Sheridan B. Green

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EDUCATION

Yale University New Haven, CT
PhD, Physics | GPA: 3.78/4.00 (7 H, 2 HP) | Physics GRE: 990 (94%) *Aug. 2017 – Dec. 2021 (expected)*

The University of North Carolina at Chapel Hill Chapel Hill, NC
BS, Physics and Mathematics | GPA: 3.93/4.00 *Aug. 2013 – May 2017*

RESEARCH EXPERIENCE

Yale University New Haven, CT
Graduate Research Fellow *Aug. 2017 – Present*

- **SatGen**: Co-author and maintainer of the `SatGen` Python library, a Monte Carlo-based semi-analytical dark matter halo generator that surpasses cosmological simulations with respect to statistical power and numerical resolution.
- **DASH**: Co-author of a publicly available library of dark matter N-body simulations. Wrote Bash and Slurm scripts to automate the scheduling, restarting, analysis, and verification of ~2,000 GPU-accelerated simulations.
- **Subhalo evolution**: Augmented `SatGen` with a DASH-calibrated tidal evolution model. Quantifying adverse impact of numerical artifacts that plague state-of-the-art cosmological simulations.
- **Galaxy cluster masses**: Used mock X-ray observations of simulated clusters to develop a precise mass estimator to be applied to *eROSITA* survey. Reduced mass scatter by 20% relative to benchmark using an ensemble learning approach. Employed stratified k-fold cross-validation and optimized hyperparameters using grid-search CV.
- **Persistent homology**: Co-author of the SCHU method for identifying cosmic voids and filament loops in cosmological simulations/surveys, which assigns a statistical significance to each object using persistence diagrams and bootstrap sampling.
- **Cluster pressure profiles**: Developed a Monte Carlo-based physical model of turbulence evolution in the intra-cluster medium, which was used to illuminate the source of a large fraction of scatter in cluster mass estimates.

The University of North Carolina at Chapel Hill Chapel Hill, NC
Undergraduate Research Assistant *Aug. 2014 – May 2017*

- **Microhalos**: Thesis awarded highest honors. Ran and analyzed large N-body simulations using a distributed computing system. Wrote visualization routines. Worked with k-NN density estimation. Built analytical models.

PUBLICATIONS [SCHOLAR][ADS][ARXIV][ORCID]

Author of 9 academic research articles with an h-index of 4 and 54 total citations (from NASA ADS)

- **Green S. B.** et al., 2020, MNRAS, 496, 2743
- **Green S. B.** et al., 2019, ApJ, 884, 33
- **Green S. B.**, vdBosch F. C., 2019, MNRAS, 490, 2091
- **Green S. B.** et al., 2019, CHANCE, 32:3, 6

HONORS AND AWARDS

- NSF Graduate Research Fellowship (2019)
- Yale McDougal Teaching Fellowship (2019)
- UNC Shearin Outstanding Senior Award in Physics (2017)
- NOAA Ernest F. Hollings Scholarship (2015)

COMPETITIONS

- **Citadel Data Open 2020**: Awarded third place (of 39 teams) in the East Coast Regional Virtual Datathon, September 14–21, 2020.

TEACHING AND ADVISING EXPERIENCE

- **Graduate Teaching Fellow (2017 – 2020)**: Taught mechanics and electronics labs for 8 terms; received highly positive evaluations.
- **Research Advisor**: Supervised 3 undergraduate research projects, leading one to publication.
- **McDougal Teaching Fellow (2019 – 2020)**: Led workshops on advanced topics in pedagogy at Yale CTL. Will graduate with a Certificate of College Teaching Preparation.

SELECTED COURSEWORK

Bayesian Probability and Statistics, Linear Algebra, Real Analysis, Mathematical Methods of Physics, Financial Markets, Data Structures, Systems Programming and Computer Organization (enrolled), Database Systems (enrolled)

TECHNICAL SKILLS

- **Programming**: Advanced: Python; Intermediate: C/C++, LaTeX, Bash; Novice: SQL
- **Scientific Computing**: UN*X, Slurm, Numpy, SciPy, matplotlib, scikit-learn, Keras, Numba, pandas, seaborn, git
- **Research**: Numerical simulations, analytical modeling of physical systems, persistent homology, ensemble regression

Updated September 22, 2020