
Chen Heinrich

Curriculum Vitae

NASA Jet Propulsion Laboratory, California Institute of Technology
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Education

- 2012 - 2017 **Ph.D. Physics** **University of Chicago, USA**
Thesis: *Lensing Bias to CMB Polarization Measurements of Compensated Isocurvature Perturbations*
Advisor: Prof. Wayne Hu
- 2009 – 2012 **B.S. Joint Honors Mathematics and Physics** **McGill University, Canada**
Thesis: *The Correlation between Dispersion Measure and X-ray Column Density from Radio Pulsars*
Advisor: Prof. Vicky Kaspi

Academic Positions

- 2017 – Now **Postdoctoral Scholar** **Jet Propulsion Laboratory, Caltech, USA**
Member of *Cosmology with the WFIRST High Latitude Survey Science Investigation Team*
Advisor: Dr. Olivier Doré

Research interests

Data Techniques: Cosmic Microwave Background, Galaxy Surveys, Statistical Tools, Deep Learning
Science Cases: Inflation, Reionization, Lensing, Dark Energy and Modified Gravity, Dark Matter

Awards and Grants

- 2019 Jet Propulsion Laboratory: *Data Science Pilot Grant (\$50K)*; PI: Olivier Doré
2016 Conference Essential Cosmology for the Next Generations: *Best Poster Prize*
2013 University of Chicago Department of Physics: *Winstein Travel Award*
2011 McGill Annual Undergraduate Research Conference: *1st Place in Physical Sciences*
McGill Physics Undergraduate Research Poster Competition: *1st Place*
2003 Opti-Math Competition: *1st Place National (Grade 8)*
2002 Opti-Math Competition: *2nd Place National & Prize Originality in Problem Solving (Grade 7)*

Students

- 2019 George (Trey) Driskell (SURF summer student at Caltech)
2019 Yash Kankanampati (SURF summer student at Caltech, co-supervised with D. Lenz)

Community Service

Co-Organizer **Caltech, USA**

2018 – Now Cahill Cosmology Journal Club

Organizer **Caltech, USA**

2019 – Now WFIRST High Latitude Survey Science Telecons (Team of ~40)

Workshop Organizer **Jet Propulsion Laboratory, Caltech, USA**

2018 Workshop Series *Hands-on Introduction to Deep Learning*

Teaching Assistant **Department of Physics, University of Chicago, USA**

2016 Quantum Field Theory III

2013 – 2014 Intermediate Electricity and Magnetism I & II, Quantum Mechanics

2012 – 2013 Classical Mechanics, Electricity and Magnetism, Waves, Optics and Heat

Outreach

Lead Instructor **KICP Space Explorers Program, University of Chicago, USA**

2014 – 2015 Science enrichment labs
Designed and taught 25 weekly labs on physics & robotics for ~20 under-privileged minority high school students who would become 1st-generation college students.

2015 Yerkes Summer Institute 2015: *Mission to Mars – The Engineering Design Process*
Led a team of graduate students, postdocs and faculty to design and teach a full-immersion (7 days) science institute at Yerkes Observatory.

2014 Yerkes Winter Institute 2014: *Robotics, Telescopes and STEAM* (3 days)

Bilingual Animator **Planetarium of Montreal (Rio Tinto), Canada**

2011 *Narrated multimedia shows, showing of night sky; led workshops and telescope time.*

Outreach Workshop Leader

2009 - now *Led, designed and organized various science and computing outreach events with a primary focus on promoting [Women in Science](#) (manuals available online).*

Publications

1. **C. Heinrich** & M. Schmittfull 2019, PRD 100, 063503
[BAO Modulation as a Probe of Compensated Isocurvature Perturbations](#)
2. **C. Heinrich** & W. Hu 2018, PRD 98, 063514
[Does Planck 2015 polarization favor high redshift reionization?](#)
3. **C. He Heinrich**, V. Miranda & W. Hu 2016, PRD 95, 023513
[Complete reionization constraints from Planck 2015 polarization](#)
4. **C. He Heinrich**, D. Grin, W. Hu 2016, PRD 94, 043534
[Lensing bias to CMB measurements of compensated isocurvature perturbations](#)

5. **C. He**, D. Grin, W. Hu 2015, PRD 92, 063018
Compensated isocurvature perturbations in the curvaton model
6. **C. He**, K. Bechtol, A.P. Hearin & D. Hooper 2015, PRD 91, 063515
Prospects for detecting gamma rays from annihilating dark matter in dwarf galaxies in the era of DES and LSST
7. **C. He**, C.-Y. Ng & V. M. Kaspi 2013, ApJ 768, 64
The correlation between dispersion measure and X-ray column density from radio pulsars
8. O. Doré et al. (WFIRST Science Investigation Team) 2018, arXiv:1804.03628
Cosmology with the High Latitude Survey" Annual Report 2017
9. G. Obied, C. Dvorkin, **C. Heinrich**, W. Hu, V. Miranda 2018, PRD 98, 043518
Inflationary vs. reionization features from Planck 2015 data
10. G. Obied, C. Dvorkin, **C. Heinrich**, W. Hu, V. Miranda 2017, PRD 96, 083526
Inflationary features and shifts in cosmological parameters from Planck 2015 data
11. V. Miranda, A. Lidz, **C. He Heinrich**, W. Hu 2016, MNRAS Vol. 467, Issue 4
CMB signatures of metal-free star formation and Planck 2015 polarization data
12. V. Miranda, W. Hu, **C. He**, H. Motohashi. 2016, PRD 93, 023504
Nonlinear excitations in inflationary power spectra
13. J. Luo, C.-Y. Ng, W. C. G Ho, S. Bogdanov, V. M. Kaspi & **C. He** 2015, ApJ 808, 130
Hunting for orphaned central compact objects among radio pulsars

Astro 2020 Science White Papers (contributed):

14. Doré et al. 2019, arXiv:1904.01174
WFIRST: The Essential Cosmology Space Observatory for the Coming Decade
15. Akeson et al. 2019, arXiv:1902.05569
The Wide Field Infrared Survey Telescope: 100 Hubbles for the 2020s
16. Alvarez et al. 2019, <https://ui.adsabs.harvard.edu/abs/2019BAAS...51c.482A>
Unique Probes of Reionization with the CMB: From the First Stars to Fundamental Physics

Seminar Talks

- 2019 INPA seminar, Lawrence Berkeley National Laboratory, USA
- 2018 YITP seminar, Yukawa Institute for Theoretical Physics, Japan
- 2018 Cosmology Seminar, Nagoya University, Japan
- 2018 KIAS Dark Energy Science Group Meeting, South Korea
- 2018 **Colloquium**, Yonsei University, South Korea
- 2018 Petyon/IAS Cosmology Lunch, Institute of Advanced Studies Princeton, USA
- 2018 Cosmology Seminar, University of Pennsylvania, USA
- 2018 Cosmology Group Meeting, Center for Computational Astrophysics, USA
- 2017 Astrophysics, Gravitation and Cosmology Seminar, UIUC, USA
- 2016 TAPIR Seminar, Caltech, USA
- 2016 IMPS Seminar, UC Santa Cruz, USA
- 2016 Cosmology Seminar, Stanford University, USA

- 2016 Cosmology Seminar, UC Berkeley, USA
- 2016 Tea Talk, Stanford University, Stanford, USA
- 2016 WOPAT, Department of Astronomy, University of Chicago, USA
- 2015 Graduate Student Symposium, University of Chicago, USA
- 2013 Special Seminar in Cosmology, Physics Department, McGill University, Canada
- 2012 Undergraduate Students Symposium, McGill University, Canada
- 2011 SAPM Seminar, Astronomers' Society of the Montreal Planetarium, Canada

Conferences

- 2019 **Poster**, Deep Learning for Science School, Lawrence Berkeley National Laboratory, USA
- 2019 **Contributed Talk**, Mini Machine-Learning Workshop for Cosmology, Caltech, USA
- 2019 **Poster**, JPL Data Science Showcase, Jet Propulsion Laboratory, USA
- 2018 **Invited Talk**, IGM 2018, Kavli Institute for the Physics and Mathematics of Universe, Japan
- 2018 **Contributed Talk**, COSMO-2018, Institute for Basic Science, South Korea
- 2018 **Poster**, JPL Postdoc Research Day, Jet Propulsion Laboratory, USA
- 2018 **Poster**, Astronomical Data Analysis IX and Cosmo21, Spain
- 2017 **Contributed Talk**, Kavli CMB Lensing Workshop, Stanford University, USA
- 2016 **Contributed Talk**, COSMO-2016, University of Michigan, USA
- 2016 **Poster**, Conference Essential Cosmology for Next Generations, Mexico
- 2013 **Poster**, 13th HEAD Meeting of the AAS 126.12 (by C.-Y. Ng; in conf. proc.)
- 2011 **Contributed Talk**, Conference Women in Physics Canada, Perimeter Institute, Canada
- 2011 **Poster**, McGill 7th Annual Undergrad Research Conference, McGill University, Canada
- 2011 **Poster**, Department of Physics Poster Competition, McGill University, Canada
- 2011 **Poster**, 12th HEAD Meeting of AAS 20.11 (by C.-Y. Ng; in conf. proc.)

References

Wayne Hu	University of Chicago, USA	whu@background.uchicago.edu
Olivier Doré	NASA Jet Propulsion Laboratory/Caltech, USA	olivier.p.dore@jpl.nasa.gov
Daniel Grin	Haverford College, USA	dgrin@haverford.edu
Vicky Kaspi	McGill University, Canada	vkaspi@physics.mcgill.ca