Sanha Cheong | Curriculum Vitae

Physics Department, Stanford University

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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
  - Teaching physics courses; designing, developing, and teaching new course [2]
- **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*

Research Activities

Current research interests: Higgs (exotic decays), dark matter, long-lived particles, QCD and jet physics, machine learning applications in physics, novel data-analysis methods

- **Stanford University & SLAC National Accelerator Laboratory** — **August 2017 – Present**
  ATLAS Experiment @ CERN
  - Searching for exotic decays of the Higgs boson into new (pseudo-)scalar particles in multi-photon final state ($h \to aa \to \gamma\gamma\gamma\gamma$)
  - Machine learning techniques within ATLAS—reconstruction of exotic signatures, jet calibration using neural networks (Generalized Numerical Inversion), etc.
  - Simulation & trigger studies for long-lived particle searches using timing information
  - ATLAS hardware upgrade: ITk, RD-53 read-out, testing, calibration, etc.
- **University of Rochester** — **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

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

- **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, *Vice Provost for Teaching & Learning* — *June 2018 – June 2019*

- **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

- **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*

- **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

- **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*

- **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

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 (ΦBK)
Society of Physics Students (SPS)
Sigma Pi Sigma (ΣΠΣ)

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

- LaTeX
- 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