



Dong-Keun KI

Curriculum vitae

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Professional Career

- from Sept. 2018 Assistant Professor, Department of Physics, The University of Hong Kong, Hong Kong
- 2014 ~ 2018 Collaborateur scientifique trice-II (Senior Research Associate) in Department of Quantum Matter Physics (DQMP) and Group of Applied Physics (GAP), University of Geneva, Switzerland
- 2010 ~ 2014 Postdoctoral researcher in Prof. Alberto Morpurgo's group in Département de Physique de la Matière Condensée (DPMC) and Group of Applied Physics (GAP), University of Geneva, Switzerland

Educations

- 2004 ~ 2010 Ph.D. in Experimental Solid-State Physics, POSTECH, Republic of Korea (Thesis supervisor: prof. Hu-Jong Lee)
**Thesis: Quantum transport properties of graphene and topological insulators*
- 1997 ~ 2004 B.S. in Physics, POSTECH, Reupublic of Korea

Key Research Interests

- Nano-engineering symmetry, interactions and topology in Flatlands (atomically thin 2D crystals)
 - : Understand the role of symmetry in various interaction-driven phenomena
 - : Investigate new moiré physics
 - : Engineer new collective/topological quantum phenomena in 'designer' Flatlands
- Flatlands quantum electronics
 - : Realize the devices with new functionality
 - : Harnessing nontrivial transport properties originating from the non-zero Berry curvature
 - : Create functional devices accessing the ballistic transport regime
- Devising and establishing experiments that can provide deeper understanding of the phenomena (e.g., ionic-liquid gating, thermoelectric and spintronic measurements, etc.)
- Topological quantum devices
 - : Exploring new topology in low-dimensional systems
- Perovskite thermoelectrics in 0D, 1D, and 2D
 - : Understand underlying physics of thermoelectric transport phenomena in Perovskite nanostructures
 - : Engineer new properties using techniques developed in 2D material heterostructures
 - : Develop new fabrication/measurement techniques

Key Research Outputs

- Quantum correlations in 2D materials and heterostructures
Science 362, 324 (2018); 2D Mater. 3, 045014 (2016); Nat. Commun. 6, 6419 (2015)
- Even-denominator fractional quantum Hall effect in suspended graphene bilayer
Nano Lett. 14, 2135 (2014)
- Interfacial engineering spin-orbit coupling in graphene using transition metal dichalcogenides substrates
Nat. Commun. 14, 6124 (2023); Phys. Rev. X 6, 041020 (2016); Nat. Commun. 6, 8339 (2015)
- New electron transport phenomena in ultraclean 2D materials and heterostructures
Nat. Phys. 13, 1207 (2017); Nano Lett. 13, 5165 (2013); Phys. Rev. Lett. 108, 266601 (2012)
- Developing new techniques or new device architectures
AIP Adv. 14, 015333 (2024); Appl. Phys. Lett. 123, 243503 (2023); Adv. Mater. 35, 2301704 (2023);
Appl. Phys. Lett. 102, 223102 (2013)

External Research Grants Awarded

- 2023 RGC Collaborative Research Fund Group Research (Co-PI), RGC Collaborative Research Fund Young CRG (Co-PI), RGC Collaborative Research Fund Equipment Grant (Co-PI)
- 2022 RGC General Research Fund (PI)
- 2021 RGC Area of Excellence (Co-PI), RGC Collaborative Research Fund Equipment Grant (Co-PI), RGC General Research Fund (PI)
- 2020 MoST National Key Research and Development Program (Co-I), RGC General Research Fund (PI)
- 2019 RGC Early Career Scheme (PI), UGC-SHAC 3rd year Donation Fund (PI)

Organisation of international conferences

- 2022 Hong Kong Forum of Physics, Hong Kong (Chair)
- 2018 Hong Kong Forum of Physics, Hong Kong (Co-Chair)
Europe-Korea Conference, Glasgow, UK (Programme Committee)
- 2017 Europe-Korea Conference, Stockholm, Sweden (Programme Committee)
- 2016 Europe-Korea Conference, Berlin, Germany (Programme Committee)

Personal Awards

- 2017 Best Young Scientist Award in the field of Basic Science by The Korean Academy of Science and Technology (Among Korean Scientists in Europe)

Selected invited talks & lectures

- 2023 Kyung-Hee University (Korea, Dec 21)
IWSSQC2023 (Guangzhou, China, Dec 13 ~ 16)
QND academic seminar & workshop (Korea, Dec 1 ~ 2)
CSW2023 (Jeju, Korea, May 29 ~ Jun 1)
School of Mesoscopic Physics "Hybrid Quantum Systems" (POSTECH, Korea, May 18 ~ 20)
KAIST SRC seminar (On-line, Mar 30)
- 2022 RGC PROCORE France/HK Joint Conference on New Frontiers in Electrochemical Materials: Preparation, Theory, and Applications (HKU, Hybrid, Aug 2 ~ 4)
- 2021 The 10th International Workshop on Solid-State Quantum Computing (CityU, Nov 29 ~ Dec 1)
GIST (On-line colloquium, Korea, May 12)
KPS Spring meeting (On-line, Korea, Apr 21 ~ 23)
City University of Hong Kong (On-line colloquium, Hong Kong, Apr 9)
- 2019 DGIST Global Innovation Festival (DGIST, Korea, Nov 27 ~ 28)

- Joint Annual Conference of Physical Societies in Guangdong-Hong Kong-Macau Greater Bay Area (Guangzhou, China, Jul 26 ~ 29)
- 2018 ICON-2DMAT (Melbourne, Australia, Dec 10 ~ 13)
Symposium on Quantum and Nano Devices (Seoul, Korea, Nov 12 ~ 14)
KPS Fall meeting (Changwan, Korea, Oct 24 ~ 26)
- 2017 ICAMD (Jeju, Korea, Dec 5 ~ 8)
- 2016 International Conference GM-2016 (Paestum, Italy, May 23 ~ 27)
19th International Winterschool on New Developments in Solid State Physics (Maunternedorf, Austria, Feb 21 ~ 26)
- 2015 GDR Mesoscopic Quantum Physics in Aussois (France, Dec 1 ~ 4)
- 2014 POSTECH Physics/BK21+/SRC Seminar (Pohang, Korea, Dec 26)
2nd Sino-European Meeting on Graphene Research (Madrid, Spain, May 12 ~ 13)
- 2013 KAIST seminar (Daejeon, Korea, Dec 23)
SRC summer workshop on topological insulator (POSTECH, Pohang, Korea, Aug 10)
Lancaster university (UK, Jul 19)
- 2012 POSTECH Physics/BK21 Seminar (Pohang, Korea, Dec 20)
KRISS (Daejeon, Korea, Dec 18)
- 2008 The Korean Superconductivity Society Meeting (Yongpyong, Korea, Jul 9 ~ 11)

Selected oral presentations

- 2017 Graphene Week 2017 (Athene, Greece, Sept 25 ~ 29)
- 2016 E-MRS spring meeting (Lille, France, May 2 ~ 6)
- 2015 Graphene Week 2015 (Manchester, UK, June 22 ~ 26)
- 2013 Joint Annual Meeting of the Austrian Physical Society and the Swiss Physical Society (JKU Linz, Austria, Sept. 3 ~ 6)
Graphene Week 2013 (Chemnitz, Germany, June 2 ~ 7)
- 2010 Graphene Week 2010 (Univ. of Maryland, USA, April 19 ~ 23)

Publication list

➤ Journal papers (peer-reviewed; *corresponding author, #equal contributions)

1. Qing Rao[#], Guoyun Gao[#], Xinyu Wang, Hongxia Xue^{*}, and Dong-Keun Ki^{*}, "Scratching lithography, manipulation, and soldering of 2D materials using microneedle probes", *AIP Adv.* 14, 015333 (2024).
***Editor's Pick**
2. Qing Rao, Hongxia Xue^{*}, and Dong-Keun Ki^{*}, "Landau-level Spectrum and the Effect of Spin-orbit Coupling in Monolayer Graphene on Transition Metal Dichalcogenides", *Phys. Status Solidi B* 2300397 (2024).
3. Yicong Chen, Dong-Keun Ki^{*}, Zhibing Li, and Jun Chen^{*}, "Concept for a fractional energy barrier tunneling junction", *Appl. Phys. Lett.* 123, 243503 (2023).
4. Qing Rao[#], Wun-Hao Kang[#], Hongxia Xue, Ziqing Ye, Xuemeng Feng, Kenji Watanabe, Takashi Taniguchi, Ning Wang, Ming-Hau Liu^{*}, and Dong-Keun Ki^{*}, "Ballistic transport spectroscopy of spin-orbit-coupled bands in monolayer graphene on WSe₂", *Nat. Commun.* 14, 6124 (2023).
5. Heekwon Lee, Zhuoran Wang, Qing Rao, Sanghyeon Lee, Xiao Huan, Yu Liu, Jihyuk Yang, Mojun Chen, Dong-Keun Ki^{*}, and Jitae Kim^{*}, "Additive Manufacturing of Thermoelectric Microdevices for Four-Dimensional Thermometry", *Adv. Mater.* 35, 2301704 (2023). ***Frontispiece**
6. Yipu Xia[#], Degong Ding[#], Ke Xiao, Junqiu Zhang, Shaogang Xu, Daliang He, Xingyu Yue, Qing Rao, Xiong Wang, Sujuan Ding, Guoyun Gao, Hongxia Xue, Yueyang Wang, Mengfei Yuan, Wingkin Ho, Dong-Keun Ki, Hu Xu, Xiaodong Cui, Chuanhong Jin^{*}, and Maohai Xie^{*}, "Wafer-scale single crystalline MoSe₂ and WSe₂ monolayers grown by molecular beam epitaxy at low-temperature - the role of island-substrate interaction and surface steps", *Nat. Sci.* 3, 20220059 (2023).
7. Jing Yu, Guoyun Gao, Wei Han^{*}, Changting Wei, Yueyang Wang, Tianxiang Lin, Tianyu Zhang, Zhi Zheng, Dong-Keun Ki, Hongyuan Zhang, Man Ho Ng, Hang Liu, Shuangpeng Wang, Hao Wang, and Francis Chi-

- Chung Ling*, “Wafer-scale PLD-grown high- κ GCZO dielectrics for 2D electronics”, *Adv. Elec. Mater.* 8, 2200580 (2022). ***Cover**
8. Peng Yang, Jijia Zha*, *Guoyun Gao*, Long Zheng, Haoxin Huang, Yunpeng Xia, Songcen Xu, Tengfei Xiong, Zhuomin Zhang, Zhengbao Yang, Ye Chen, *Dong-Keun Ki*, Jun J. Liou, Wugang Liao*, and Chaoliang Tan*, “Growth of Tellurium Nanobelts on h-BN for p-type Transistors with Ultrahigh Hole Mobility”, *Nano-Micro Lett.* 14, 109 (2022).
 9. Rashad Rashid, Francis Chi-Chung Ling*, Shuang-Peng Wang, Ke Xiao, Xiaodong Cui, *Qing Rao*, and *Dong-Keun Ki*, “IP and OOP ferroelectricity in hexagonal γ - In_2Se_3 nanoflakes grown by chemical vapor deposition”, *J. Alloys Compd.* 870, 159344 (2021).
 10. Mojun Chen, Jihyuk Yang, Zhenyu Wang, Zhaoyi Xu, Heekwon Lee, Hyeonseok Lee, Zhiwen Zhou, Shien-Ping Feng, Sanghyeon Lee, Jaeyeon Pyo, Seung Kwon Seol, *Dong-Keun Ki*, and Ji Tae Kim, “3D Nanoprinting of Perovskites”, *Adv. Mater.* 31, 1904073 (2019). ***Cover**
 11. Youngwoo Nam, *Dong-Keun Ki*, David Soler-Delgado, and Alberto F. Morpurgo, “A family of finite-temperature electronic phase transitions in graphene multilayers”, *Science* 362, 324 (2018)
 12. Youngwoo Nam, *Dong-Keun Ki*, David Soler-Delgado, and Alberto F. Morpurgo, “Electron-hole collision limited transport in charge-neutral bilayer graphene”, *Nat. Phys.* 13, 1207 (2017)
 13. Lin Wang, N. Chepiga, *Dong-Keun Ki*, L. Li, F. Li, W. Zhu, Y. Kato, Y. Kato, O. S. Ovchinnikova, F. Mila, I. Martin, D. Mandrus, and Alberto F. Morpurgo, “Controlling the topological sector of magnetic solitons in exfoliated $\text{Cr}_{1/3}\text{NbS}_2$ crystals”, *Phys. Rev. Lett.* 118, 257203 (2017) ***Editors’ Suggestion**
 14. Zhe Wang, *Dong-Keun Ki*, Diego Mauro, Jun Yong Khoo, Leonid Levitov, and Alberto F. Morpurgo, “Origin and magnitude of ‘designer’ spin-orbit interaction in graphene on semiconducting transition metal dichalcogenides”, *Phys. Rev. X* 6, 041020 (2016) ***200+ citations**
 15. Lin Wang, Ignacio Gutiérrez-Lezama, Céline Barreteau, *Dong-Keun Ki*, Enrico Giannini, and Alberto F. Morpurgo, “Direct observation of long-range field-effect from gate tuning of non-local conductivity”, *Phys. Rev. Lett.* 117, 176601 (2016) ***Editors’ Suggestion**
 16. Youngwoo Nam, *Dong-Keun Ki**, Mikito Koshino, Edward McCann, and Alberto F. Morpurgo, “Interaction-induced insulating state in thick multilayer graphene”, *2D Mater.* 3, 045014 (2016) ***Co-corresponding**
 17. Zhe Wang, *Dong-Keun Ki*, Hua Chen, Allan H. MacDonald, and Alberto F. Morpurgo, “Strong interface-induced spin-orbit interaction in graphene on WS_2 ” *Nat. Commun.* 6, 8339 (2015) ***400+ citations**
 18. Anya L. Grushina, *Dong-Keun Ki*, Mikito Koshino, Aurelien A. L. Nicolet, Clément Faugeras, Edward McCann, Marek Potemski, and Alberto F. Morpurgo, “Insulating state in tetralayers reveals an even-odd interaction effect in graphene multilayers” *Nat. Commun.* 6, 6419 (2015)
 19. Nuno J. G. Couto, Davide Costanzo, *Dong-Keun Ki*, Kenji Watanabe, Takashi Taniguchi, Francisco Guinea, and Alberto F. Morpurgo, “Random strain fluctuations as dominant disorder source for high-quality on-substrate graphene devices” *Phys. Rev. X* 4, 041019 (2014) ***250+ citations**
 20. *Dong-Keun Ki*, Vladimir I. Fal’ko, Dmitry A. Abanin, and Alberto F. Morpurgo, “Observation of Even Denominator Fractional Quantum Hall Effect in Suspended Bilayer Graphene” *Nano Lett.* 14, 2135 (2014) ***Perspectives in Science**: B. J. LeRoy and M. Yankowitz, *Science* 345, 31 (2014), ***150+ citations**
 21. *Dong-Keun Ki* and Alberto F. Morpurgo, “High-Quality Multiterminal Suspended Graphene Devices” *Nano Lett.* 13, 5165 (2013)
 22. Christophe Caillier, *Dong-Keun Ki*, Yuliya Lisunova, Laroslav Gaponenko, Patrycja Paruch, and Alberto F. Morpurgo, “Identification of a strong contamination source for graphene in vacuum systems” *Nanotechnology* 24, 405201 (2013)
 23. Anya L. Grushina, *Dong-Keun Ki*, and Alberto F. Morpurgo, “A ballistic pn junction in suspended graphene with split bottom gates” *Appl. Phys. Lett.* 102, 223102 (2013)
 24. *Dong-Keun Ki* and Alberto F. Morpurgo, “Crossover from Coulomb Blockade to Quantum Hall Effect in Suspended Graphene Nanoribbons” *Phys. Rev. Lett.* 108, 266601 (2012)
 25. Seung-Geol Nam, *Dong-Keun Ki*, Jong Wan Park, Youngwook Kim, Jun Sung Kim, and Hu-Jong Lee, “Ballistic transport of graphene pnp junctions with embedded local gates” *Nanotechnology* 22, 415203 (2011) ***IOP Select**
 26. Sanghyun Jo, *Dong-Keun Ki*, Dongchan Jeong, Hu-Jong Lee, and Stefan Kettmann, “Spin relaxation properties in graphene due to its linear dispersion” *Phys. Rev. B* 84, 075453 (2011)

27. Seung-Geol Nam, Dong-Keun Ki, and Hu-Jong Lee, "Thermoelectric transport of massive Dirac fermions in bilayer graphene" **Phys. Rev. B** 82, 245416 (2010)
28. Dong-Keun Ki, Seung-Geol Nam, Hu-Jong Lee, and Barbaros Özyilmaz, "Dependence of quantum-Hall conductance on the edge-state equilibration position in a bipolar graphene sheet" **Phys. Rev. B** 81, 033301 (2010)
29. Dong-Keun Ki and Hu-Jong Lee, "Quantum-Hall resistances of a multiterminal top-gated graphene device" **Phys. Rev. B** 79, 195327 (2009) ***Editors' Suggestion**
30. Dong-Keun Ki, Sanghyun Jo, and Hu-Jong Lee, "Observation of chiral quantum-Hall edge states in graphene" **Appl. Phys. Lett.** 94, 162113 (2009) ***Selected for the May 4, 2009 issue of Virtual Journal of Nanoscale Science & Technology**
31. Dong-Keun Ki, Dongchan Jeong, Jae-Hyun Choi, Hu-Jong Lee, and Kee-Su Park, "Inelastic scattering in a monolayer graphene sheet: A weak-localization study" **Phys. Rev. B** 78, 125409 (2008) ***150+ citations**
32. Dongchan Jeong, Dong-Keun Ki, Myung-Ho Bae, Hu-Jong Lee, Chul-Ho Lee, Jinkyong Yoo, and Gyu-Chul Yi, "Observation of Single-Electron Transport in a $Zn_{0.8}Mg_{0.2}O/ZnO$ Coaxial Heterostructure Nanorod" **J. Korean Phys. Soc.** 53, 962 (2008)
33. Dong-Keun Ki and Hu-Jong Lee, "Observation of Spin-Singlet Proximity Effect in a Superconductor/Ferromagnet Interface" **J. Korean Phys. Soc.** 52, 386 (2008)
34. Yong-Duk Jin, Dong-Keun Ki, and Hu-Jong Lee, "Josephson Vortex Dynamics in Tilted Magnetic Fields" **Prog. Supercond.** 9, 140 (2008)
35. Jonghwa Eom, Yun-Sok Shin, Hu-Jong Lee, Dong-Kun Kie, Taegon Kim, and Jonghan Song, "Coexistence of the Kondo and the Superconducting Proximity Effects in AuFe/Al Loops" **J. Korean Phys. Soc.** 48, 446 (2006)

➤ **Invited review articles**

1. Dong-Keun Ki and Hu-Jong Lee, "그래핀의 전자수송 특성 (Transport properties of graphene)" 물리학과 첨단기술 (**Physics and High Technology**), published by Korean Physical Society 18, No 7 / 8 **written in Korean*
2. Hu-Jong Lee and Dong-Keun Ki, "Transport Properties in Graphene" **APCTP Bulletin** 23-24, page 7-12