

# 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”

## 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.

<b>PUBLICATIONS</b>	<b>On the smoothness of the geodesic spray for the Camassa-Holm equation</b> , with Jae Min Lee, <i>J. Math. Anal. Appl.</i> , <b>516</b> (1) (2022) 126472 1–12.	
	<b>Noncommutative differential <math>K</math>-theory</b> , with Arthur Parzygnat, Corbett Redden, and Augusto Stoffel, <i>J. Geom. Phys.</i> , <b>174</b> (2022) 104446 1–40. arXiv:2106.12073.	
	<b>A note on Venice lemma in differential <math>K</math>-theory</b> , <i>Arch. Math.</i> , <b>118</b> (2) (2022) 215–224.	
	<b>A classification of equivariant gerbe connections</b> with Corbett Redden, <i>Commun. Contemp. Math.</i> , <b>21</b> (2) (2019) 1850001 1–40. arXiv:1709.06003.	
	<b>Geometric models of twisted differential <math>K</math>-theory I</b> , <i>J. Homotopy and Relat. Struct.</i> , <b>13</b> (1) (2018) 143–167. arXiv:1602.02292	
	<b>A smooth variant of Hopkins-Singer differential <math>K</math>-theory</b> , <i>New York J. Math.</i> , <b>23</b> (2017) 655–670. arXiv:1607.08686	
<b>PREPRINTS</b>	<b>Generalizations of the Thistlethwaite–Tsvietkova method</b> , with Alice Kwon and Ying Hong Tham, (2023).	
	<b>Geometric families define differential <math>K</math>-theory</b> , with Jae Min Lee, (2022).	
	<b>Brown representability for directed graphs</b> , with Zachary McGuirk, (2020) arXiv:2003.07426.	
<b>WORK IN PROGRESS</b>	<b>Cycle maps in twisted differential <math>K</math>-theory</b> , with Daniel Grady	
	<b>Equivariant arithmetic Chow groups and equivariant differential cohomology</b> , with Sreedhar Bhamidi	
	<b>Equivariant eta forms in local index theory</b> , with Jae Min Lee.	
	<b>The Euler–Arnold theory via algebraic topology: Sullivan’s methodology</b> , with Jae Min Lee.	
<b>BOOKS</b>	<b>Knowledge and education in the era of new media</b> (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, <i>Pakyounghsa</i> , (2022) ISBN-13: 9791165192730 Contributed a chapter “How can we be good at mathematics?” Available to purchase at Kyobo, Aladin.	
<b>BOOK PROJECTS IN PROGRESS</b>	<b>Gelfand’s Geometry</b> (in Korean) <i>Kyungmoon Publishing Co.</i> Korean translation of the monograph <i>Geometry</i> by Israel M. Gelfand and Tatiana Alekseyevskaya (Gelfand), <i>Birkhäuser</i> , (2020) ISBN-13: 9781071602997	
	<b>Calculus</b> (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, <i>Kyungmoon Publishing Co.</i>	
	<b>Elementary Calculus</b> (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, <i>Kyungmoon Publishing Co.</i>	
	<b>College Mathematics</b> (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, <i>Kyungmoon Publishing Co.</i>	
	<b>Mathematics Department Colloquium</b> Pusan National University, Busan, Korea <i>An introduction to differential <math>K</math>-theory</i> Host: Donghoon Jang	
<b>SELECTED PRESENTATIONS</b>	May 2022	
	<b>Three W’s Seminar</b> Korea Institute for Advanced Study (KIAS), Seoul, Korea <i>The Atiyah–Jänich theorem and its twisted refinement</i> Host: Sreedhar Bhamidi	
	December 2020	
<b>SELECTED PRESENTATIONS</b>	<b>Mathematics Department Colloquium</b> Chungbuk National University, Cheongju, Korea <i>The Atiyah–Jänich theorem and its twisted refinement</i> Host: Sejong Kim	
	November 2020	

**KIAS Topology Seminar**

Korea Institute for Advanced Study (KIAS), Seoul, Korea  
*Twisted differential K-theory, geometric models, and sheaves of spectra*  
 Host: Hsuan-Yi Liao

December 2019

**DG Seminar**

Korea Institute for Advanced Study (KIAS), Seoul, Korea  
*What is an  $\infty$ -category? (1), (2), (3)*  
 Host: Bumsig Kim

February 2019

**2018 Seoul – Tokyo Conference in Mathematics**

Korea Institute for Advanced Study (KIAS), Seoul, Korea  
*Cycle maps in differential K-theory*  
 Host: Jinsung Park

December 2018

**Topology in Australia and South Korea 2018**

IBS Center for Geometry and Physics (IBS-CGP), Pohang, Korea  
*A classification of equivariant gerbe connections*  
 Host: Gabriel C. Drummond-Cole

April 2018

**The 13th KIAS Winter School on Differential Geometry**

Korea Institute for Advanced Study (KIAS), Seoul, Korea  
*Introduction to differential cohomology* (3 lectures)  
 Host: Insong Choe and Jaigyoung Choe  
 Conference venue: Hill Condominium, High 1 Resort, Jeongseon, Korea

January 2018 – February 2018

**Higher Categories and Mirror Symmetry**

Korea Institute for Advanced Study (KIAS), Seoul, Korea  
*A classification of equivariant gerbe connections*  
 Host: Bumsig Kim and Gregory Ginot

December 2017

**Topology Workshop – Cohomology Theories, Categories, and Applications**

University of Pittsburgh, Pittsburgh, PA USA  
*A geometric model of twisted differential K-theory*  
 Host: Hisham Sati

March 2017

**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

August 2016

*A geometric model of twisted differential  $K$ -theory*

Poster presentation

**Deformation Theory Seminar**

University of Pennsylvania, Philadelphia PA USA

June 2016

*A geometric model of twisted differential  $K$ -theory*

Host: James Stasheff

**2016 Lehigh University Geometry and Topology Conference**

Lehigh University, Bethlehem PA USA

May 2016

*A geometric model of twisted differential  $K$ -theory*

**GRANTS**

**Basic Research Program in Science and Engineering**

The National Research Foundation of Korea (NRF)

March 2020–August 2023

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

**National University Forstering 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

September 2019–August 2020

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.)

**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.  
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 2023  
External reviewer for tenure-track faculty hiring process. June 2020 – Present  
6 national universities and 8 private universities in Korea (counted with multiplicity).  
External interviewer for tenure-track faculty hiring process. January 2021  
1 national university 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)

Representative of Faculty Assembly September 2022 – August 2024  
legislation subcommittee – statute, regulations, and human resources affairs  
Steering committee member of the Education Research Institute December 2019 – Present  
Internal admission officer 2021, 2022  
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 2021, Fall 2022  
Member of the department officer hiring committee Feb. 2021, Feb. 2022  
Interviewer and question designer for undergraduate admission Fall 2019 – Present  
Transfer admissions (interviewer 3 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 1 time / question designer 3 times).

### Outreach and Community Service

Invited speaker for a public lecture for high school students  
9 high schools via online (in Chungbuk Province) July 2023  
8 high schools on-site, 17 high schools via online (in Chungbuk Province and Sejong City)  
May 2022 – August 2022  
5 high Schools (in Chungbuk Province) December 2021  
1 high School (in Chungbuk Province) 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  $\text{\LaTeX}$ .

### Characteristic Classes Learning Group (2 students)

May 2013 – February 2014

Lecturing and mentoring in a learning group of Milnor and Stasheff's Characteristic Classes.

**TEACHING  
EXPERIENCES**

**At Chungbuk National University**

Advanced Topics in History of Mathematics and Mathematics Education (graduate course)  
 Foundation of Mathematics II (graduate course)  
 Foundation of Mathematics I (graduate course)  
 Topics in Geometry I (3 semesters; graduate course)  
 Geometry and Education (Undergraduate topics course on teaching geometry, 2 semesters)  
 Differential Geometry II (5 semesters; incl. Fall 2023)  
 Differential Geometry I (4 semesters)  
 Complex Analysis II  
 Complex Analysis I  
 Geometry for Teachers II (2 semesters. Introduction to Euclidean, non-Euclidean, and projective geometries)  
 Geometry for Teachers I (4 semesters. Conics and the classification theorem)  
 Introduction to geometry (Currently teaching)  
 Calculus II (2 semesters; incl. Fall 2023)  
 Calculus I (2 semesters)

**At the City University of New York**

Vector Analysis (Multivariable calculus and differential forms)  
 Calculus III (Multivariable calculus)  
 Calculus II (Integral calculus, 2 semesters)  
 Calculus II Lab (MAPLE simulation)  
 Calculus I (Differential calculus, 3 semesters)  
 Calculus I Lab (MAPLE simulation)  
 Precalculus  
 Trigonometry and College Algebra (Community College teaching experience)  
 College Algebra  
 Tasks Involved: Lecturing, grading, and writing and administering exams.

**TEACHING  
AWARDS**

Faculty Teaching Excellence, Chungbuk National University  
 3 semesters: Fall 2021, Fall 2020, Fall 2019

**ACADEMIC  
HONORS  
& AWARDS**

Dissertation Year Fellowship, CUNY Graduate Center	Fall 2015 – Spring 2016
Quantitative Reasoning Fellowship, CUNY Graduate Center	Fall 2014 – Spring 2015
Graduate Teaching Fellowship, CUNY Graduate Center	Fall 2012 – Spring 2014
University Fellowship, CUNY Graduate Center	Fall 2013 – Spring 2014
Science Fellowship, CUNY Graduate Center	Fall 2010 – Spring 2012
Yonsei Special Awards, Yonsei University	Spring 2006, Fall 2006, Fall 2007, and Spring 2008
Highest Honors Student, High Honors Student, Honors Student, Yonsei University	Fall 2001, Spring 2001, and Fall 2007
University Designated Scholarship, Yonsei University	Fall 2002
The Kwanjeong Scholarship, Kwanjeong Educational Foundation	April 2002

**SELECTED  
TRAVEL  
SUPPORT  
RECEIVED**

<b>Workshop on gauge theory and Floer homology</b> Peking University, Beijing, China. Full accommodation support.	December 2019
<b>International Workshop on Algebraic Topology</b> Southern University of Science and Technology, Shenzhen, China. Travel award \$ 500 and full accommodation support.	June 2018
<b>Summer School “Coarse Index Theory”</b> Albert-Ludwigs-Universität Freiburg, Freiburg, Germany. Travel and accommodation award €1,580.	September 2016

**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

**REFERENCES**

**Mahmoud Zeinalian** (Doctoral advisor)  
Professor of Mathematics  
CUNY Graduate Center and Lehman College  
mzeinalian@gc.cuny.edu

**Józef Dodziuk** (Teaching)  
Visiting Professor of the Hebrew University of Jerusalem  
Professor of Mathematics Emeritus at CUNY Graduate Center  
jdodziuk@gmail.com

**Martin Bendersky**  
Professor of Mathematics  
CUNY Graduate Center and Hunter College  
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**James Stasheff**  
Visiting Faculty at University of Pennsylvania  
Professor of Mathematics Emeritus at University of North Carolina at Chapel Hill  
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**Corbett Redden**  
Associate Professor of Mathematics  
Long Island University C. W. Post Campus  
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**Thomas Tradler**  
Professor of Mathematics  
CUNY Graduate Center and New York City College of Technology  
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**Jae-Suk Park**  
Professor of Mathematics  
Pohang University of Science and Technology  
jaesuk@postech.ac.kr

**DATE**

Last updated: 1 September 2023.