

# Kyungmin Lee

## Curriculum Vitae

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### Education

- 2009–2016 **Ph.D. in Theoretical Physics**, *Cornell University*, Ithaca, NY.  
◦ Advisor: Prof. Eun-Ah Kim (Dept. of Physics, Cornell)
- 2002–2009 **B.S. in Physics and B.S. in Computer Science and Engineering**, *Seoul National University*, Seoul, Korea.  
◦ Graduated with *summa cum laude*  
◦ Military service from 2005 to 2007.

### List of Publications

- [P1] **Kyungmin Lee**, Arijeet Pal, Hitesh J. Changlani, “Frustration-induced Emergent Hilbert Space Fragmentation”, *arXiv*:2011.01936.
- [P2] **Kyungmin Lee**, Jesse Choe, Davide Iaia, Juqiang Li, Junjing Zhao, Ming Shi, Junzhang Ma, Mengyu Yao, Zhenyu Wang, Chien-Lung Huang, Masayuki Ochi, Ryotaro Arita, Utpal Chatterjee, Emilia Morosan, Vidya Madhavan, and Nandini Trivedi “Metal-to-insulator transition in Pt-doped  $\text{TiSe}_2$  driven by emergent network of narrow transport channels,” *npj Quantum Mater.* **6**, 8 (2021).
- [P3] **Kyungmin Lee**, Ronald Melendrez, Arijeet Pal, Hitesh J. Changlani, “Exact three-colored quantum scars from geometric frustration,” *Phys. Rev. B* **101**, 241111(R) (2020).
- [P4] J. Zhao, **Kyungmin Lee**, J. Li, D. B. Lioi, D. J. Gosztola, G. P. Wiederrecht, G. Karapetrov, Nandini Trivedi, U. Chatterjee, “Spectroscopic fingerprints of many-body renormalizations in  $1T\text{-TiSe}_2$ ,” *Phys. Rev. B* **100**, 045106 (2019).
- [P5] **Kyungmin Lee**<sup>†</sup>, Tamaghna Hazra<sup>†</sup>, Mohit Randeria and Nandini Trivedi, “Topological superconductivity in Dirac honeycomb systems,” *Phys. Rev. B* **99**, 184514 (2019).
- [P6] Jesse Choe, **Kyungmin Lee**, C.-L. Huang, Nandini Trivedi, and E. Morosan, “Magnetotransport in Fe-intercalated  $\text{TS}_2$ : Comparison between  $T = \text{Ti}$  and  $\text{Ta}$ ,” *Phys. Rev. B* **99**, 064420 (2019).
- [P7] **Kyungmin Lee**, Junping Shao, Eun-Ah Kim, F. D. M. Haldane, Edward H. Rezayi, “Pomeranchuk Instability of Composite Fermi Liquids,” *Phys. Rev. Lett.* **121**, 147601 (2018) (*Editors’ Suggestion*).  
◦ Steven Kivelson, “Nematic Quantum Hall Fluid Without Stripes”, Journal Club for Condensed Matter Physics. <https://www.condmatjclub.org/?p=3437>
- [P8] **Kyungmin Lee**, Eun-Ah Kim, “Emergent topological superconductivity at nematic domain wall of  $\text{FeSe}$ ,” *arXiv*:1702.03294.
- [P9] **Kyungmin Lee**, Steven Kivelson, Eun-Ah Kim, “Cold-spots and glassy nematicity in underdoped cuprates,” *Phys. Rev. B* **94**, 014204 (2016).
- [P10] Zhao Liu, Abolhassan Vaezi, **Kyungmin Lee**, Eun-Ah Kim, “Non-Abelian phases in two-component  $\nu = 2/3$  fractional quantum Hall states: Emergence of Fibonacci anyons,” *Phys. Rev. B* **92**, 081102(R) (2015).
- [P11] Milan P. Allan<sup>†</sup>, **Kyungmin Lee**<sup>†</sup>, Andreas W. Rost<sup>†</sup>, Mark H. Fischer, Freek Massee, Kunihiro Kihou, Chul-Ho Lee, Akira Iyo, Hiroshi Eisaki, Tien-Ming Chuang, J.C. Davis, Eun-Ah Kim, “Identifying the ‘Fingerprint’ of Antiferromagnetic Spin-Fluctuations in Iron-Pnictide Cooper Pairing,” *Nat. Phys.* **11**, 177-182 (2015).
- [P12] **Kyungmin Lee**, Abolhassan Vaezi, Mark H. Fischer, Eun-Ah Kim, “Superconducting proximity effect in topological metals,” *Phys. Rev. B* **90**, 214510 (2014).
- [P13] **Kyungmin Lee**, Mark H. Fischer and Eun-Ah Kim, “Signatures of unconventional pairing in near-vortex electronic structure of  $\text{LiFeAs}$ ,” *New J. Phys.* **15**, 053048 (2013).

### Invited Talks

- 2020 **APCTP Seminar**, *Asia Pacific Center for Theoretical Physics*, Pohang, Korea.  
◦ Talk: Exact three-colored quantum scars from geometric frustration

- 2017 **Order, Fluctuations, and Strong Correlations: New Platforms and Developments**, *Kavli Institute for Theoretical Physics*, Santa Barbara, CA.  
 ◦ Talk: Pomeranchuk instability of composite Fermi liquid
- 2014 **Energy Materials Nanotechnology Summer Meeting**, Cancun, Mexico.  
 ◦ Talk: Identifying the ‘Fingerprint’ of Antiferromagnetic Spin-fluctuations in LiFeAs

## Contributed Talks & Poster Presentations

- 2019 **APS March Meeting**, Boston, MA.  
 ◦ Talk: Emergent interacting two-fluids in a disordered Hubbard model
- 2018 **APS March Meeting**, Los Angeles, CA.  
 ◦ Talk: Pomeranchuk instability of composite Fermi liquid  
 ◦ Talk: Pairing instabilities at the edge and the bulk of a topological insulator
- 2016 **Gordon Research Conference on Correlated Electron Systems**, South Hadley, MA.  
 ◦ Poster: Cold-spots and glassy nematicity in underdoped cuprates
- 2015 **Gordon Research Conference on Superconductivity**, Hong Kong, China.  
 ◦ Poster: Reconciling the existence of cold spots with short range charge order
- 2015 **APS March Meeting**, San Antonio, TX.  
 ◦ Talk: Non-abelian phases in two-component  $\nu = 2/3$  FQHS: Emergence of Fibonacci anyons  
 ◦ Talk: What is the role and importance of short range order in cuprates?
- 2014 **APS March Meeting**, Denver, CO.  
 ◦ Talk: Superconducting Proximity Effect in Topological Metal
- 2013 **APS March Meeting**, Baltimore, MD.  
 ◦ Talk: Prediction for fingerprints of bosonic modes through self-energy effects in LiFeAs
- 2012 **APS March Meeting**, Boston, MA.  
 ◦ Talk: Local electronic structure near a vortex in LiFeAs within self-consistent BdG
- 2011 **Gordon Research Conference on Superconductivity**, Waterville Valley, NH.  
 ◦ Poster: Nematicity in 3-band Hubbard model of cuprate superconductors
- 2011 **APS March Meeting**, Dallas, TX.  
 ◦ Talk: Nematicity in 3-band Hubbard model of cuprate superconductors

## Research Experience

- 2019 – Present **Postdoctoral Scholar**, *National High Magnetic Field Laboratory*, Tallahassee, FL.
- 2016 – 2019 **Postdoctoral Researcher**, *The Ohio State University*, Columbus, OH.  
 ◦ Advisor: Prof. Nandini Trivedi (Dept. of Physics, OSU), Prof. Mohit Randeria (Dept. of Physics, OSU)
- 2010 – 2016 **Graduate Research Assistant**, *Cornell*, Ithaca, NY.  
 ◦ Advisor: Prof. Eun-Ah Kim (Dept. of Physics, Cornell)
- 2008 **Undergraduate Research Participation**, *Quantum Field Laser Lab, Optics Group, SNU*, Seoul, Korea.  
 ◦ Assisted experiments on Single Atom Trapping of  $^{85}\text{Rb}$  using Magneto-Optical Trap.  
 ◦ Conducted independent research.  
 (Topic: Motion of trapped atom under misaligned beams)  
 Advisor: Prof. Kyungwon An (Dept. of Physics and Astronomy, SNU)
- 2005 **Quantum Information Science Undergraduate Research Program**, *KIAS*, Seoul, Korea.  
 ◦ Worked as RA for Quantum Information Processing and Quantum Communication Research.  
 ◦ Participated in problem solving sessions  
 Advisor: Prof. Jaewan Kim (School of Computational Sciences, KIAS)
- 2004 **Experimental Physics Summer Camp for Undergraduate Students**, *Research Center for Oxide Electronics, SNU*, Seoul, Korea.  
 ◦ Designed and conducted independent research.  
 (Topic: Research on Ferromagnetism in Nanoscale using Atomic Force Microscope)  
 Advisor: Prof. Tae Won Noh (Dept. of Physics and Astronomy, SNU)

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## Teaching Experience

- 2009 **Teaching Assistant for *Fundamentals of Physics I***, Cornell, Ithaca, NY.
- 2008 **Assistant Teacher for College of Engineering Students**, SNU, Seoul, Korea.
- Assisted undergraduate students with regular curriculum (3 hours/week).
  - Prepared lectures and assignments.
- 2008 **Assistant Teacher for Basic Physics Class**, SNU, Seoul, Korea.
- Assisted international undergraduate students in basic physics (4 hours/week).
  - Prepared lectures and assignments.

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## Other Academic Experience

- 2014 **Boulder School 2014: Modern Aspects of Superconductivity**, Boulder, CO.
- 2012 **International Summer School: New Trends on Computational Approaches for Many-Body Systems**, Université de Sherbrooke, Sherbrooke, Québec, Canada.
- 2005 **Lindau Nobel Laureate Meetings**, Lindau, Germany.
- Selected as Korean delegate for the 55<sup>th</sup> *Meetings of Nobel Laureates at Lindau*
  - Attended lectures and discussions with Nobel Laureates
- 2004 **KIAS-SNU Theoretical Physics Winter Camp**, KIAS and SNU, Seoul, Korea.
- Attended lectures and conducted group research project on theoretical physics. (Project Topic: Quantization of Magnetic Monopole)
  - Received best research group award.

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## Awards and Scholarships

- 2015 **Douglas Fitchen Memorial Award**, Cornell, Ithaca, NY.
- 2003–2008 **Undergraduate Student Scholarship Program**, KFAS, Seoul, Korea.
- 2001 32<sup>nd</sup> **International Physics Olympiad – Silver Medal**, Antalya, Turkey.
- 2000 31<sup>st</sup> **International Physics Olympiad – Honorary Mention**, Leicester, UK.

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## Other Experiences

- 2005–2007 Military Service
- 2004 35<sup>th</sup> International Physics Olympiad – Staff

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## Languages

Korean Native  
English Fluent  
Japanese Intermediate

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## Technical Skills

- Projects Developer and maintainer of
- `LatticeTools.jl`, Toolkit for construction and symmetry analysis of tight binding models in Julia
  - `ExactDiagonalization.jl`, Exact diagonalization for a generic many body Hamiltonian in Julia
  - `HartreeFockBogoliubov.jl`, Hartree-Fock-Bogoliubov solver for electronic systems in Julia
  - `PiTensor`, Python wrapper for ITensor.
- Programming Languages C, C++, Fortran, Haskell, Java, Javascript, Julia, Mathematica, Matlab, Python, PHP, SQL
- Tools and Libraries Docker, Git, CircleCI, Travis CI, Node.js, MPI, PETSc/SLEPc