

# Sang-Hyun (Maverick) Oh

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## PERSONAL DETAILS

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<i>Legal Name</i>	Sang-Hyun Oh
<i>Preferred Name</i>	Maverick
<i>E-mail</i>	maverick.sh.oh@gmail.com, soh39@ucmerced.edu

## EDUCATION

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**University of California, Merced**  
(Merced, California, the United States) AUG. 2020 - PRESENT  
*Graduate*

Ph.D. program in physics. Currently pursuing.

**Gwangju Institute of Science and Technology (GIST)**  
(Gwangju, South Korea) MAR. 2015 - AUG. 2020  
*Undergraduate*

B.S. in physics. Cum laude (3.95/4.5 TGPA).

Includes exchange programs to University of California, Berkeley (Summer 2016) and California Institute of Technology (Fall 2019).

## RESEARCH EXPERIENCE

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**Dark Matter Substructure Analysis with Quadruply Lensed Quasars** 2020 - PRESENT

**SUPERVISOR** | Prof. Anna Nierenberg, UC Merced (California, US)

**ABOUT** | Working on modeling and analysis of gravitationally lensed quasar systems to understand and constrain dark matter properties, using the data from Hubble Space Telescope to statistically constrain the distribution of dark matter halos, which is related to their fundamental properties.

**Poetics Research on Early Korean Science Poems by Yi-Sang** 2020 - PRESENT

**SUPERVISOR** | Prof. Soo Jong Lee, GIST (Gwangju, South Korea)

**ABOUT** | Working on interpreting poems in 1930s by Yi-Sang, which uses science concepts.

**PUBLICATION** | [5] **ON MEDIA** | [7] [8]

**Machine Learning on AdS/CFT** JAN. 2020 - JUL. 2020

*Quantum Field and Gravity Theory Group*

**SUPERVISOR** Prof. Keun-Young Kim, GIST (Gwangju, South Korea)

**ABOUT** | Worked on reproducing the machine learning technique and framework on AdS/CFT correspondence that was proposed by Koji Hashimoto. Taught two other internship students who joined later.

**PUBLICATION** | [3]

**Astrophysics Simulation Result Analysis** 2019

*Theoretical Astrophysics Including Relativity and Cosmology Group (TAPIR)*

**SUPERVISORS** | Prof. Philip Fajardo-Hopkins and Dr. Coral Wheeler, Caltech (California, US)

**ABOUT** | Analyzed galaxy formation history from GIZMO Feedback In Realistic Environment (FIRE) simulations with different reionization period using Python.

**Graphical Notation of Tensor Calculus** 2018 - 2020

### *Quantum Field and Gravity Theory Group*

**SUPERVISOR** | Prof. Keun-Young Kim, GIST (Gwangju, South Korea)

**ABOUT** | Studied the graphical notation of tensorial identities and equations (Penrose graphical notation, etc.), and wrote a pedagogical paper to spread the use of the graphical notation in vector calculus and undergraduate physics.

**PUBLICATION** | [2] [4]      **ON MEDIA** | [6]

### **X-ray Diffraction Simulation and Data Analysis**

2017 - 2019

#### *X-ray Laboratory for Nanoscale Phenomena*

**SUPERVISOR** | Prof. Do Young Noh, GIST (Gwangju, South Korea)

**ABOUT** | Worked on computer simulation of X-ray diffraction (XRD) pattern with diffraction grating, and analysis of XRD data for single pulse emission spectroscopy using MATLAB, including data preprocessing, curve fitting and numerical study on spectroscopy correlation.

**PUBLICATION** | [1]

## **PUBLICATION**

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- [1] Muhammad Ijaz Anwar, Sung Soo Ha, Byung-Jun Hwang, Seonghyun Han, **Maverick S. H. Oh**, Mohd Faiyaz, Do Young Noh, Hyon Chol Kang, and Sunam Kim. Hard x-ray von hamos spectrometer for single-pulse emission spectroscopy. *Journal of the Korean Physical Society*, 75(7):494–497, Oct 2019. doi.org/10.3938/jkps.75.494.
- [2] Joon-Hwi Kim, **Maverick S. H. Oh**, and Keun-Young Kim. Boosting vector calculus with the graphical notation. *American journal of physics*, 89(2):200–209, 2021.
- [3] Mugeon Song, **Maverick S. H. Oh**, Yongjun Ahn, and Keun-Young Kima. AdS/deep-learning made easy: simple examples. *Chinese Physics C*, 45(7):073111, jul 2021.
- [4] **Maverick S. H. Oh**. Graphical notation for vector calculus and its generalization. Bachelor Thesis, 2020. library.gist.ac.kr/storage/thesis/GIST\_20155110\_Sang-Hyun%20h\_20201013103856901.pdf.
- [5] 오상현 (**Maverick S. H. Oh**) and 이수정 (Soo Jong Lee). 이상 시의 4차원 시공간 설계 및 건축 : 삼차각설계도와 건축무한육면각체의 연결, 그리고 차원 확장 (design and construction in four-dimensional space-time in yi-sang's poems :the connection between three-dimensional angle blueprint and building infinite-hexahedral-angle bodies, and dimension expansion). *Journal of Korean Culture (JKC)*, 54:107–156, 2021. Written in Korean.

## **TEACHING EXPERIENCE**

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### **TA: Introductory Physics I for Biological Sciences**

JAN. - MAY. 2021

*University of California, Merced*

Teaching assistance and grader, assisting Dr. Toni Stone. Led discussions of an intro level physics I (mechanics) course for two sessions of bio-major students.

### **TA: Introductory Physics I for Biological Sciences Lab**

AUG. - DEC. 2020

*University of California, Merced*

Teaching assistance and grader, assisting Dr. Kristina Callaghan. Taught three sessions of bio-major students an intro level physics I lab (mechanics) course using Beyond Labz, a simulation-bases virtual laboratory because of COVID-19 restrictions.

### **Machine Learning and Physics – Undergrad Research Program**

JUN. - JUL. 2020

*Gwangju Institute of Science and Technology*

Instructor for GIST Summer Undergraduate Research Fellowship (G-SURF), under the supervision of Prof. Keun-Young Kim. Taught undergraduate students the basics of machine learning, software skills (PyTorch) and their application on AdS/CFT.

## Physics Using Machine Learning – Pre-College Research Program

AUG. 2021, JAN. 2022

*Gwangju Institute of Science and Technology*

Instructor for Summer/Winter Pre-Undergraduate Research Participation Program (Pre-URP), under the supervision of Prof. Keun-Young Kim. Taught high school students the basics of machine learning, software skills (PyTorch), Neural ODE, and their application to classical mechanics problems.

## TA: History of Universe and Human

MAR. 2020 - JUN. 2020

*Gwangju Institute of Science and Technology*

Teaching assistant and grader, assisting Prof. Keun-Young Kim. The course covered “big history”, which is the natural&human history from the big bang to the present.

## TA: Single Variable Calculus and Applications

SEP. 2016 - DEC. 2016

*Gwangju Institute of Science and Technology*

Teaching assistant and grader, assisting Prof. Chi-Ok Hwang. The course mainly covered single-variable calculus, sequence, and series.

## SKILLS

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<i>Languages</i>	Korean	(Native)
	English	(Fluent)
<i>Programming</i>	Python & PyTorch	(Advanced)
	MATLAB	(Advanced)
	C	(Intermediate)
<i>Other Softwares</i>	L <sup>A</sup> T <sub>E</sub> X, 3D CAD (SolidWorks, OnShape), Adobe Photoshop & Illustrator, MS Office	

## HONORS

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- National Scholarship to pursue B.S. in GIST, Korea Student Aid Foundation, 2015–2019
- Academic Excellence Scholarship, GIST, 2017–2018
- Scholarship for Study Abroad Program at Caltech, GIST, 2019
- Scholarship for Study Abroad Program at UC Berkeley, GIST, 2016

## MEDIA COVERAGE

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- [6] Emerging Technology from the arXiv. How to turn the complex mathematics of vector calculus into simple pictures. *MIT Technology Review*, Nov 2019. [technologyreview.com/s/614704/](https://technologyreview.com/s/614704/).
- [7] 한소범 (So-Beom Han). ‘수포자’ 교수와 문학은 1도 모르던 물리학도, 천재시인 이상의 비밀을 풀다. *한국일보(Hankook Ilbo)*. Written in Korean. [hankookilbo.com/News/Read/A2021100515390000378](https://hankookilbo.com/News/Read/A2021100515390000378).
- [8] 선한결 (Han-Gyeol Seon). 이상 ‘건축무한육면각체’ 물리학으로 풀어... "이과가 이과했다". *한국경제(The Korea Economic Daily)*. Written in Korean. [hankyung.com/it/article/202109230135i](https://hankyung.com/it/article/202109230135i).

## OUTREACH

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- Participating in Skype A Scientist, which is an outreach program toward the general public including students and families.
- Science communicator under Ministry of Science and ICT (MSIT, South Korea) and Korea Foundation for the Advancement of Science and Creativity (KOFAC, South Korea) since 2018. I have delivered multiple lectures and performances to students and the general public for popularization of science.