

# SangEun Han

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## Personal information

### Citizenship

Republic of Korea (South Korea)

## Education

### KAIST (Korea Advanced Institute of Science and Technology)

CANDIDATE OF INTEGRATED MASTER'S AND PH.D PROGRAM IN PHYSICS (EXPECTED GRADUATION DATE: AUGUST 2020)

Daejeon, S.Korea

March 2013 - Present

### KAIST (Korea Advanced Institute of Science and Technology)

BACHELOR OF SCIENCE, MAGNA CUM LAUDE, FEBURARY, 2013

Double major in Physics and Mathematical Sciences

Daejeon, S.Korea

Feburary 2010 - Feburary 2013

### HanKuk University of Foreign Studies

IN DEPARTMENT OF PHYSICS

Seoul, S.Korea

March 2006 - January 2008

## Honors

### AWARDS

- |      |  |                |
|------|--|----------------|
| 2018 | <b>Outstanding Poster Award</b> , Workshop on Spin-orbit Coupled Topological states    | October 2018   |
| 2018 | <b>Pre-doctoral Fellow of Physics at KAIST</b> , Department of Physics, KAIST          | August 2018    |
| 2014 | <b>Spring Outstanding Teaching Assistant Awards</b> , Department of Physics, KAIST     | September 2014 |
| 2011 | <b>Presidential Design Award</b> , Fall Semester's Freshmen Design Course Award, KAIST | February 2012  |

### SCHOLARSHIPS

- |             |  |                         |
|-------------|--|-------------------------|
| 2014 - 2015 | <b>Scholarship</b> , Center for Theoretical Physics, Institute for Basic Science | March 2014 - May 2015   |
| 2006 - 2008 | <b>Scholarship</b> , Hankuk University of Foreign Studies                        | 2006 Fall - 2008 Spring |

## Services

### Referee

of Phys. Rev. Research.

January 2020 - Present

### Referee

of Phys. Rev. Lett.

April 2019 - Present

### Referee

of Phys. Rev. B

September 2018 - Present

### Sergent

at Military service at Army in Republic of Korea

February 2008 - January 2010

## Publication list

**“Lattice vibration as a knob for novel quantum criticality: Emergence of supersymmetry from spin-lattice coupling”**

SangEun Han, JUNHYUN, AND EUN-GOOK MOON

arXiv:1911.01435 [cond-mat.str-el]

**“Emergent Anisotropic Non-Fermi Liquid at a Topological Phase Transition in Three Dimensions”**

SangEun Han, CHANGHEE LEE, HONGKI MIN, AND EUN-GOOK MOON

Phys. Rev. Lett. **122**, 187601. arXiv:1809.10691 [cond-mat.str-el]

**“Quantum Criticality with Infinite Anisotropy in Topological Phase Transitions between Dirac and Weyl Semi-metals”**

SangEun Han, GIL YOUNG CHO, AND EUN-GOOK MOON

Phys. Rev. B **98**, 085149. arXiv:1804.01547 [cond-mat.str-el]

## **“Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators”**

**SangEun Han** AND EUN-GOOK MOON

Phys. Rev. B **97**, 241101(R). arXiv:1802.05727 [cond-mat.str-el]

## **“Topological Phase Transitions in Line-nodal Superconductors”**

**SangEun Han**, GIL YOUNG CHO, AND EUN-GOOK MOON

Phys. Rev. B **95**, 094502. arXiv:1601.00975 [cond-mat.str-el]

## **“Explaining the Lepton Non-universality at the LHCb and CMS from an Unified Framework”**

SANJOY BISWAS, DEBTOSH CHOWDHURY, **SangEun Han**, AND SEUNG J. LEE

JHEP **02**, 142 (2015). arXiv:1409.0882 [hep-ph]

MANUSCRIPTS UNDER PREPARATION

## **“Stability of $O(N)$ criticality with Lattice Vibrations”**

**SangEun Han** AND EUN-GOOK MOON

# **Presentation**

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## **ORAL PRESENTATION**

### **APS March Meeting 2020**

Quantum criticalities with lattice vibrations

*Denver, USA*

*Mar. 3, 2020*

### **12th BK21+ Young Physicists Workshop**

Emergence of Supersymmetry from spin-lattice coupling

*Daejeon, S. Korea*

*Feb. 4, 2019*

### **KAIST-Weizmann Workshop on Quantum Condensed Matter Physics**

Emergence of Supersymmetry from spin-lattice coupling

*Rehovot, Israel*

*Dec. 5, 2019*

### **2019 KPS Fall Meeting**

Quantum criticalities with lattice vibrations

*Gwangju, S. Korea*

*Oct. 25, 2019*

### **APS March Meeting 2019**

Emergent Anisotropic Non-Fermi Liquid

*Boston, USA*

*Mar. 4, 2019*

### **11th BK21+ Young Physicists Workshop**

Emergent Anisotropic Non-Fermi Liquid

*Pohang, S. Korea*

*Feb. 15, 2019*

### **2018 KPS Spring Meeting**

Emergent Anisotropic Non-Fermi Liquid

*Daejeon, S. Korea*

*Apr. 26, 2018*

### **APS March Meeting 2018**

Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators

*Los Angeles, USA*

*Mar. 7, 2018*

### **2017 KPS Spring Meeting**

Topological Phase Transitions in Dirac semi-metals of distorted spinels

*Daejeon, S. Korea*

*Apr. 21, 2017*

### **APS March Meeting 2017**

Topological Phase Transitions in Dirac semi-metals of distorted spinels

*New Orleans, USA*

*Mar. 14, 2017*

## **POSTER PRESENTATION**

### **2020 Theory Winter School**

Emergence of supersymmetry from spin-lattice coupling

*Tallahassee, USA*

*Jan. 6-10, 2020*

### **IBSPCS-KIAS International Workshop Frustrated Magnetism**

Stability of Quantum Criticalities

*Daejeon, S. Korea*

*Oct. 14-18, 2019*

### **The 2<sup>nd</sup> Workshop on Spin-orbit Coupled Topological States**

Stability of Quantum Criticalities

*Pohang, S. Korea*

*Sep. 19-21, 2019*

### **KIAS workshop on Topology and Correlation in quantum materials**

Emergent Anisotropic Non-Fermi Liquid at a Topological Phase Transition in Three Dimensions

*Busan, S. Korea*

*May 29-31, 2019*

### **The 19th JAPAN-KOREA-TAIWAN SYMPOSIUM ON STRONGLY CORRELATED ELECTRON SYSTEMS**

Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators /  
Emergent Anisotropic Non-Fermi Liquid

*Tokyo, Japan*

*Jan. 11-13, 2019*

<b>The 1<sup>st</sup> Workshop on Spin-Orbit Coupled Topological States</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators / Emergent Anisotropic Non-Fermi Liquid • Outstanding Poster Award	Pohang, S. Korea Oct. 1-5, 2018
<b>Advanced School and Workshop on Correlations in Electron Systems – from Quantum Criticality to Topology -</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators / Emergent Anisotropic Non-Fermi Liquid	Trieste, Italy Aug. 6-17, 2018
<b>International Workshop on “New Paradigms in Quantum Matter 2018”</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators / Emergent Anisotropic Non-Fermi Liquid	Beijing, China Jun. 24-Jul. 7, 2018
<b>KIAS workshop on Topology and Correlation</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	Seoul, S. Korea Jun. 7-8, 2018
<b>10th BK21+ Young Physicists Workshop</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	Seoul, S. Korea Feb. 8-9, 2018
<b>The 19th International Conference on Recent Progress in Many-Body Theories</b> Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	Pohang, S. Korea Jun. 25-30, 2017
<b>2016 Quantum Materials Symposium</b> Topological Phase Transitions in Line-nodal Superconductors	Incheon, S. Korea Feb. 22-26, 2016

## Conferences / Scientific Schools

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<b>APS March Meeting 2020</b>	Denver, USA Mar. 2-6, 2020
<b>2020 Quantum Materials Symposium</b>	Pyeongchang, S. Korea Feb. 9-14, 2016
<b>12th BK21+ Young Physicists Workshop</b>	Daejeon, S. Korea Feb. 3-4, 2019
<b>2020 Theory Winter School</b>	Tallahassee, USA Jan. 6-10, 2020
<b>KAIST-Weizmann Workshop on Quantum Condensed Matter Physics</b>	Rehovot, Israel Dec. 4-5, 2019
<b>2019 KPS Fall Meeting</b>	Gwangju, S. Korea Oct. 23-25, 2019
<b>IBSPCS-KIAS International Workshop Frustrated Magnetism</b>	Daejeon, S. Korea Oct. 14-18, 2019
<b>The 2<sup>nd</sup> Workshop on Spin-orbit Coupled Topological States</b>	Pohang, S. Korea Sep. 19-21, 2019
<b>KIAS workshop on Topology and Correlation in quantum materials</b>	Busan, S. Korea May 29-31, 2019
<b>Workshop Quantum Many-Body States 2019</b>	Daejeon, S. Korea May 9-10, 2019
<b>Mini-Workshop Exotic Magnetic Phases in Quantum Many-body Systems</b>	Daejeon, S. Korea April 23, 2019
<b>APS March Meeting 2019</b>	Boston, USA Mar. 4-8, 2019
<b>11th BK21+ Young Physicists Workshop</b>	Pohang, S. Korea Feb. 14-15, 2019

<b>The 19th JAPAN-KOREA-TAIWAN SYMPOSIUM ON STRONGLY CORRELATED ELECTRON SYSTEMS</b>	<i>Tokyo, Japan</i> <i>Jan. 11-13, 2019</i>
<b>The 1<sup>st</sup> Workshop on Spin-Orbit Coupled Topological States</b>	<i>Pohang, S. Korea</i> <i>Oct. 1-5, 2018</i>
<b>KAIST-UCSB-KAERI joint Workshop on Correlated Electronic Systems</b>	<i>Daejeon, S. Korea</i> <i>Sept. 20-21, 2018</i>
<b>Advanced School and Workshop on Correlations in Electron Systems - from Quantum Criticality to Topology -</b>	<i>Trieste, Italy</i> <i>Aug. 6-17, 2018</i>
<b>International Workshop on “New Paradigms in Quantum Matter 2018”</b>	<i>Beijing, China</i> <i>Jun. 24-Jul. 7, 2018</i>
<b>KIAS-KAIST workshop on Topology and Correlation</b>	<i>Seoul, S. Korea</i> <i>Jun. 7-8, 2018</i>
<b>Workshop Quantum Many-Body States 2018</b>	<i>Daejeon, S. Korea</i> <i>Apr. 27-28, 2018</i>
<b>2018 KPS Spring Meeting</b>	<i>Daejeon, S. Korea</i> <i>Apr. 25-27, 2018</i>
<b>APS March Meeting 2018</b>	<i>Los Angeles, USA</i> <i>Mar. 5-9, 2018</i>
<b>10th BK21+ Young Physicists Workshop</b>	<i>Seoul, S. Korea</i> <i>Feb. 8-9, 2018</i>
<b>APCTP Mini-school on Entanglement and Topological Phases of Matter</b>	<i>Pohang, S. Korea</i> <i>Jan. 29-Feb. 1, 2018</i>
<b>The 19th International Conference on Recent Progress in Many-Body Theories</b>	<i>Pohang, S. Korea</i> <i>Jun. 25-30, 2017</i>
<b>4th One-day KIAS Workshop on Recent Progress in Condensed Matter Physics</b>	<i>Seoul, S. Korea</i> <i>May 25, 2017</i>
<b>2017 KPS Spring Meeting</b>	<i>Daejeon, S. Korea</i> <i>Apr. 19-21, 2017</i>
<b>APS March Meeting 2017</b>	<i>New Orleans, USA</i> <i>Mar. 13-17, 2017</i>
<b>Pyeong-Chang Summer Institute 2016</b>	<i>Pyeongchang, S. Korea</i> <i>Jul. 3-9, 2016</i>
<b>2016 KPS Spring Meeting</b>	<i>Daejeon, S. Korea</i> <i>Apr. 20-22, 2016</i>
<b>2016 Quantum Materials Symposium</b>	<i>Incheon, S. Korea</i> <i>Feb. 22-26, 2016</i>
<b>Focus Workshop Topology in Matter</b>	<i>Daejeon, S. Korea</i> <i>Nov. 25-27, 2015</i>
<b>IBS-MultiDark Joint Focus Program: WIMPs and Axions</b>	<i>Daejeon, S. Korea</i> <i>Oct. 10-21, 2014</i>
<b>The 2nd New Physics @ Korea Institute workshop</b>	<i>Jeju, S. Korea</i> <i>Sept. 14-19, 2014</i>
<b>Pyeong-Chang Summer Institute 2014</b>	<i>Pyeongchang, S. Korea</i> <i>Aug. 24-30, 2014</i>
<b>Cargese International School for Theoretical Particle Physics: MultiTeV Probes of the Standard Model and beyond with the LHC</b>	<i>Cargese, France</i> <i>Jul. 14-26, 2014</i>

<b>2014 KIAS-SNU Physics Winter Camp</b>	<i>Pyeongchang, S. Korea</i> <i>Feb. 10-16, 2014</i>
<b>2014 Open KIAS Winter School on Collider Physics</b>	<i>Pyeongchang, S. Korea</i> <i>Jan. 19-25, 2014</i>
<b>Busan Particle Physics Workshop</b>	<i>Busan, S. Korea</i> <i>Oct. 18-19, 2013</i>
<b>19th International Summer Institute on Phenomenology of Elementary Particles and Cosmology</b>	<i>Gurye, S. Korea</i> <i>Aug. 17-23, 2013</i>
<b>Pyeong-Chang Summer Institute 2013</b>	<i>Pyeongchang, S. Korea</i> <i>Jul. 7-13, 2013</i>
<b>2013 Open KIAS Winter School on Collider Physics</b>	<i>Jeongseon, S. Korea</i> <i>Feb. 17-23, 2013</i>
<b>2013 KIAS-SNU Physics Winter Camp</b>	<i>Pyeongchang, S. Korea</i> <i>Jan. 20-27, 2013</i>
<b>The 12th Summer Institute for Theoretical Physics</b>	<i>Pohang, S. Korea</i> <i>Jul. 22-29, 2012</i>
<b>2012 KIAS-SNU Physics Winter Camp</b>	<i>Pyeongchang, S. Korea</i> <i>Jan. 29-Feb. 5, 2012</i>

## Teaching experiences

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### Teaching Assistants in

- PH504 Graduate Quantum Mechanics 2
- PH503 Graduate Quantum Mechanics 1
- PH496 Colloquium & PH990 Seminar
- PH503 Graduate Quantum Mechanics 1
- PH302 Undergraduate Quantum Mechanics 2
- PH301 Undergraduate Quantum Mechanics 1
- PH654 Quantum Field Theory 2
- PH142 General Physics 2
- PH141 General Physics 1

*March 2013 - December 2017*  
September 2017 - December 2017  
March 2017 - June 2017  
September 2016 - December 2016  
March 2016 - June 2016  
September 2015 - December 2015  
March 2015 - June 2015  
March 2014 - June 2014  
September 2013 - December 2013  
March 2013 - June 2013

## References

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### Prof. Eun-Gook Moon

DEPARTMENT OF PHYSICS, KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY (KAIST)  
291 Daehak-ro, Yuseong-gu, Daejeon 34141, Republic of Korea  
Email: egmoon@kaist.ac.kr

### Prof. Hongki Min

DEPARTMENT OF PHYSICS AND ASTRONOMY, SEOUL NATIONAL UNIVERSITY  
1 Gwanak-ro, Gwanak-gu, Seoul 08826, Republic of Korea  
Email: hmin@snu.ac.kr

### Prof. Gil Young Cho

DEPARTMENT OF PHYSICS, POHANG UNIVERSITY OF SCIENCE AND TECHNOLOGY (POSTECH)  
77 Cheongam-ro, Nam-gu, Pohang 37673, Republic of Korea  
Email: gilyoungcho@postech.ac.kr