

Sihao Cheng (程思浩)

Curriculum Vitae / September, 2021

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Department of Physics and Astronomy
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EDUCATION

Ph.D. & M.A., Physics and Astronomy, *Johns Hopkins University*, United States 2017–2021
advisor: Brice Ménard
B.Sc. (with Honors), Astronomy, *Peking University*, China 2012–2016
advisor: Eric W. Peng

EMPLOYMENT

Visiting fellow, Centre of Data Science, *École Normale Supérieure*, France 2021–present
Postdoc fellow, Physics and Astronomy, *Johns Hopkins University*, United States 2021–present

RESEARCH INTEREST

I am interested in using statistical analysis of large data sets to better understand our Universe, including topics in observational cosmology, stellar physics, and extrasolar planets. I am currently working on two topics:

1. a powerful new statistic that borrows ideas from convolutional neural nets, and its applications in astrophysics and beyond;
2. white dwarfs, including their evolution, merger, and planets around them.

AWARDS

2020 Outstanding Publication in Astrostatistics Award Jan 2021
Lin-Qiao Prize for Undergraduate Research at Peking University Sept 2015
Wu-Si Scholarship May 2014, May 2015
Gold Medals of international astronomical olympiads (IOAA, IAO, & APAO) 2008 – 2011

GRANT & TELESCOPE TIME

60 hours on 3.5m APO telescope 2019-2020
IAU travel grant for Symposium No.357, 1,000 euro Oct 2019

TEACHING & MENTORING EXPERIENCE

Teaching assistant, Johns Hopkins University, Stars & the Universe 2019
Teaching assistant, Johns Hopkins University, Physics I & II 2017–2018
Mentoring undergrad student:
Vedant Chandra (currently a PhD student at Harvard/CfA) 2019-2020

REFERENCES

Prof. Brice Ménard, Johns Hopkins University	menard@jhu.edu
Prof. Marc Kamionkowski, Johns Hopkins University	kamion@jhu.edu
Prof. Stéphane Mallat, Collège de France	stephane.mallat@ens.fr
Prof. Yuan-Sen Ting, Australian National University	ting@ias.edu

TALKS & PRESENTATIONS

Cosmology seminar at University of California, Berkeley	Sept 2021
Contributed Talk, <i>Learn the Universe – an ML X Cosmology Workshop</i> , New York city, NY	Aug 2021
HotSci Seminar at STScI	July 2021
Cosmology group meeting at Ohio State University	July 2021
Science coffee at STScI	July 2021
LSST DESC telecon	Jun 2021
Poster, <i>Statistical Challenges in Modern Astronomy VII</i> , online	Jun 2021
Poster, <i>Where the Earth Meets the Sky</i> , online	May 2021
Seminar at the German Center for Cosmological Lensing	May 2021
Cosmology group meeting at University of Edinburgh	May 2021
Seminar at Shanghai Jiao Tong University	Apr 2021
Invited Talk , <i>White Dwarfs from Physics to Astrophysics</i> , KITP	Mar 2021
Cosmology group meeting at Harvard University	Mar 2021
Lunch talk at Peking University	Mar 2021
Seminar at Tsinghua University	Mar 2021
Colloquium (with Brice Ménard) at University of British Columbia	Mar 2021
Cosmology group meeting at Leiden	Jan 2021
Cosmology seminar at IPMU	Jan 2021
Cosmology seminar at IAP	Dec 2020
Lunch talk at University of Virginia/NRAO	Nov 2020
Euclid US telecon	Nov 2020
Cosmology/machine learning journal club at Fermilab	Oct 2020
Seminar at DIRAC, University of Washington	Oct 2020
(invited) Cosmology seminar at Duke University	Oct 2020
Seminar at Columbia University	Oct 2020
Astrophysics and Cosmology Seminar at University of Arizona	Sept 2020
Wine & Cheese seminar at Johns Hopkins University	Sept 2020
Cosmology journal club at University of Oxford	Sept 2020
<i>Euclid</i> Modelling working group	Sept 2020
Astrocoffee at Weizmann Institute of Science	Aug 2020
Contributed Talk, <i>Cosmology from Home</i>	Aug 2020
LSST DESC weak lensing mass mapping working group	Aug 2020
Astrophysics/Cosmology Seminar at University of Sussex	July 2020
Compact object journal club, STScI, Baltimore, MD	Apr 2020
Lunch Seminar at Indiana University, Bloomington, IN	Mar 2020
CTC seminar at University of Maryland, College Park, MD	Mar 2020
Thunch seminar at Princeton University and astro-coffee at IAS, Princeton, NJ	Feb 2020
A special seminar at Boston University, Boston, MA	Feb 2020
(invited) The Stars & Planets Seminar at Harvard-Smithsonian CfA, Cambridge, MA	Feb 2020
Contributed Talk, <i>White Dwarfs as Probes of Fundamental Physics and Tracers of Planetary, Stellar, and</i>	

Galactic Evolution, Hilo, HI (IAU grant awarded for travel) Oct 2019
Contributed Talk, *The Beginnings and Ends of Double White Dwarfs*, Copenhagen, Denmark (grant awarded for travel) July 2019
Poster, 2019 STScI Spring Symposium: *The Deaths and Afterlives of Stars*, Baltimore, MD Apr 2019

PUBLICATIONS

[Weak lensing scattering transform: dark energy and neutrino mass sensitivity](#)

Visualised what the scattering transform sees from a lensing mass map, and emphasised its advantage of having Gaussian likelihood

Sihao Cheng and Brice Ménard

2021, *MNRAS*, 507, 1012

[Forever young white dwarfs: when stellar ageing stops](#)

Camisassa, M. **et al.**

2021, *A&A Letters*, 649, 7

[A new approach to observational cosmology using the scattering transform](#)

Introduced a new statistic inspired by convolutional neural nets to observational cosmology, and demonstrated that it outperforms classic estimators

Sihao Cheng, Yuan-Sen Ting, Brice Ménard, and Joan Bruna

2020, *MNRAS*, 499, 5902

[An Increase in Small-planet Occurrence with Metallicity for Late-type Dwarf Stars in the Kepler Field and Its Implications for Planet Formation](#)

Cicero X. Lu, Kevin C. Schlaufman, and **Sihao Cheng**

2020, *AJ*, 160, 253

[Multi-Gigayear White Dwarf Cooling Delays from Clustering-Enhanced Gravitational Sedimentation](#)

Evan B. Bauer, Josiah Schwab, Lars Bildsten, and **Sihao Cheng**

2020, *ApJ*, 902, 93

[A Gravitational Redshift Measurement of the White Dwarf Mass–Radius Relation](#)

Used populational gravitational redshift to probe the white dwarf mass–radius relation over a wide mass range

Vedant Chandra, Hsiang-Chih Hwang, Nadia L. Zakamska, and **Sihao Cheng**

2020, *ApJ*, 899, 146

[Carbon star formation as seen through the non-monotonic initial–final mass relation](#)

Marigo, P. **et al.**

2020, *Nature Astronomy*

[Double White Dwarf Merger Products among High-mass White Dwarfs](#)

Measured the white dwarf merger rate with unprecedented high precision using a novel kinematic method

Sihao Cheng, Jeffrey D. Cummings, Brice Ménard, and Silvia Toonen

2020, *ApJ*, 891, 160

[Two delays in white dwarf evolution revealed by *Gaia*](#)

Sihao Cheng

2019, *Proceedings of IAU*, 15 (S357), 175

[A Cooling Anomaly of High-mass White Dwarfs](#)

Discovered an unexpected, extremely long cooling delay in a population of white dwarfs using Gaia data

Sihao Cheng, Jeffrey D. Cummings, and Brice Ménard

2019, *ApJ*, 886, 100

[Meteor spectral observation with DSLR, normal lens and prism](#)

Sihao Cheng and Simiao Cheng

2011, *JMO*, 39, 39