Scott G. Carlsten

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EDUCATION

Princeton University, Princeton, NJ

- **M.A. Astrophysics** **May 2019**
- **Ph.D. Astrophysics** **expected May 2022**
  Honors: National Science Foundation Graduate Research Fellow, GPA 4.0/4.0, Dissertation topic: *Evolution of Faint Nearby Galaxies.*

Rice University, Houston, TX

- **B.S. Astrophysics,** *summa cum laude with distinction in research* **May 2017**
  Honors: Max Roy Fellow (*4-year full academic scholarship*), Bonner Award (*outstanding physics junior*), Heaps Prize (*outstanding senior thesis*), Dessler Prize (*top astrophysics graduate*), Physics GRE perfect score (*990/990*).

PROFESSIONAL EXPERIENCE

Princeton University, Princeton, NJ
NSF Graduate Research Fellow
Principal Investigator of the ELVES Survey (*Exploration of Local VolumE Satellites*) 2019 – present

- Conceived, planned, and led an innovative survey of faint nearby galaxies. I coordinated a multi-institution team, wrote grant applications for telescope time, analyzed and interpreted data, and prepared final written and oral reports.
- Developed python code to implement novel image processing techniques enabling identification of these rare galaxies in large (terabyte-scale) datasets – leading to a several times (4x) increase in known samples of these faint galaxies, thereby facilitating numerous scientific analyses. (See Publications below.)

Princeton University, Princeton, NJ
Graduate Research Assistant 2017 – 2019

- Calibrated and further developed an important method of measuring distances to faint, "dwarf" galaxies. That is, I subjected noisy imaging data to Fourier analysis, resulting in significantly (>5x) cheaper distance measurements (in terms of telescope usage) than those previously employed.
- Developed a strategy to mitigate a source of systematic error caused by turbulence in the atmosphere. This systematic error would likely have prevented large next-generation observatories being constructed during the next decade from achieving their design specifications. I tested the strategy using data from a current survey, demonstrating that new observatories can use the mitigation to attain their design performance specifications.

Rice University, Houston TX
Research Assistant 2015 – 2017
Conducted independent research projects in star formation and cosmology, both leading to publications:

- Characterized a novel observational diagnostic for the physical conditions in star-forming regions that can be easily observed by next-generation space telescopes.
- Helped create a new means of calculating the effect of unknown physics in the very early universe on cosmological observables, facilitating new learning about this previously inaccessible period in the universe.

Cerro Tololo Inter-American Observatory, Atacama Desert, Chile
NSF Undergraduate Intern January – May 2015

- Analyzed spectroscopic data of rare "shell" galaxies and compared that with computer simulations to distinguish between two competing theories of how these galaxies formed. (See Publications below.)

Los Alamos National Laboratory. Los Alamos, NM
Summer Intern Summer 2014

- Assisting one of the Senior Physicists, I wrote MATLAB code to rapidly stream data off of a digitizer board and developed algorithms for the parallel processing of radio-frequency data.

SKILLS

Programming: python (numpy, scipy) [5+ years], MATLAB [2 years], C++ [1 year]. Familiar with SQL, bash, and Linux.

Quantitative Skills: Statistical inference, Bayesian analysis, differential equations, Fourier analysis, Monte Carlo simulations, uncertainty quantification.

Written & Verbal Communication: Ten first author papers in top refereed journals with five co-authored papers (see below). Ten+ conference and seminar talks; presentations at weekly group meetings; participated in biannual seminars in effective science communication (2017- present).

REFEREED PUBLICATIONS

First Author (n=10):

- Carlsten, S., Greene, J., Beaton, R., Greco, J. 2021. "ELVES II: GCs and Nuclear Star Clusters of Dwarf Galaxies; The Importance of Environment." *Submitted to the Astrophysical Journal.*
- Carlsten, S., Greene, J., Greco, J., Beaton, R., Kado-Fong, E. 2021. "ELVES I: Structures of Dwarf Satellites of MW-like Galaxies; Morphology, Scaling Relations, and Intrinsic Shapes." *Submitted to the Astrophysical Journal.*
- Carlsten, S., Greene, J., Peter, A., Beaton, R., Greco, J. "Luminosity Functions and Host-to-host Scatter of Dwarf Satellite Systems in the Local Volume." *Astrophysical Journal*, 2021, 908, 109.
- Carlsten, S., Greene, J., Peter, A., Greco, J., Beaton, R. "Radial Distributions of Dwarf Satellite Systems in the Local Volume." *Astrophysical Journal,* 2020, 902, 124.
- Carlsten, S., Greco, J., Beaton, R., Greene, J. "Wide-field Survey of Dwarf Satellite Systems around 10 Hosts in the Local Volume." *Astrophysical Journal,* 2020, 891, 144.
- Carlsten, S., Beaton, R., Greco, J., Greene, J. "Using Surface Brightness Fluctuations to Study Nearby Satellite Galaxy Systems: Calibration and Methodology." *Astrophysical Journal*, 2019, 879, 13.
- Carlsten, S., Beaton, R., Greco, J., Greene, J. "Using Surface Brightness Fluctuations to Study nearby Satellite Galaxy Systems: The Complete Satellite System of M101." *Astrophysical Journal Letters*, 2019, 878, L16.
- Carlsten, S., Hartigan, P. "Photoevaporation of Molecular Clouds in Regions of Massive Star Formation as Revealed through H_2 and Brγ Emission." *Astrophysical Journal,* 2018, 869, 77.
- Carlsten, S., Strauss, M., Lupton, R., Meyers, J., Miyazaki, S. "Wavelength-dependent PSFs and Their Impact on Weak Lensing Measurements." *Monthly Notices of the Royal Astronomical Society*, 2018, 479, 149.
- Carlsten, S., Hau, G., Zenteno, A. "Stellar Populations of Shell Galaxies." *Monthly Notices of the Royal Astronomical Society,* 2017, 472, 2889.

Co-author (n=5):

- Greco, J., van Dokkum, P., Danieli, S., Carlsten, S., Conroy, C. "Measuring Distances to Low-luminosity Galaxies Using Surface Brightness Fluctuations." *Astrophysical Journal,* 2021, 908, 24.
- Wang, W., Takada, M., Li, X., Carlsten, S., Lan, T-W., Shi, J., Miyatake, H., More, S., Beaton, R., Lupton, R., Lin, Y-T., Qiu, T., Luo, W. "A Comparative Study of Satellite Galaxies in Milky Way-like Galaxies from HSC, DECaLS, and SDSS." *Monthly Notices of the Royal Astronomical Society,* 2021, 500, 3779.
- Homma, D., Chiba, M., Komiyama, Y., Tanaka, M., Okamoto, S., Tanaka, M., Ishigaki, M., Hayashi, K., Arimoto, N., Carlsten, S., Lupton, R., Straus, M., Miyazaki, S., Torrealba, G., Wang, S-Y., Murayama, H. "Boötes. IV. A new Milky Way Satellite Discovered in the Subaru Hyper Suprime-Cam Survey and Implications for the Missing Satellite Problem." *Publications of the Astronomical Society of Japan*, 2019, 71, 94.
- Johnson, S., Mulchaey, J., Chen, H-W., Wijers, N., Connor, T., Muzahid, S., Schaye, J., Cen., Y, Carlsten, S., Charlton, J., Drout, M., Goulding, A., Hansen, T., Walth, G. "The Physical Origins of the Identified and Still Missing Components of the Warm-Hot Intergalactic Medium: Insights from Deep Surveys in the Field of Blazar 1ES1553+113." *Astrophysical Journal Letters*, 2019, 884, L31.
- Garcia, M., Amin, M., Carlsten, S., Green, D. "Stochastic Particle Production in a de Sitter Background." *Journal of Cosmology and Astroparticle Physics,* 2019, 05, 012.

SELECT TALKS AND PRESENTATIONS

- Institute for Advanced Study, Princeton, NJ (invited)	5/2021
- Kavli Institute for the Physics and Mathematics of the Universe, Tokyo, Japan (virtual, invited)	10/2020
- Space Telescope Science Institute Spring Symposium, Baltimore, MD (virtual, contributed)	8/2020
- Kavli Institute for Theoretical Physics, Santa Barbara, CA (virtual, invited)	8/2020
- Cambridge University, Cambridge, UK (virtual, invited)	6/2020
- Subaru Telescope 20th Anniversary Conference, Waikoloa, HI (contributed)	11/2019
- Columbia University, New York, NY (invited)	11/2019