

Sheridan B. Green

Résumé

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OVERVIEW

- Fourth-year Ph.D. candidate and NSF Graduate Research Fellow in the Dept. of Physics at Yale, coupling numerical simulations of dark matter halo evolution with semi-analytical modeling to constrain the nature of dark matter.
- Much of my research is statistical by nature, employing tools from machine learning (random forests and convolutional neural networks) and topological data analysis (persistent homology).
- Experienced with Python (four years) and distributed computing systems and familiar with C/C++ and parallel/GPU-computing.
- Since beginning graduate school, I have lead-authored four scientific publications and co-authored an additional five, with several more in preparation; I am very capable of remaining productive while collaborating on several research projects simultaneously.

EDUCATION

Doctor of Philosophy, Physics	expected 2022
Master of Philosophy, Physics	2020
Master of Science, Physics	2018
<i>Yale University</i>	
Dissertation: “The tidal evolution of dark matter substructure: a data-driven semi-analytical model and its applications to small-scale cosmology”	
Advisor: Prof. Frank C. van den Bosch	
Committee: Profs. Daisuke Nagai , Jessi Cisewski-Kehe , and Nikhil Padmanabhan	
GRE Physics: 990/990 (94%)	
Bachelor of Science, Physics and Mathematics	2017
<i>The University of North Carolina at Chapel Hill</i>	
Concentration in Astrophysics	
Highest honors in physics, highest distinction, GPA: 3.93/4.00	
Thesis: “ Constraining an Early Matter-Dominated Era through Cosmological Simulations ”	
Advisor: Prof. Adrienne L. Erickcek	

HONORS AND AWARDS

- 2019 [McDougal Teaching Fellowship \(Yale\)](#) – \$5k/yr
- 2019 [National Science Foundation Graduate Research Fellowship](#) – \$138k
- 2017 [Paul E. Shearin Outstanding Senior Award in Physics \(UNC-Chapel Hill\)](#) – \$500
- 2013–2017 [Dean’s List Honoree \(UNC-Chapel Hill\)](#)
- 2016 [Skynet Undergraduate Research Scholarship \(UNC-Chapel Hill\)](#)
- 2016 [Designated a Carolina Research Scholar](#)
- 2016 [Elected to Phi Beta Kappa Academic Honor Society](#)
- 2015 [NOAA Ernest F. Hollings Undergraduate Scholarship](#) – \$28k

PUBLICATIONS [\[scholar\]](#)[\[ADS\]](#)[\[arXiv\]](#)[\[ORCiD\]](#)

PEER-REVIEWED ARTICLES

6. **Sheridan B. Green**, Han Aung, Daisuke Nagai, and Frank C. van den Bosch, “[Scatter in Sunyaev–Zel’dovich effect scaling relations explained by inter-cluster variance in mass accretion histories](#)”, *MNRAS* **496**, 2743 (2020).

5. Tim B. Miller, Frank C. van den Bosch, **Sheridan B. Green**, and Go Ogiya, “[Dynamical self-friction: how mass loss slows you down](#)”, *MNRAS* **495**, 4496 (2020).
4. **Sheridan B. Green**, Michelle Ntampaka, Daisuke Nagai, Lorenzo Lovisari, Klaus Dolag, Dominique Eckert, and John A. ZuHone, “[Using X-Ray Morphological Parameters to Strengthen Galaxy Cluster Mass Estimates via Machine Learning](#)”, *The Astrophysical Journal* **884**, 33 (2019).
3. **Sheridan B. Green** and Frank C. van den Bosch, “[The tidal evolution of dark matter substructure – I. Subhalo density profiles](#)”, *MNRAS* **490**, 2091 (2019).
2. Xin Xu, Jessi Cisewski-Kehe, **Sheridan B. Green**, and Daisuke Nagai, “[Finding filament loops and cosmic voids using topological data analysis](#)”, *Astronomy and Computing* **27**, 34 (2019).
1. Go Ogiya, Frank C. van den Bosch, Oliver Hahn, **Sheridan B. Green**, Tim B. Miller, and Andreas Burkert, “[DASH: a library of dynamical subhalo evolution](#)”, *MNRAS* **485**, 189 (2019).

SUBMITTED PRE-PRINTS

1. Fangzhou Jiang, Avishai Dekel, Jonathan Freundlich, Frank C. van den Bosch, **Sheridan B. Green**, Philip F. Hopkins, Andrew Benson, and Xiaolong Du, “[SatGen: a semi-analytical satellite galaxy generator – I. The model and statistics of Local-Group satellites](#)”, *arXiv:2005.05974*, submitted to *MNRAS*.

MANUSCRIPTS IN PREP

4. **Sheridan B. Green**, Priyanka Singh, Xun Shi, Alex Saro, Daisuke Nagai, and Klaus Dolag, “Correcting the hydrostatic mass bias in the Sunyaev–Zel’dovich effect scaling relation of *Magneticum* clusters”, to be submitted to *MNRAS: Letters*.
3. **Sheridan B. Green**, Michelle Ntampaka, Daisuke Nagai, John A. ZuHone, and Han Aung, “Accurate Sunyaev–Zel’dovich Galaxy Cluster Mass Estimation via Convolutional Neural Networks”, to be submitted to *The Astrophysical Journal Letters*.
2. Jessi Cisewski-Kehe, **Sheridan B. Green**, Mike Wu, Brittany T. Fasy, Wojciech Hellwing, and Mark R. Lovell, “Topological Hypothesis Tests for the Large-Scale Structure of the Universe”, to be submitted to *Annals of Applied Statistics*.
1. **Sheridan B. Green**, Frank C. van den Bosch, and Fangzhou Jiang, “The tidal evolution of dark matter substructure – II. Subhalo mass functions”, to be submitted to *MNRAS*.

OTHER PUBLICATIONS

2. **Sheridan B. Green**, Abby Mintz, Xin Xu, and Jessi Cisewski-Kehe, “[Topology of Our Cosmology with Persistent Homology](#)”, *CHANCE* **32:3**, 6 (2019).
1. Jenny Farmer, **Sheridan B. Green**, and Donald J. Jacobs, “[Distribution of volume, microvoid percolation, and packing density in globular proteins](#)”, *arXiv:1810.08745*, software whitepaper and technical report.

SELECTED COURSEWORK

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|---------------------------------------|-------------------------------------|
| • Bayesian Probability and Statistics | • Time Series with R/Python |
| • Group Theory | • Financial Markets |
| • Linear Algebra | • SQL for Data Science |
| • Mathematical Methods of Physics | • Data Structures |
| • Real Analysis | • YSBS Business Essentials Bootcamp |

LANGUAGES

- Natural – English (native), French (limited)
- Programming – Python, C/C++, Bash, \LaTeX , Mathematica
- Scientific Computing – UN*X, Slurm, NumPy, SciPy, matplotlib, scikit-learn, Keras, Numba, pandas, seaborn, git