

# Sanha Cheong | Curriculum Vitae

Physics Department, Stanford University – Stanford, CA

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## Education

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- **Stanford University** **Stanford, CA**
  - *Ph.D. in Physics (Adviser: Prof. Ariel Schwartzman)* *September 2017 – Present*<sup>1</sup>
  - 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 course<sup>2</sup>
- **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

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- **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

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

<sup>2</sup>PHYSICS 166/266, Statistical Methods in Experimental Physics

## Research Publications

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### 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

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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. Parkes, 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

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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 <b>Stanford University</b>                                  | <b>Stanford, CA</b> |
| 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, *Vice Provost for Teaching & Learning* 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, *Society of Physics Students (SPS)* August 2016 – May 2017

## Leadership & Representative Positions

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

## Advising, Outreach, and Other Services

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

## Awards and Such

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

## Professional Memberships

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American Astronomical Society (AAS)

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

## Computer & Hardware Skills

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### 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<sup>A</sup>T<sub>E</sub>X
- 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

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

## Citizenship

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Republic of Korea