

Byungdo Park

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RESEARCH INTERESTS

Differential geometry and algebraic topology. Secondary characteristic classes, geometric structures on higher bundles, generalized cohomology theories and their equivariant, differential, and twisted refinements, higher categories and sheaves, index theory, noncommutative geometry, and topology of matters.

ACADEMIC APPOINTMENTS

Chungbuk National University, Cheongju, Korea September 2023 – Present
Associate Professor at the Department of Mathematics Education

Chungbuk National University, Cheongju, Korea September 2019 – August 2023
Assistant Professor at the Department of Mathematics Education

Korea Institute for Advanced Study (KIAS), Seoul, Korea October 2017 – August 2019
Research Fellow (Postdoc) at School of Mathematics

The City University of New York (CUNY), New York NY, USA January 2017 – May 2017
Adjunct Assistant Professor (Hunter College and the Bronx Community College) of Mathematics

Max Planck Institute for Mathematics, Bonn, Germany October 2016 – December 2016
Postdoctoral Fellow

VISITING POSITIONS

The Hebrew University of Jerusalem, Jerusalem, Israel February 2020
Host: Zachary McGuirk

Hausdorff Research Institute for Mathematics, Bonn, Germany May 2017 – August 2017
Guest (Postdoc)
Trimester program “K-Theory and Related Fields”

Hausdorff Research Institute for Mathematics, Bonn, Germany August 2015
Guest (PhD Student)
Trimester program “Homotopy theory, manifolds, and field theories”

ADMINISTRATIVE POSITIONS

Chungbuk National University, Cheongju, Korea March 2024 – August 2024
Associate Dean of the College of Education
(Dual mandate) Director of the Teacher Appointment Support Center
(Dual mandate) Director of the Future Education Center

EDUCATION

CUNY Graduate Center, New York NY, USA August 2010 – September 2016
Doctor of Philosophy in Mathematics
Thesis title: A geometric model of twisted differential K -theory
Advisor: Mahmoud Zeinalian

CUNY Graduate Center, New York NY, USA February 2015
Master of Philosophy in Mathematics
Advancement to candidacy.

Yonsei University, Seoul, Korea March 2001 – February 2009
Bachelor of Science in Mathematics
Senior Thesis: Notes on L-Infinity algebras
Advisor: Jae-Suk Park
Member of honor program in sciences
On Leave from October 2002 to February 2006 for a mandatory military service.

- PUBLICATIONS** **On the smoothness of the geodesic spray for the Camassa-Holm equation**, with Jae Min Lee, *J. Math. Anal. Appl.*, **516**(1) (2022) 126472 1–12.
Noncommutative differential K -theory, with Arthur Parzygnat, Corbett Redden, and Augusto Stoffel, *J. Geom. Phys.*, **174** (2022) 104446 1–40. arXiv:2106.12073.
A note on Venice lemma in differential K -theory, *Arch. Math.*, **118**(2) (2022) 215–224.
A classification of equivariant gerbe connections with Corbett Redden, *Commun. Contemp. Math.*, **21**(2) (2019) 1850001 1–40. arXiv:1709.06003.
Geometric models of twisted differential K -theory I, *J. Homotopy and Relat. Struct.*, **13**(1) (2018) 143–167. arXiv:1602.02292
A smooth variant of Hopkins-Singer differential K -theory, *New York J. Math.*, **23** (2017) 655–670. arXiv:1607.08686
- PREPRINTS** **Brown functors of directed graphs**, with Hsuan-Yi Liao, Dang Khoa Nguyen, and Zachary McGuirk, (2025) arXiv:2503.14865.
Generalizations of the Thistlethwaite–Tsvietkova method, with Alice Kwon and Ying Hong Tham, (2023) arXiv:2309.01282.
Geometric families define differential K -theory, with Jae Min Lee, (2024).
- REPORT** **Self-Evaluation Report of the Department of Mathematics Education for the Self-Certified Major Education System of Chungbuk National University** (in Korean)
Principal Investigator.
Certified for 4 years (1 March 2025 to 28 February 2030)
Document: College of Education-14664 (2024.12.19.), Office of Education Innovation-1302 (2025.02.26.)
- WORK IN PROGRESS** **Cycle maps in twisted differential K -theory**, with Daniel Grady
Equivariant arithmetic Chow groups and equivariant differential cohomology, with Sreedhar Bhamidi
Equivariant eta forms in local index theory, with Jae Min Lee.
The Euler–Arnold theory via algebraic topology: Sullivan’s methodology, with Jae Min Lee.
Geometric models of twisted differential K -theory II: Non-torsion case, first draft available.
Twisted Atiyah–Jänich theorem, first draft available.
- POLICY RESEARCH IN PROGRESS** **A study on cycles required by the 6th teacher training institution competency assessment and the role of the college administration** (in Korean)
Document: College of Education-9505(2024.8.30.)
- BOOKS** **Calculus** (in Korean), **Precalculus** (in Korean) and **College Mathematics** (in Korean), with Daewoong Cheong, Sukjung Hwang, Un Cig Ji, Sangdon Jin, Sejong Kim, Sun Kwang Kim, Doowon Koh, Ohsang Kwon, Eunjeong Lee, Jaemin Shin, Changhun Yang, Mee Sue Yoo, Youngho Yoon, *Kyungmoon Publishing Co.*
ISBN-13: 9791160736908 (Calculus) Available to purchase at Kyobo, Aladin.
ISBN-13: 9791160736915 (Precalculus) Available to purchase at Kyobo, Aladin.
ISBN-13: 9791160736922 (College Mathematics) Available to purchase at Kyobo, Aladin.
Knowledge and education in the era of new media (in Korean), with Jin Choi, Seung-Hyun Choi, Hye-Jee Gil, Yeungyu Ha, Jiyoung Hwang, Gail Jeon, Jieun Lim, Sein Shin, Kyung Chan Son, Kyungwon Son, Jooho Song, and Hyun Wi Yoon, *Pakyoungsa*, (2022) ISBN-13: 9791165192730
Contributed a chapter “How can we be good at mathematics?”
Available to purchase at Kyobo, Aladin.
- BOOK PROJECTS IN PROGRESS** **Gelfand’s Geometry** (in Korean) *Kyungmoon Publishing Co.*
Korean translation of the monograph *Geometry* by Israel M. Gelfand and Tatiana Alekseyevskaya (Gelfand), *Birkhäuser*, (2020) ISBN-13: 9781071602997
- SELECTED PRESENTATIONS** **KIAS Geometry and Topology Group Seminar**
Korea Institute for Advanced Study (KIAS), Seoul, Korea November 2024
Differential cohomology and gerbes: An introduction to higher differential geometry
Host: Seokbong Seol

- Algebraic Structures in Geometry and Physics: a conference on the occasion of Jae-Suk Park's 60th birthday**
 Uni Hotel Jeju, Jeju, Korea November 2024
Aspects of differential K-theory
 Host: Cheol-Hyun Cho and Hwajong Yoo
- IUT Mathematics and Statistics Research Seminar (online)**
 Isfahan University of Technology, Isfahan, Iran December 2023
Differential Cohomology and Gerbes: An Introduction to Higher Differential Geometry (3 lectures)
 Host: Sajjad Lakzian
- Mathematics Department Colloquium**
 Pusan National University, Busan, Korea May 2022
An introduction to differential K-theory
 Host: Donghoon Jang
- Three W's Seminar (online)**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea December 2020
The Atiyah-Jänich theorem and its twisted refinement
 Host: Sreedhar Bhamidi
- Mathematics Department Colloquium (online)**
 Chungbuk National University, Cheongju, Korea November 2020
The Atiyah-Jänich theorem and its twisted refinement
 Host: Sejong Kim
- KIAS Topology Seminar**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea December 2019
Twisted differential K-theory, geometric models, and sheaves of spectra
 Host: Hsuan-Yi Liao
- DG Seminar**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea February 2019
What is an ∞ -category? (1), (2), (3)
 Host: Bumsig Kim
- 2018 Seoul – Tokyo Conference in Mathematics**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea December 2018
Cycle maps in differential K-theory
 Host: Jinsung Park
- Topology in Australia and South Korea 2018**
 IBS Center for Geometry and Physics (IBS-CGP), Pohang, Korea April 2018
A classification of equivariant gerbe connections
 Host: Gabriel C. Drummond-Cole
- The 13th KIAS Winter School on Differential Geometry**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea January 2018 – February 2018
Introduction to differential cohomology (3 lectures)
 Host: Insong Choe and Jaigyoung Choe
 Conference venue: Hill Condominium, High 1 Resort, Jeongseon, Korea
- Higher Categories and Mirror Symmetry**
 Korea Institute for Advanced Study (KIAS), Seoul, Korea December 2017
A classification of equivariant gerbe connections
 Host: Bumsig Kim and Gregory Ginot
- Topology Workshop – Cohomology Theories, Categories, and Applications**
 University of Pittsburgh, Pittsburgh, PA USA March 2017
A geometric model of twisted differential K-theory
 Host: Hisham Sati

Research Seminar

The Bronx Community College, CUNY, Bronx NY USA
Aspects of equivariant gerbes with connection
 Host: Cormac O’Sullivan

February 2017

Algebraic Topology Seminar

Princeton University, Princeton NJ USA
A geometric model of twisted differential K-theory
 Host: Tony Bahri and Martin Bendersky

February 2017

K-theory Seminar

Hausdorff Research Institute for Mathematics, Bonn, Germany
Models of differential K-theory and comparison problems
 Host: Kristian Jonsson Moi

November 2016

Higher Differential Geometry Seminar

Max Planck Institute for Mathematics, Bonn, Germany
A geometric model of twisted differential K-theory
 Host: Christian Blohmann

November 2016

Geometry and Physics (GAP) Seminar

Pennsylvania State University, University Park, PA USA
A geometric model of twisted differential K-theory
 Host: Ping Xu and Mathieu Stiénon

September 2016

GAP XIV: Geometry and Physics “Séminaire itinérant” — Graded geometry and applications to physics

University of Sheffield, Sheffield, UK
A geometric model of twisted differential K-theory
 Poster presentation

August 2016

Deformation Theory Seminar

University of Pennsylvania, Philadelphia PA USA
A geometric model of twisted differential K-theory
 Host: James Stasheff

June 2016

2016 Lehigh University Geometry and Topology Conference

Lehigh University, Bethlehem PA USA
A geometric model of twisted differential K-theory

May 2016

GRANTS**National University Development Project – International Collaborative Research Support**

Chungbuk National University October 2024–February 2025
 Project title: Construction of a Brown functor on finite directed graphs using directed graph path cohomology
 Principal Investigator. Amount KRW 15,000,000 (equivalent to \$13,333)
 Documents: Research Promotion Division-7193 (2024.10.22.)

Basic Research Program in Science and Engineering

The National Research Foundation of Korea (NRF)
 The Ministry of Science and ICT, Republic of Korea
 Project title: A study on differential cocycles via higher sheaves on manifolds
 Principal Investigator. Amount KRW 90,000,000 (equivalent to \$80,000)
 Grant No. 2020R1G1A1A01008746

March 2020–August 2023

National University Development Project – Creativity of next-generation researchers

Chungbuk National University May 2022–December 2022
 Project title: An approach on Euler-Arnold equations via algebraic topology: Sullivan’s methodology
 Principal Investigator. Amount KRW 9,000,000 (equivalent to \$8,000)
 Documents: Research Support Division-3768 (2022.05.11.)

Research Grant for New Faculty

Chungbuk National University
 Project title: Geometry and topology of directed graphs
 Principal Investigator. Amount KRW 17,000,000 (equivalent to \$15,111)
 Documents: Research Foundation-11099 (2019.08.28.)

September 2019–August 2020

Development of New Leading Scientists**KIAS School of Mathematics Group Seminar**

Korea Institute for Advanced Study

January 2019–August 2019

The Ministry of Science and ICT, Republic of Korea

Project title: KIAS Topology Seminar

Co-organizer. Annual grant KRW 7,500,000 (equivalent to \$6,667)

Project title: Three W's Seminar

Co-organizer. Annual grant KRW 7,500,000 (equivalent to \$6,667)

Development of New Leading Scientists

Korea Institute for Advanced Study

October 2017–August 2019

The Ministry of Science and ICT, Republic of Korea

Project title: Differential cocycles in algebraic topology and their applications

Principal Investigator. Amount KRW 25,917,000 (equivalent to \$23,037)

Doctoral Student Research Grant

CUNY Graduate Center

June 2015–May 2016

Project title: Twisted differential K -theory, infinity categories, and mathematical physics

Principal Investigator. Amount \$1,000

CUNY Doctoral Students' Council Grant

Fall 2015

A grant for organizing seminars and conferences

Project title: The Homotopy Theory Learning Group

Principal Investigator. Amount \$700

CUNY Doctoral Students' Council Grant

Fall 2014

A grant for organizing seminars and conferences

Project title: The Algebraic Topology Student Seminar

Principal Investigator. Amount \$600

SERVICE**Scholarly Service**

Referee for Journal of Geometry and Physics

Referee for Journal of the Korean Mathematical Society

Reviewer for Mathematical Reviews

June 2018 – Present

Reviewer for Zentralblatt Math

March 2016 – Present

Editor of Newsletter of the Korean Mathematical Society

January 2023–December 2024

Reviewer for the National Research Foundation (NRF) of Republic of Korea

2024, 2023

External reviewer for tenure-track faculty hiring process

June 2020 – Present

7 national universities and 10 private universities in Korea (counted with multiplicity).

External interviewer for tenure-track faculty hiring process

December 2023, January 2021

2 national universities in Korea.

PhD thesis reader (Committee vice chair) for 1 PhD in Mathematics Education

Organizer for Geometry Seminar at CBNU Mathematics Education dept. October 2020–Present

Organizer for Topology Seminar at KIAS

January 2018–August 2019

Organizer for the three W's Seminar at KIAS

January 2019–August 2019

Postdocs' seminar addressing Was, Warum, Wie (what, why, and how in German) on each research topic.

Organizer for the Homotopy Theory Learning Group at CUNY

Fall 2015

Organizer for the Algebraic Topology Student Seminar at CUNY

Fall 2014

University Service (at Chungbuk National University)Reviewer for the Executive Committee for the 6th Governmental Assessment for Teacher-training institutions
September 2024 – Present

Ex officio positions (of the Associate Dean of the College of Education)

March 2024 – August 2024

Member of the Planning Committee
Member of the Research Environment Committee
Member of the Admission Management Committee
Member of the Admission Management Committee for International Students
Member of the Teacher Training Committee
Member of the Undergraduate Common Curriculum Committee
Member of the Committee for Laboratory Safety Management
Member of the Committee for Energy Conservation
Member of the Curriculum committee of the College of Education
Steering committee member of the Graduate School of Education
Steering committee member of the Teacher Training Division
Steering committee member of the Education Center for Gifted-Students in Sciences
Division Head of the Administrative Support Team of the Executive Committee for the 6th Governmental Assessment for Teacher-training institutions
Associate Head of the Task-Force Committee for the University Support Project for Improving Teacher Training Programs (MOE project)

Representative of Faculty Assembly September 2022 – August 2024
Legislation subcommittee – statute, regulations, and human resources affairs

Member of the Institutional Assessment Research Committee March 2024 – October 2024

Steering committee member of the Education Research Institute December 2019 – Present
Internal admission officer 2023, 2022, 2021
Member of the Curriculum committee of the College of Education May 2020 – May 2022
Member of the Task-Force Committee for Future Education Center construction and pilot operation project August 2020 – February 2021

Departmental Service (at Chungbuk National University)

Member of the departmental scholarship committee August 2020 – February 2024
Member of the curriculum committee March 2020 – August 2023
Member of the tenure-track faculty search committee Fall 2023, Fall 2022, Fall 2021
Member of the department officer hiring committee Feb. 2021, Feb. 2022
Interviewer and question designer for undergraduate admission Fall 2019 – Present
Transfer admissions (interviewer 4 times / question designer 3 times), internal transfers (interviewer 1 time / question designer 1 time), personality and aptitude interviewer (4 times).
Interviewer and question designer for graduate admission Spring 2023 – Present
The Graduate School of Education – (interviewer 2 time / question designer 4 times).

Outreach and Community Service

Invited speaker for a public lecture for high school students in Chungbuk Province
3 high school on-site, 5 high schools on-campus July 2024– December 2024
2 high schools on-site, 9 high schools via online July 2023– December 2023
8 high schools on-site, 17 high schools via online (also in Sejong City) May 2022 – August 2022
5 high Schools December 2021
1 high School July 2020
Advisory panel for an expansion plan of Chungbuk Mathematics Experience Center, Chungbuk Natural Sciences Education Center November 2019 – December 2019

**SUPERVISION
EXPERIENCES**

A study on differential cocycles via higher sheaves on manifolds (2 students) May 2020 – June 2021

Mentoring a undergraduate student for reading Atiyah, Bott, and Shapiro, *Clifford Modules* and a Master's student for Freed and Hopkins *Chern-Weil forms and abstract homotopy theory*.

Geometry and topology of directed graphs (2 students) September 2019 – February 2020
Mentored undergraduate students for learning algebraic tools for research, providing support for participating conferences, and teaching \LaTeX .

Characteristic Classes Learning Group (2 students) May 2013 – February 2014
Lecturing and mentoring in a learning group of Milnor and Stasheff's Characteristic Classes.

Summer School “Coarse Index Theory”

September 2016

Albert-Ludwigs-Universität Freiburg, Freiburg, Germany.

Travel and accomodation award €1,580.

GAP XIV: Geometry and Physics “Séminaire itinérant” — Graded geometry and applications to physics

August 2016

University of Sheffield, Sheffield, UK

Travel and accommodation award \$1,380.

Topology of Manifolds: A conference in honour of Machael Weiss’ 60th birthday

June 2016

University of Lisbon, Lisbon, Portugal.

Travel and accommodation award \$2,340.

GAP XIII: Geometry and Physics “Séminaire itinérant” — Derived geometry

July 2015

IBS Center for Geometry and Physics, Pohang, South Korea.

Travel award \$1,600 and full accommodation support.

LANGUAGES**Languages** English: Fluent. Korean: Native. French and German: Basic proficiency.**Proficiency in Computer Languages** C/C++, MATLAB, FORTRAN, MAPLE \LaTeX **SELECTED OFFERS****Korea Institute for Advanced Study (KIAS)**, Seoul, Korea

March 2019

Research Fellow (Postdoc) in School of Mathematics

2-year extension of the contract (October 2019 – September 2021 – Resigned as of August 31, 2019).

Eduard Čech Institute for Algebra, Geometry and Physics, Prague, The Czech Republic

16-month postdoctoral position (Offer declined)

April 2017

In the research group of Branislav Jurčo and Martin Markl

DATE

Last updated: 19 March 2025.