

# SangEun Han

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## Education

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

DOCTOR OF PHILOSOPHY IN PHYSICS, AUGUST 2020

Adviosr: Prof. Eun-Gook Moon

Thesis: *Renormalization group study on Strongly correlated system*

Daejeon, S.Korea

March 2013 - August 2020

### 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

### Sergeant

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

Submitted to journal (under review). 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 (Virtual APS March Meeting)**

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*

#### **The 1<sup>st</sup> Workshop on Spin-Orbit Coupled Topological States**

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

Emergent Anisotropic Non-Fermi Liquid

*Pohang, S. Korea*

*Oct. 1-5, 2018*

- *Outstanding Poster Award*

## **Advanced School and Workshop on Correlations in Electron Systems – from Quantum Criticality to Topology -**

*Trieste, Italy*

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

*Aug. 6-17, 2018*

## **International Workshop on “New Paradigms in Quantum Matter 2018”**

*Beijing, China*

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

*Jun. 24-Jul. 7, 2018*

## **KIAS workshop on Topology and Correlation**

*Seoul, S. Korea*

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

*Jun. 7-8, 2018*

## **10th BK21+ Young Physicists Workshop**

*Seoul, S. Korea*

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

*Feb. 8-9, 2018*

## **The 19th International Conference on Recent Progress in Many-Body Theories**

*Pohang, S. Korea*

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

*Jun. 25-30, 2017*

## **2016 Quantum Materials Symposium**

*Incheon, S. Korea*

Topological Phase Transitions in Line-nodal Superconductors

*Feb. 22-26, 2016*

## **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