

SangEun Han

Department of Physics, 60 St. George Street, University of Toronto, Toronto, Ontario M5S 1A7, Canada

✉ se.han@utoronto.ca | 🏠 sehan.org | 🎓 SangEun Han

Education

KAIST (Korea Advanced Institute of Science and Technology)

DOCTOR OF PHILOSOPHY IN PHYSICS, AUGUST 2020

Advisors: 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, FEBRUARY, 2013

Double major in Physics and Mathematical Sciences

Daejeon, S.Korea

February 2010 - February 2013

Hankuk University of Foreign Studies

IN DEPARTMENT OF PHYSICS

Seoul, S.Korea

March 2006 - January 2008

Academic Affiliation

Department of Physics, University of Toronto

Postdoctoral Fellow

November 2020 - Present

School of Computational Sciences, KIAS

Visiting Scholar

August 2020 - October 2020

Department of Physics, KAIST

Candidate of Integrated Master's and Ph.D Program

March 2013 - August 2020

Honors

AWARDS

2018 **Outstanding Poster Award**, Workshop on Spin-orbit Coupled Topological states

October 2018

2018 **Pre-doctoral Fellow of Physics at KAIST**, Department of Physics, KAIST

August 2018

2014 **Spring Outstanding Teaching Assistant Awards**, Department of Physics, KAIST

September 2014

2011 **Presidential Design Award**, Fall Semester's Freshmen Design Course Award, KAIST

February 2012

SCHOLARSHIPS

2014 - 2015 **Scholarship**, Center for Theoretical Physics, Institute for Basic Science

March 2014 - May 2015

2006 - 2008 **Scholarship**, 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

“*Fractonic Quantum Phases in Breathing Pyrochlore Lattice*”

SangEun Han, ADARSH S. PATRI, AND YONG BAEK KIM

arXiv:2109.03835 [cond-mat.str-el]

“Non-Landau Fermi Liquid induced by Bose Metal”

SangEun Han AND YONG BAEK KIM

arXiv:2102.05052 [cond-mat.str-el]

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

SangEun Han, JUNHYUN LEE, AND EUN-GOOK MOON

Phys. Rev. B **103**, 014435. 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

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	<i>Tallahassee, USA</i> <i>Jan. 6-10, 2020</i>
IBSPCS-KIAS International Workshop Frustrated Magnetism Stability of Quantum Criticalities	<i>Daejeon, S. Korea</i> <i>Oct. 14-18, 2019</i>
The 2nd Workshop on Spin-orbit Coupled Topological States Stability of Quantum Criticalities	<i>Pohang, S. Korea</i> <i>Sep. 19-21, 2019</i>
KIAS workshop on Topology and Correlation in quantum materials Emergent Anisotropic Non-Fermi Liquid at a Topological Phase Transition in Three Dimensions	<i>Busan, S. Korea</i> <i>May 29-31, 2019</i>
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	<i>Tokyo, Japan</i> <i>Jan. 11-13, 2019</i>
The 1st 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 • <i>Outstanding Poster Award</i>	<i>Pohang, S. Korea</i> <i>Oct. 1-5, 2018</i>
Advanced School and Workshop on Correlations in Electron Systems – from Quantum Criticality to Topology - Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators / Emergent Anisotropic Non-Fermi Liquid	<i>Trieste, Italy</i> <i>Aug. 6-17, 2018</i>
International Workshop on “New Paradigms in Quantum Matter 2018” Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators / Emergent Anisotropic Non-Fermi Liquid	<i>Beijing, China</i> <i>Jun. 24-Jul. 7, 2018</i>
KIAS workshop on Topology and Correlation Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	<i>Seoul, S. Korea</i> <i>Jun. 7-8, 2018</i>
10th BK21+ Young Physicists Workshop Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	<i>Seoul, S. Korea</i> <i>Feb. 8-9, 2018</i>
The 19th International Conference on Recent Progress in Many-Body Theories Long-range Coulomb Interaction effects on Topological Phase Transitions between Semi-metals and Insulators	<i>Pohang, S. Korea</i> <i>Jun. 25-30, 2017</i>
2016 Quantum Materials Symposium Topological Phase Transitions in Line-nodal Superconductors	<i>Incheon, S. Korea</i> <i>Feb. 22-26, 2016</i>

Teaching experiences

Teaching Assistants in	<i>March 2013 - December 2017</i>
• PH504 Graduate Quantum Mechanics 2	September 2017 - December 2017
• PH503 Graduate Quantum Mechanics 1	March 2017 - June 2017
• PH496 Colloquium & PH990 Seminar	September 2016 - December 2016
• PH503 Graduate Quantum Mechanics 1	March 2016 - June 2016
• PH302 Undergraduate Quantum Mechanics 2	September 2015 - December 2015
• PH301 Undergraduate Quantum Mechanics 1	March 2015 - June 2015
• PH654 Quantum Field Theory 2	March 2014 - June 2014
• PH142 General Physics 2	September 2013 - December 2013
• PH141 General Physics 1	March 2013 - June 2013

References

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