

Sanha Cheong | Curriculum Vitae

Physics Department, Stanford University – Stanford, CA

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Education

- **Stanford University** **Stanford, CA**
Ph.D. in Physics (Adviser: Prof. Ariel Schwartzman) *September 2017 – Present*¹
 - Working on the ATLAS experiment at CERN with the SLAC ATLAS Group
 - Research interests: Higgs, dark matter, long-lived particles, QCD and jet physics, machine learning applications in physics, novel data-analysis methods
 - Teaching undergraduate & graduate physics courses, designing and running a new course²
- **University of Rochester** **Rochester, NY**
B.S. in Physics & Astronomy (Highest Distinction), B.A. in Mathematics *Class of 2017*
 - Overall GPA: 3.92/4.00, major GPA 3.99/4.00, elected to Phi Beta Kappa (ΦBK)
 - International Baccalaureate Scholarship, \$16k per year
- **Yew Chung International School of Shanghai** **Shanghai, China**
International Baccalaureate (IB) Diploma *Class of 2013*
 - Total of 8 IB subjects including Further Mathematics, Higher-level Physics, Chemistry, and Economics

Research Activities

- **SLAC ATLAS Group** **Menlo Park, CA**
Graduate Research Assistant *August 2017 – Present*
 - Machine learning techniques for experimental particle physics—reconstruction of exotic signatures, jet calibration using neural networks (Generalized Numerical Inversion), etc.
 - Simulation & trigger studies for long-lived particle searches using timing information at the HL-LHC
 - ATLAS hardware upgrade: ITk, RD-53A read-out, testing, calibration, etc.
- **University of Rochester** **Rochester, NY**
Undergraduate Research Assistant (Adviser: Prof. Regina Demina) *November 2015 – May 2017*
 - Studies of large-scale structures and baryon acoustic oscillations using SDSS-III BOSS data
 - Development of a novel analysis algorithm accelerating the computation of galaxy 2-point correlation functions with an alternative background-subtraction method

¹On an official leave of absence from August 2019 until March 2021, serving in the Republic of Korea Army

²PHYSICS 166/266, Statistical Methods in Experimental Physics

Research Publications

ATLAS publications with significant contributions:

1. **ATLAS Collaboration**. "Simultaneous Jet Energy and Mass Calibrations with Neural Networks." *ATLAS PUB Note*, ATL-PHYS-PUB-2020-001. [CDS Link](#)

Independent publications:

1. **S. Cheong**, A. Cukierman, B. Nachman, M. Safdari, A. Schwartzman. "Parametrizing the Detector Response with Neural Networks". *Journal of Instrumentation*, **15** P01030, January 2020. [arXiv:1910.03773](#) [[physics.data-an](#)]
2. R. Demina, **S. Cheong**, S. BenZvi, O. Hindrichs. "A Computationally Efficient Approach for Calculating Galaxy Two-point Correlations". *Monthly Notices of the Royal Astronomical Society*, Vol. 480, Issue 1, p. 49-56, sty1812, October 2018. [arXiv:1611.09892](#) [[astro-ph.CO](#)]

Oral & Poster Presentations

1. **S. Cheong**. "Introduction to Deep Learning for Mathematicians by a Physicist (Capabilities of Neural Networks: Mathematical and Empirical Perspectives)". *Department of Mathematics Graduate Seminars*, Sogang University, Seoul, South Korea, July 16, 2018.
2. **S. Cheong**, J. Pearkes, A. Cukierman. "Merged Di-photon Identification for the ATLAS Experiment at the Large Hadron Collider". *CS 231N Project Poster Session, Spring 2018*, Stanford, CA, June 12, 2018.
3. **S. Cheong**. "Modification to the Calculation of a Two-point Correlation Function". *APS April Meeting 2017 (Q2C: Quarks to Cosmos)*, Washington, DC, January 28-31, 2017.
4. **S. Cheong**. "Introduction to Baryon Acoustic Oscillations (BAO)". *University of Rochester Summer REU Presentation*, Rochester, NY, August 5, 2016.

Schools & Workshops Attended

1. *US ATLAS Hadronic Final State Forum 2018*, Berkeley, CA, December 10 - 14, 2018.
2. *APS Bridge Program and National Mentoring Community Conference*, Google Sunnyvale Campus & Stanford University, CA, November 16 - 18, 2018.
3. *46th SLAC Summer Institute (The Standard Model at 50: Successes & Challenges)*, Menlo Park, CA, July 30 - August 10, 2018.

Teaching Experiences

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| o Stanford University | Stanford, CA |
| Teaching Assistant | |
| - PHYSICS 152/252 Introduction to Particle Physics | Spring 2019 |
| - PHYSICS 166/266 Statistical Methods in Experimental Physics | Winter 2019 |
| - PHYSICS 41 Mechanics | Winter 2018 |

Teaching Mentor, <i>Vice Provost for Teaching & Learning</i>	June 2018 – June 2019
o University of Rochester	Rochester, NY
Teaching Assistant	
- PHY 227 Thermodynamics & Statistical Mechanics	Spring 2017
- PHY 142 Electricity & Magnetism (Honors)	Fall 2016
- PHY 143 Waves and Modern Physics (Honors)	Spring 2016
- PHY 122 Electricity & Magnetism	Fall 2015
- MTH 172 Honors Calculus II	Spring 2015
- MTH 171 Honors Calculus I	Fall 2014
Physics GRE Tutor, <i>Society of Physics Students (SPS)</i>	August 2016 – May 2017

Leadership & Representative Positions

o Stanford University	Stanford, CA
Recruitment Chair & First-year Mentoring Chair, <i>Graduate Students in Applied Physics & Physics (GSAPP)</i>	June 2018 – June 2019
SASS Czar (Organizer), <i>SLAC Association for Student Seminars</i>	June 2018 – June 2019
o University of Rochester	Rochester, NY
Business Manager, <i>SPS UR Chapter</i>	June 2016 – May 2017
Student Representative, <i>Physics & Astronomy Undergraduate Curriculum Committee</i>	September 2016 – May 2017

Advising, Outreach, and Other Services

o Stanford University	Stanford, CA
Graduate Coordinator, <i>Physics Undergraduate Summer Research</i>	June 2018 – August 2018
Graduate Research Mentor, <i>Stanford Undergraduate Research Association</i>	January 2018 – June 2019
o University of Rochester	Rochester, NY
Alumni Interviewer, <i>Office of Admissions</i>	November 2017 – May 2019
Peer Adviser, <i>College Center for Advising Services</i>	August 2016 – May 2017

Awards and Such

1. Janet Fogg Prize. *University of Rochester*, May 2017.
2. Excellence in Undergraduate Teaching. *University of Rochester*, May 2017.

Professional Memberships

American Astronomical Society (AAS)

American Physical Society (APS)
Phi Beta Kappa (Φ BK)
Society of Physics Students (SPS)
Sigma Pi Sigma (Σ ΠΣ)

Computer & Hardware Skills

Data Analysis

- Experiences in big data analysis for physics & astronomy research
- Developing new statistical analysis algorithms and applying machine learning techniques

Programming Languages

- PYTHON, C, C++, ROOT, JAVA, MATHEMATICA
- UNIX shell (BASH) scripting

Document Editing and Productivity Software

- L^AT_EX
- GitHub, Microsoft Office, Google Docs
- Basic web-design using HTML, CSS, JAVASCRIPT, and Jekyll

Hardware Skills

- Radioactivity work training
- Basic machine shop training, circuit design (Protel DXP), printed circuit boards

Languages

English (fluent), Korean (fluent), Mandarin (conversational)

Citizenship

Republic of Korea