Hubmann*, X. Lu, D. A. Kozlov, L. E. Golub, D. K. Efetov and S. D. Ganichev

Nano Letters, 20, 10 (2020).

28. Untying the insulating and superconducting orders in magic-angle graphene

P. Stepanov, I. Das, X. Lu, A. Fahimniya, K. Watanabe, T. Taniguchi, F. H. L. Koppens, J. Lischner, L. Levitov and D. K. Efetov

Nature, 583, 375–378 (2020).

<https://doi.org/10.1038/s41586-020-2459-6>

[News: Nature: News and Views](#);

27. High-order minibands and interband Landau level reconstruction in graphene moiré superlattice

X. Lu, J. Tang, J. R. Wallbank, S. Wang, C. Shen, S. Wu, P. Chen, W. Yang, J. Zhang, K. Watanabe, T. Taniguchi, R. Yang, D. Shi, D. K. Efetov, V. I. Fal’ko and G. Zhang

Physical Review B, 102, 045409 (2020).

26. Superconductivity and strong correlations in moiré flat bands

L. Balents, C. Dean, D. K. Efetov and A. F. Young

Nature Physics, 16, 725 (2020) - (Focus/Perspective – Invited Review Article).

<https://doi.org/10.1038/s41567-020-0906-9>

[Journal Club for Condensed Matter Physics: by Senthil Todadri](#);

25. Magic-angle bilayer graphene nanocalorimeters: toward broadband, energy-resolving single photon detection
P. Seifert, X. Lu, P. Stepanov, J. R. Duran, K. C. Fong, A. Principi and **D. K. Efetov**
Nano Letters, **5**, 20 (2020).
24. Critical role of device geometry for the phase diagram of twisted bilayer graphene
Z. A. H. Goodwin, V. Vitale, F. Corsetti, **D. K. Efetov**, A. A. Mosto and J. Lischner
Physical Review B, **101**, 165110 (2020).
23. Nanoscale imaging and control of hBN defect single photon emitters by a resonant nano-antenna
N. Palombo Blascetta, M. Liebel, X. Lu, T. Taniguchi, K. Watanabe, **D. K. Efetov** and N. F. van Hulst
Nano Letters, **3**, 20 (2020).
22. Superconductors, orbital magnets, and correlated states in magic angle bilayer graphene
X. Lu, P. Stepanov, W. Yang, M. Xie, A. M. Ali, I. Das, C. Urgell, K. Watanabe, T. Taniguchi, G. Zhang, A. Bachtold, A. MacDonald and **D. K. Efetov**
Nature, **574**, 653 (2019).
(<https://doi.org/10.1038/s41586-019-1695-0>)
News: The New York Times; Le Monde; La Vanguardia; Physics Today; TV3; Spektrum etc.
Journal Club for Condensed Matter Physics: by Mike Zaletel;
21. Thermal radiation control from hot graphene electrons coupled to a photonic crystal nanocavity
R.-J. Shiue, Y. Gao, C. Tan, C. Peng, J. Zheng, **D. K. Efetov**, Y. D. Kim, J. Hone and D. Englund
Nature Communications, **10**, 109 (2019).
20. Compact mid-infrared graphene thermopile enabled by a nanopatterning technique of electrolyte gates
C. Peng, S. Nanot, R.J. Shiue, G. Grosso, Y. Yang, M. Hempel, P. Jarillo-Herrero, J. Kong, F. H. L. Koppens, **D.K. Efetov** and D. Englund
New Journal of Physics, **20**, 083050 (2018).
19. Fast thermal relaxation in cavity-coupled graphene bolometers with a Johnson noise read-out
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15. A MoTe₂ based light emitting diode and photodetector for silicon photonic integrated circuits
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Nature Nanotechnology, **12**, 1124–1129 (2017).
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13. Inducing superconducting correlation in quantum Hall edge states
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11. Active 2D materials for on-chip nanophotonics and quantum optics
R.-J. Shiue, **D. K. Efetov**, G. Grosso, C. Peng, K. C. Fong and D. Englund
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Journal of Physics: Condensed Matter, **28**, 505304 (2016).
9. Crossover from retro to specular Andreev reflections in bilayer graphene
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8. Li intercalation into graphite: direct optical imaging and Cahn-Hilliard reaction dynamics
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The Journal of Physical Chemistry Letters, **7** (11), 2151–2156 (2016).
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Nature Physics, **12**, 328–332 (2016).
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6. High-responsivity graphene–boron nitride photodetector and autocorrelator in a silicon photonic integrated circuit
R. J. Shiue, Y. Gao, Y. Wang, C. Peng, A. D. Robertson, **D. K. Efetov**, S. Assefa, F. H. L. Koppens, J. Hone and D. Englund
Nano letters, **15** (11), 7288–7293 (2015).
5. Multiband transport in bilayer graphene at high carrier densities
D. K. Efetov, P. Maher, S. Glinskis and P. Kim
Physical Review B, **84** (16), 161412 (2011) - (Editor's suggestion).
4. Nanocrystalline graphite growth on sapphire by carbon molecular beam epitaxy
S. K. Jerng, D. S. Yu, Y. S. Kim, J. Ryou, S. Suklyun, C. Kim, S. Yoon, **D. K. Efetov**, P. Kim and S.H. Chun
The Journal of Physical Chemistry C, **115** (11), 4491–4494 (2011).

3. Controlling electron-phonon interactions in graphene at ultrahigh carrier densities

D. K. Efetov and P. Kim

Physical Review Letters, **105 (25), 256805 (2010)** - (Editor's suggestion).

(<https://link.aps.org/doi/10.1103/PhysRevLett.105.256805>).

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2. Electronic transport in locally gated graphene nanoconstrictions

B. Özyilmaz, P. Jarillo-Herrero, D. K. Efetov and P. Kim

Applied Physics Letters, **91 (19), 192107 (2007)**.

1. Electronic transport and quantum hall effect in bipolar graphene p-n-p junctions

B. Özyilmaz, P. Jarillo-Herrero, D. K. Efetov, D. Abanin, L. S. Levitov and P. Kim

Physical Review Letters, **99 (16), 166804 (2007)** - (Editor's suggestion).

Patents

3. A superconducting transition-edge thermal sensor

P. Seifert, J. Duran, X. Lu, P. Stepanov and D. K. Efetov

European patent application, 19382979.3-1212 (2020).

2. A superconducting nanowire single-photon detector, and a method for obtaining such detector

J. Duran, P. Seifert, X. Lu, A. Ali and D. K. Efetov

European patent application, 19382806.8-1020 (2019).

1. Locally gated graphene nanostructures and methods of making and using

B. Özyilmaz, D. K. Efetov, P. Jarillo-Herrero and P. Kim

US Patent, 8,659,009 (2014).

Full List of Invited Talks

168. 2/24 - Stuttgart Physik Kolloquium, **Stuttgart, GER**

167. 1/24 - Quantum Materials Symposium, **Bad Honnef, GER**

2023

166. 12/23 - Strange Metals in Quantum Materials and Quantum Emulators, **Bad Honnef, GER**

165. 11/23 - Quantum technologies colloquium, **Princeton University, USA**

164. 10/23 - DFG priority program SSPP24 meeting, **Bad Honnef, GER**

163. 10/23 - SFB 953 - Erlangen Symposium, **Erlangen, GER**

162. 10/23 - Nobel Institute symposium on magic graphene, **Chalmers, SWE**

161. 10/23 - Phase slip in superconductors conference, **London, UK**

160. 8/23 - SuperC conference, **Helsinki, FIN**

159. 8/23 - Institute Q physics colloquium, **Aalto University, FIN**

158. 8/23 - Chinese Physical Society Fall Meeting 2023 (online), **Beijing, CN**

157. 8/23 - PSI Condensed matter summer Camp (online), **Zuoz, CH**

156. 7/23 - EP2DS, **Grenoble, FRA**

155. 6/23 - Physics colloquium, **Hamburg University, GER**

154. 6/23 - Topological matter conference, **Cologne, GER**

153. 5/23 - FLATS conference, **Saclay, FRA**

152. 4/23 - Solid State Physics colloquium, **TU Munich, GER**

151. 3/23 - German Physical Society meeting, **Dresden, GER**

150. 3/23 - Physics seminar, **MPI-PCS Dresden, GER**

147. 3/23 - Moire quantum matter workshop, **Aspen Physics Center, USA**

146. 3/23 - APS March meeting, **Las Vegas, USA**

145. 2/23 - Mautendorf winter school, **Mautendorf, AUT**

144. 2/23 - Chemistry colloquium, **LMU Munich, GER**

143. 1/23 - Quantum geometric advantage workshop, **Nanyang Technical University, SIN**

2022

- 142. 12/22 - Physics colloquium, **University Duisburg-Essen, GER**
- 141. 12/22 - Physics colloquium, **RWTH Aachen, GER**
- 140. 12/22 - National Graphene Institute seminar, **University of Manchester, UK**
- 139. 11/22 - Materials Research Society meeting, **Boston, USA**
- 138. 10/22 - "Frontiers of Condensed Matter" school (online), **Les Houches, FR**
- 137. 10/22 - William Fine physics seminar (online), **University of Minnesota, USA**
- 136. 9/22 - "Advances in Quantum Transport in Low-Dimensional Systems" workshop (online), **London, UK**
- 135. 9/22 - "Nano meets Quantum" CeNS workshop, **Venice, IT**
- 134. 8/22 - Graphene Week 2022, **Munich, GER**
- 133. 8/22 - ICTP "Strongly Correlated Matter: from Quantum Criticality to Flat Bands" (online), **Trieste, IT**
- 132. 8/22 - Materials with novel electronic properties (MANEP) workshop (online), **Les Diablerets, CH**
- 131. 8/22 - Low Temperature Physics 29 conference (online), **Sapporro, JP**
- 130. 8/22 - Princeton Condensed Matter Summer school, **Princeton University, USA**
- 129. 7/22 - "Novel electronic properties of 2D materials" conference, **San Sebastian, SP**
- 128. 7/22 - Graphene 2022 conference, **Aachen, GER**
- 127. 7/22 - Munich Quantum conference MCQST2022, **Sonthofen, GER**
- 126. 6/22 - ICPS 2022 conference (online), **Sydney, AU**
- 125. 6/22 - Gordon Research conference – Correlated materials, **Massachusetts, USA**
- 124. 6/22 - Condensed Matter seminar, **Boston College, USA**
- 123. 6/22 - Quantum seminar, **BBN Raytheon, USA**
- 122. 6/22 - Gordon Research conference - Beyond graphene, **New Hampshire, USA**
- 121. 6/22 - CeNS colloquium, **LMU Munich, GER**
- 120. 5/22 - Physics seminar (online), **IIP Natal, BRA**
- 119. 5/22 - Virtual Science Forum seminar (online), **TU Delft, NL**
- 118. 5/22 - QT Flagship Cluster meeting (online), **Paris, FR**
- 117. 5/22 - Moiré summer school, **Capri, IT**
- 116. 5/22 - Entangled States of Matter conference, **Berlin, GER**
- 115. 4/22 - 2DTech seminar (online), **Chalmers University, SE**
- 114. 4/22 - Landau Institute colloquium (online), **Landau Institute, RU**
- 113. 3/22 - Princeton Physics colloquium, **Princeton University, USA**
- 112. 3/22 - New era of two-dimensional quantum matter workshop, **Princeton University, USA**

2021

- 111. 12/21 - ICAMD 2021 conference (online), **Jeju, KR**
- 110. 11/21 - EQTC 2021 conference (online), **Dublin, IR**
- 109. 10/21 - Condensed matter seminar (online), **HKUST, CN**
- 108. 9/21 - Condensed matter seminar, **ETH Zurich, CH**
- 107. 7/21 - DFG Priority program 2244 kick-off lecture (online), **TU Dresden, GER**
- 106. 6/21 - Nanolithography summer school (online), **University of Salamanca, SP**
- 105. 6/21 - NT21 conference (online), **Rice University, USA**
- 104. 6/21 - Emergent topological superconductivity workshop (online), **Aalto University, FI**
- 103. 6/21 - Vortex Matter workshop (online), **IIT Kanpur, IN**
- 102. 6/21 - Quantum materials seminar (online), **Flatiron Institute NY, USA**
- 101. 5/21 - Physics colloquium (online), **IISc Bangalore, IN**
- 100. 5/21 - Workshop Cavity QED in materials (online), **MPI Hamburg, GER**
- 99. 3/21 - Workshop Strong correlations in 2D materials (online), **Hebrew University, IL**
- 98. 3/21 - APS March meeting (online), **USA**
- 97. 3/21 - Condensed matter Seminar (online), **Amherst University, USA**
- 96. 3/21 - Condensed matter Seminar (online), **Ohio State University, USA**
- 95. 2/21 - Graphene for US (online), **New York, USA**
- 94. 2/21 - Correlated Synthetic Quantum Materials Symposium (online), **Bremen, GER**
- 93. 2/21 - APCTP-KIAS Quantum Materials Symposium (online), **Seoul, KR**

92. 2/21 - Physics Colloquium (online), **University of Washington, USA**
 91. 1/21 - Seminar LMPQ Université de Paris (online), **Paris, FR**

2020

90. 12/20 - KITP Correlated Systems Workshop (online), **UCSB, USA**
 89. 11/20 - Russian condensed matter Colloquium (online), **Moscow, RU**
 88. 11/20 - Coherent order and transport in spin-active systems SPICE workshop (online), **Mainz, GER**
 87. 11/20 - Saclay Physics Colloquium (online), **Paris, FR**
 86. 10/20 - Condensed matter Seminar (online), **Princeton, USA**
 85. 10/20 - Condensed matter Seminar (online), **Harvard, USA**
 84. 11/20 - Topological Superconductivity SPICE workshop (online), **Mainz, GER**
 83. 10/20 - Chez Pierre Seminar (online), **MIT, USA**
 82. 10/20 - Physics Seminar (online), **Harvard, USA**
 81. 9/20 - 70-th birthday of K. B. Efetov Workshop, **Bochum University, GER**
 80. 9/20 - Nanoscale Phenomena Conference, **Samarkand, UZ**
 79. 8/20 - PSI Summer Camp (online), **Zuos, CH**
 78. 8/20 - MaNEP SWM-2020 Workshop, **Les Diablerets, CH**
 77. 8/20 - 90-th birthday of G.M.Eliashberg Conference (held online 8/21), **Moscow, RU**
 76. 7/20 - Graphene 2020 Conference (online), **Phantoms, SP**
 75. 6/20 - ISTA Physics Seminar, **IST Austria, AT**
 74. 6/20 - Munich Physics Colloquium (online), **LMU Munich, GER**
 73. 6/20 - Electronic Correlations and Topology School, **Natal, BR**
 72. 5/20 - Correlated Quantum Matter Workshop, **Belgrade, SRB**
 71. 5/20 - Entangled States of Matter Workshop, **Berlin, GER**
 70. 5/20 - Correlations Conference, **ICTP Trieste, IT**
 69. 5/20 - Twistronics Workshop, **MPI Hamburg, GER**
 68. 5/20 - Condensed Matter Seminar (online), **NTU Singapore, SG**
 67. 4/20 - IMDEA Seminar (online), **Madrid, SP**
 66. 3/20 - Heraeus-Seminar DFG, **Bad Honnef, GER**
 65. 3/20 - QSIT Colloquium, **ETH Zurich, CH**
 64. 3/20 - Physics Seminar, **Paul-Scherrer Institute, CH**
 63. 3/20 - IWEPM, **Kirchberg, AUT**
 62. 3/20 - APS March Meeting, **Denver, USA**
 61. 2/20 - Physics Seminar, **ICMM Madrid, SP**
 60. 2/20 - Condensed Matter Physics Seminar, **Oxford, UK**
 59. 2/20 - Israel Physics Society Plenary Talk, **Weizmann, IL**
 58. 2/20 - Physics Seminar, **IST Austria, AT**

2019

57. 12/19 - Physics Department Colloquium, **Weizmann, IL**
 56. 12/19 - Physics Department Colloquium, **University of Geneva, CH**
 55. 11/19 - ICFO Colloquium, **Barcelona, SP**
 54. 11/19 - IQFA conference, **Paris, FR**
 53. 10/19 - Condensed Matter Seminar, **Rutgers, USA**
 52. 10/19 - Metro-Gotham Meeting, **New York Academy of Sciences, USA**
 51. 10/19 - Emergent Topology Conference, **Princeton, USA**
 50. 9/19 - Summer School Nicols Cabrera, **Madrid, SP**
 49. 9/19 - Hocino Conference, **Barcelona, SP**
 48. 9/19 - BEC2019, **Sant Feliu, SP**
 47. 8/19 - Emergent Phenomena in Correlated Quantum Matter, **Cargese, FR**
 46. 7/19 - Theoretical and Experimental Magnetism, **Abington, UK**
 45. 7/19 - Physics in the City, **London, UK**
 44. 7/19 - BIST Workshop, **Barcelona, SP**
 43. 7/19 - Aspen Physics Workshop, **Aspen, USA**
 42. 6/19 - Graphene 2019, **Rome, IT**

41. 6/19 - CLEO Europe, **Munich, GER**
40. 6/19 - Gordon Research Conference, **Hong Kong, CN**
39. 6/19 - 2D Materials Conference, **Valencia, SP**
38. 6/19 - Moiré in Paris Conference, **Paris, FR**
37. 5/19 - Nano Spain Conference, **Barcelona, SP**
36. 5/19 - U in Nanoscale Systems Workshop, **Zaragoza, SP**
35. 4/19 - University of Seoul Seminar, **Seoul, KR**
34. 4/19 - Korean Physical Society Meeting, **Daejeon, KR**
33. 4/19 - Spanish Network of 2D Materials, **Granada, SP**
32. 3/19 - Max Planck Workshop on Quantum Technologies, **Barcelona, SP**
31. 3/19 - IMDEA Seminar, **Madrid, SP**
30. 2/19 - European Quantum Technologies Conference, **Grenoble, FR**
29. 2/19 - SPIE Photonics West, **San Francisco, USA**
28. 2/19 - Van der Waals Colloquium, **Leiden University, NL**
27. 1/19 - Applied Physics Seminar, **Caltech, USA**
26. 1/19 - Correlations in Moiré, **KITP at UCSB, USA**
25. 1/19 - Physics Department Colloquium, **Bochum University, GER**

2018 and before

24. 10/18 - Nanotechnology Seminar, **ICN2, SP**
23. 9/18 - Physics Department Seminar, **Basel University, CH**
22. 7/18 - Magnetism and Superconductivity at the Nanoscale, **Coma-Ruga, SP**
21. 6/18 - Interaction of Light with Quantum Materials, **Castelldefels, SP**
20. 6/18 - Cambridge Graphene Center Seminar, **Cambridge University, UK**
19. 5/18 - BIST Graphene Conference, **ICFO, SP**
18. 5/18 - Walter Schottky Institute Seminar, **TU Munich, GER**
17. 6/17 - Centre of Ultra-Cold Atoms meeting, **MIT, USA**
16. 3/17 - Bacon+ Meeting, **Harvard University, USA**
15. 6/16 - ICFO L4G Seminar, **Barcelona, SP**
14. 6/16 - SPIE Photonics Europe, **Brussels, BE**
13. 9/15 - Graphene Optics Workshop 2015, **Exeter University, UK**
12. 9/15 - Superconductivity and Magnetism in Nanosystems, **Moscow, RU**
11. 11/14 - Bacon+ Meeting, **Harvard University, USA**
10. 10/14 - BBN Raytheon Seminar, **Cambridge, USA**
9. 8/14 - High Magnetic Fields 21 Conference, **Panama City, USA**
8. 7/14 - Jarillo-Herrero Group Seminar, **MIT, USA**
7. 2/14 - Englund Group Seminar, **MIT, USA**
6. 11/13 - QDev Seminar, **Niels Bohr Institute, DK**
5. 11/13 - Condensed Matter Seminar, **Stanford University, USA**
4. 11/13 - Applied Physics Seminar, **Yale University, USA**
3. 9/13 - Light for Graphene Seminar, **ICFO, SP**
2. 9/13 - Kouvenhoven Group Seminar, **TU Delft, NL**
1. 5/12 - Electrochemical Society Meeting, **Seattle, USA**