Dr. Nicholas Galitzki

CONTACT INFORMATION

Department of Physics
University of California San Diego
9500 Gilman Dr. #0424
La Jolla, CA, 92093-0424

RESEARCH INTERESTS

Experimental cosmology, astrophysical instrumentation, data analysis, polarimetry, cosmic microwave background, interstellar medium, dust, cryogenics, balloon-borne telescopes

EDUCATION

The University of Pennsylvania, Philadelphia, PA
Ph.D., Physics and Astronomy **May 2016**

- *Magnetic Fields in Molecular Clouds: The BLASTPol[1] and BLAST-TNG[2] Experiments*
- Adviser: Prof. Mark Devlin

California Institute of Technology, Pasadena, CA
B.S., Astrophysics **June 2008**

RESEARCH EXPERIENCE

University of California San Diego, La Jolla, CA
Simons Observatory Postdoctoral Fellow **Sept. 2016 - Present**

- Simons Observatory cryogenic camera design, integration, and testing.
- Simons Observatory systematic studies, data acquisition, and analysis.
- Simons Array design, field deployment, and calibration.

University of Pennsylvania, Philadelphia, PA
Graduate Student **Sept. 2010 - May 2016**

- BLAST-TNG design, construction, and testing.
- BLASTPol data reduction and analysis.
- BLASTPol commissioning, testing, and Antarctic launch.

California Institute of Technology, Pasadena, CA
Undergraduate Researcher **Jun. 2006 - Jun. 2008**

- Developed a radio interferometer for atmospheric characterization.

Jet Propulsion Laboratory, Pasadena, CA
Summer Undergraduate Research Fellowship **Jun. 2005 - Sept. 2005**

- Developed a lunar based seismometer for the detection of strange quark matter.

FELLOWSHIPS AND AWARDS

University of Pennsylvania, Philadelphia, PA
School of Arts and Sciences Dissertation Completion Fellowship **Sept. 2015-May 2016**

- Fellowship fully funds student for the final year of their dissertation.
- One student is nominated from the department each year.

American Astronomical Society (AAS)
Astronomy Ambassador **Jan. 2015 - Present**

- Awarded in partnership with the Astronomical Society of the Pacific (ASP).
- AAS Ambassador status maintained through continued Astronomy outreach work.

MENTORING EXPERIENCE

University of California San Diego, La Jolla, CA
Graduate Students

Michael Randall, *Simons Observatory* **June 2019 - Present**
Jacob Spisak, *Simons Observatory* **June 2018 - Present**
Ningfeng Zhu, *Graduate at UPenn, Simons Observatory* **Jan. 2018 - Present**

[1] BLASTPol: The Balloon-borne Large Aperture Sbumillimeter Telescope for Polarimetry
[2] BLAST-TNG: The Balloon-borne Large Aperture Submillimeter Telescope - The Next Generation

- My mentee as part of the Simons Observatory Mentorship Program.

Tran Tsan, *Simons Observatory* **Sept. 2017 - Present**
Joseph Seibert, *Simons Observatory* **Sept. 2017 - Present**
Maximiliano Silva-feaver, *Simons Observatory* **Sept. 2016 - Present**

Research Assistants

Christopher Ellis, *Simons Observatory* **June 2019 - Present**
Kevin Crowley, *Simons Observatory* **Sept. 2016 - June 2018**
- Currently a physics graduate student at Princeton University

Undergraduate Researchers

Hakob Abajian **June 2019 - Present**
Tamar Ervin **July 2019 - Sept. 2019**
Logan Foote **June 2019 - Aug. 2019**

University of Pennsylvania, Philadelphia, PA
Mark Giovinazzi, *Undergraduate, BLAST-TNG* **Jan. 2015 - May 2016**
- Currently a physics and astronomy graduate student at the University of Pennsylvania

Timothy McSorley, *Undergraduate, BLAST-TNG* **Jan. 2015 - May 2016**
- Currently a physics and astronomy graduate student at the University of California Irvine

Recent Professional Talks

Invited, Cardiff University Seminar, Cardiff, UK **Sept. 2019**
Forethought for foregrounds: Next steps in precision cosmology with the Simons Observatory and BLAST-TNG

Invited, Midwest Magnetic Fields Meeting 2019, Madison, WI **May 2019**
Dust polarimetry of the interstellar medium with the Simons Observatory and BLAST-TNG

Invited, 13th Conference on the Intersections of Particle and Nuclear Physics, Palm Springs, CA **May 2018**
The Simons Observatory: Project Overview

Invited, The Oasis Institute, San Diego, CA **May 2019**
Exploring the Origins of the Universe: The Big Bang

233rd Meeting of the American Astronomical Society, Seattle, WA **Jan. 2019**
BLAST-TNG: Amtarctic pre-flight integration

Invited, University of Southern California Colloquium, Los Angeles, CA **Sept. 2018**
Forethought for foregrounds: Next steps in precision cosmology

SPIE Astronomical Telescopes + Instrumentation, Austin, TX **Jun. 2018**
The Simons Observatory: Instrument Overview

Professional Service

UCSD Physics Department **Aug. 2018 - Present**
Education and Public Outreach Committee member

Simons Observatory Collaboration **Sept. 2017 - Present**
Small aperture telescope, work breakdown structure Level 3 leader

Simons Observatory Collaboration **Sept. 2016 - Present**
Education and public outreach committee co-leader

CMB-S4 Collaboration Meeting **Oct. 2019**
Local organizing committee member

Simons Observatory Collaboration Meeting **Jun. 2017**
Local organizing committee member

NASA **Jun. 2017**
Review panel member

Simons Observatory Collaboration **Sept. 2016 - Sept. 2017**
Cryogenics working group co-leader

Polarbear Collaboration **Sept. 2016 - Jun. 2017**
Remote observer for Polarbear-1 observations.

Polarbear Collaboration **Oct. 2016**
Internal reviewer for a publication

Professional Membership

CMB-S4 Collaboration, Member **2018 - Present**

Simons Observatory Collaboration, Member **2016 - Present**

Polarbear Collaboration, Member **2016 - Present**

American Astronomical Society, Member **2015 - Present**

SPIE: The international society for optics and photonics, Member **2014 - Present**

BLAST Collaboration, Member **2012 - Present**

Teaching Experience

The Center for Engaged Teaching, La Jolla, CA

Introduction to College Teaching **Oct. 2017 - Dec. 2017**

- 9 week course to develop expertise in evidence-based effective teaching practices that support student learning.
- Course culminates in the development and presentation of a lesson plan that includes active learning components.

The Netter Center, Philadelphia, PA

The Netter Center Astronomy Curriculum Chair **Aug. 2015 - May 2016**

- Developed a 12 Lesson Astronomy Curriculum for an under-served inner-city high school.
- Course included organizing lessons, and facilitating demonstrations.
- Mentoring of several undergraduate student volunteers who will assist in teaching the course.

iPraxis, Philadelphia, PA

iPraxis Afterschool Class Mentor **Jan. 2015-May 2015**

- A reverse engineering class for inner-city middle school students.
- Involved creating lessons and activities to help students understand how basic toys and mechanical/electrical devices worked.

University of Pennsylvania, Philadelphia, PA

Teaching Assistant **Jan. 2013-May 2013**

- Phys 101: General Physics: Mechanics, Heat, and Sound
  - Undergraduate course in physics.
  - Responsibilities included leading a weekly recitation section, grading, and office hours.
  - Instructor: Prof. Mark Devlin

Teaching Assistant **Aug. 2011-Dec. 2011, Jan. 2012-May 2012, Aug. 2012- Dec. 2012, Aug. 2013- Dec. 2013**

- Astr 001: Survey of the Universe
  - Undergraduate course in basic astronomy for non-science majors.
  - Responsibilities included grading and office hours.
  - Instructor: Prof. Mark Devlin

Center for Teaching and Learning **Aug.2012**

- Teaching Assistant Training Workshop Leader
  - Developed lessons on teaching methodology in months prior to workshop.
  - Taught lessons and interactive sessions over one week period prior to start of semester.
  - Responsible for training new teaching assistants for the School of Arts and Sciences.

Teaching Assistant **Aug. 2010-Dec. 2010**

- Phys 101 and Phys 102 - Laboratory
  - Undergraduate lab courses in physics, concentrating on subjects in mechanics, electricity, and magnetism.

- Responsibilities included preparing laboratory lectures and demonstrations, supervising student lab groups, and grading lab reports.
- Lab supervisor: Dr. Robert Johnson

Laboratory Experience

Software:

- *SolidWorks*: Extensive experience with design and simulation.
- *COMSOL Multiphysics*: Experience with mechanical and thermal simulation software.
- *GrabCAD*: Organizational and administrative experience with versioning control software within several collaborations.
- *Microsoft Project*: Significant work constructing and managing project gantt charts.
- *Jira*: Utilized to coordinate the research activities of the graduate students I mentor.
- *Zemax*: Experience with optical design and simulation.
- Experience with Excel, MATLAB, and Mathematica.

Instrumentation, Control, Data Acquisition, Test, and Measurement:

- Extensive cryogenic experience with sub-kelvin systems including dilution refrigerators as well as liquid cryogen handling.
- Experience with FARO Laser Trackers for surface accuracy and alignment measurements.
- Significant experience with Fourier transform spectrometers for bandpass measurements.
- Experience with LabVIEW control programs.

Data analysis:

- *TOAST*: Experience with map making software designed for time ordered data processing used in both SO and BLAST-TNG.
- *Python*: Extensive use for data analysis and observatory control software.
- *C++ and Perl*: Implemented for instrument control programs and data reduction.
- *UNIX shell scripting*: General experience for a variety of applications.
- *Jython*: Experience for use with the Herschel ESA instrument data reduction tools.

Public Outreach

University of California San Diego

Astronomy on Tap San Diego Co-Lead **Aug. 2017 - Present**

- Organize public talks and solicit speakers with my co-lead, Lisa Will, at local venues for the general public.

Comicon panel member, "Putting more science in your fiction" **July 2017, July 2018, July 2019**

- Fielded questions from members of the public attending the convention.

San Diego Festival of Science and Engineering - Sponsored Booth **March 2017, March 2018, March 2019**

- Primary organizer for our department's booth.
- Booth had multiple demonstrations carried out by volunteer faculty and graduate students.

Skype a Scientist **Jan. 2017 - Jan. 2018**

- Scientists and classrooms are connected to allow students to ask questions about the scientist's research.
- Has facilitated interactions with over 100 students to date.

UCSD Cosmology - Lab Tours **Sept. 2016 - Present**

- Tours occur on average once a month.
- Groups have 5 to 80 students with an age range from middle-school to community college.

Fleet Science Center - #2Scientists **Sept. 2016 - Present**

- An event hosted at local bars that occurs once per quarter.
- Members of the public ask us a wide range of science questions.

San Diego area public talks **Sept. 2016 - Present**

- Occur once per quarter on average.
- Venues have included bars, science festivals, and local astronomy association functions.

San Diego Astronomy Association - Active member **Sept. 2016 - Present**

- Participate in observing nights open to the public.

Simons Observatory

Education and Public Outreach Committee - Mentorship program **Oct. 2017 - Present**

- The program matches senior members of the collaboration with junior members to provide advice and assist with career goals.

Fleet Science Center - Cosmology and Cocktails **June 2017**

- Organized a panel event followed by mingling with the public at the Fleet Science Center.
- Event included over 50 members of the collaboration with over 500 attendees.

Popscope

Public Astronomy Nights **March 2015 - Present**

- Sidewalk astronomy program to bring telescope observing to diverse communities.
- Involves transporting telescopes to public spaces and organizing observations of common night sky targets.

University of Pennsylvania

Department of Physics and Astronomy - Public Astronomy Nights **Sept. 2011 - May 2016**

- Open night for the public held each semester with demonstrations, a lecture, and observing.

Philadelphia Science Festival - Science Carnival Sponsored Booth **May 2015, May 2016**

- Organized the Department of Physics and Astronomy's demonstration booth.
- Selected for sponsorship by the University of Pennsylvania.
- Booth had multiple activity stations at the carnival which is attended by thousands of people.

Philadelphia Science Festival - Clark Park Discovery Days **April 2015, April 2016**

- Organizer for the Department of Physics and Astronomy's demonstration booth.
- An event held at a Philadelphia park to provide science outreach to the local community.

The Franklin Institute - Passport to the Universe **Aug. 2015**

- Organizer for the four demonstration tables run by graduate student volunteers.
- Program tailored to children and families.

Pennsylvania Science Olympiad - Urban Schools Initiative
Philadelphia Regional Science Olympiad Competition **March 2015**

- Volunteered with the Science Olympiad competition for urban under-served schools.
- Assisted in organizational and judging responsibilities.

REFEREED PUBLICATIONS

[1] Namikawa, T. et al., *Evidence for the Cross-correlation between Cosmic Microwave Background Polarization Lensing from Polarbear and Cosmic Shear from Subaru Hyper Suprime-Cam*, 2019, *ApJ*, 882, doi:10.3847/1538-4357/ab3424

[2] Fissel, L. M. et al., *Relative Alignment Between the Magnetic Field and Molecular Gas Structure in the Vela C Giant Molecular Cloud using Low and High Density Tracers*, 2019, *ApJ*, 878, doi:10.3847/1538-4357/ab1eb0

[3] Shariff, J. A. et al., *Submillimeter Polarization Spectrum of the Carina Nebula*, 2019, *ApJ*, 872, doi:10.3847/1538-4357/aaff5f

[4] Navaroli, M. F., Teply, G. P., Crowley, K. D., Kaufman, J. P., **Galitzki**, N. B., Arnold, K. S., Keating, B. G., *Design and characterization of a ground-based absolute polarization calibrator for use with polarization sensitive CMB experiments*, 2019, *Journal of Astronomical Instrumentation*, Volume 8, Issue 2, ID 1950006, doi:10.1142/S2251171719500065

[5] The Simons Observatory Collaboration et al., *The Simons Observatory: Science goals and forecasts*, 2019, *JCAP*, Issue 02, ID 056, doi:10.1088/1475-7516/2019/02/056

[6] Westbrook, B. et al., *The POLARBEAR-2 and Simons Array Focal Plane Fabrication Status*, 2018, *JLTP*, Volume 193, Issue 5-6, doi:10.1007/s10909-018-2059-0

[7] Ashton, P. et al., *First Observation of the Submillimeter Polarization Spectrum in a Translucent Molecular Cloud*, 2018, *ApJ*, 857, doi:10.3847/1538-4357/aab3ca

[8] Soler, J. D. et al., *The relation between the column density structures and the magnetic field orientation in the Vela C molecular complex*, 2017, *A&A*, 603, idA64, doi:10.1051/0004-6361/201730608

[9] Takakura, S. et al., *Performance of a continuously rotating half-wave plate on the POLARBEAR telescope*, 2017, *JCAP*, 05, 008, doi:10.1088/1475-7516/2017/05/008

[10] The POLARBEAR Collaboration et al., *A Measurement of the Cosmic Microwave Background B-Mode Polarization Power Spectrum at Sub-Degree Scales from 2 years of POLARBEAR Data*, 2017, *ApJ, 848, doi:10.3847/1538-4357/aa8e9f*

[11] Santos, F. P. et al., *Comparing Submillimeter Polarized Emission with Near-infrared Polarization of Background Stars for the Vela C Molecular Cloud*, 2017, *ApJ, 837*, doi:10.3847/1538-4357/aa62a7

[12] Gandilo, N. N. et al., *Submillimeter Polarization Spectrum in the Vela C Molecular Cloud*, 2016, *ApJ*, 824, 84 doi:10.3847/0004-637X/824/2/84

[13] Fissel, L. M. et al., *Balloon-borne Submillimeter Polarimetry of the Vela C Molecular Cloud: Systematic Dependence of the Polarization Fraction on Column Density and Local Polarization-Angel Dispersion*, 2016, *ApJ*, 824, 134 doi:10.3847/0004-637X/824/2/134

[14] **Galitzki**, N. et al., *The Next Generation BLAST Experiment*, 2014, *Journal of Astronomical Instrumentation*, Volume 3, Issue 2, ID: 1440001, doi:10.1142/S2251171714400017

[15] Chui, T. et al., *Cryogenics for Lunar Exploration*, 2006, *Cryogenics*, Volume 46, Issue 2-3, p. 74-81, doi:10.1016/j.cryogenics.2005.10.006

PUBLICATIONS IN REVIEW

[16] Adachi, S. et al., *A Measurement of the Degree Scale CMB B-mode Angular Power Spectrum with POLARBEAR*, 2019, *Submitted to ApJ*, in revision, arxiv:1910.02608

[17] Aguilar Faundez, M. et al., *Cross-correlation of POLARBEAR CMB Polarization Lensing with High- z Sub-mm Herschel-ATLAS galaxies*, 2019, *Submitted to ApJ*, in revision, arxiv:1903.07046

CONFERENCE PROCEEDINGS AND WHITE PAPERS

[18] Abazajian, K. et al., *CMB-S4 Decadal Survey APC White Paper*, 2019, arxiv:1908.01062

[19] The Simons Observatory Collaboration et al., *The Simons Observatory: Astro2020 Decadal Project Whitepaper*, 2019, arxiv:1907.08284

[20] Abazajian, K. et al., *CMB-S4 Science Case, Reference Design, and Project Plan*, 2019, arxiv:1907.04473

[21] **Galitzki**, N. et al., *The Simons Observatory: Project overview and status*, 2019, *AAS*, 233

[22] **Galitzki**, N. et al., *BLAST-TNG Antarctic Pre-Flight Integration*, 2019, *AAS*, 233

[23] **Galitzki**, N. et al. *The Simons Observatory: instrument overview*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312985

[24] **Galitzki**, N. on behalf of the Simons Observatory Collaboration, *The Simons Observatory: Project Overview*, 2018, *Proc. of CIPANP*, arxiv:1810.02465

[25] Salatino, M. et al. *Studies of systematic uncertainties for Simons Observatory: polarization modulator related effects*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312993

[26] Hill, C. A. et al. *BoloCalc: a sensitivity calculator for the design of Simons Observatory*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2313916

[27] Gallardo, P. A. et al. *Systematic uncertainties in the Simons Observatory: optical effects and sensitivity considerations*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312971

[28] Orlowski-Scherer, J. L. et al. *Simons Observatory large aperture receiver simulation overview*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312868

[29] Navaroli, M. F., Teply, G. P., Crowley, K. D., Kaufman, J. P., **Galitzki**, N. B., Arnold, K. S., Keating, B. G., *Design and characterization of a ground-based absolute polarization calibrator for use with polarization sensitive CMB experiments*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312856

[30] Zhu, N. et al. *Simons Observatory large aperture telescope receiver design overview*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312871

[31] Coppi, G. et al. *Cooldown strategies and transient thermal simulations for the Simons Observatory*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2312679

[32] Vavagiakis, E. M. et al. *Prime-Cam: a first-light instrument for the CCAT-prime telescope*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2313868

[33] Lourie, N. P. et al. *Preflight characterization of the BLAST-TNG receiver and detector arrays*, 2018, *Proc. of SPIE*, 10708, doi:10.1117/12.2314396

[34] Dicker, S. R. et al. *Cold optical design for the large aperture Simons' Observatory telescope*, 2018, *Proc. of SPIE*, 10700, doi:10.1117/12.2313444

[35] Lourie, N. P. et al. *Design and characterization of a balloon-borne diffraction-limited submillimeter telescope platform for BLAST-TNG*, 2018, *Proc. of SPIE*, 10700, doi:10.1117/12.2314380

[36] Fissel, L. M. et al. *BLAST-TNG: A Next Generation Balloon-borne Large Aperture Submillimeter Polarimeter*, 2017, *AAS*, 229

[37] Ashton, P. C. et al. *The First Observation of the Submillimeter Polarization Spectrum in a Low-A_V Molecular Cloud*, 2017, *AAS*, 229

[38] **Galitzki**, N. et al. *Instrumental performance and results from testing of the BLAST-TNG receiver submillimeter optics, and MKID arrays*, 2016, *Proc. of SPIE*, 9914, doi:10.1117/12.2231167

[39] Dober, B. et al. *Optical Demonstration of THz, Dual-Polarization Sensitive Microwave Kinetic Inductance Detectors*, 2016, *JLTP*, 184, doi:10.1007/s10909-015-1434-3

[40] Fissel, L. M. et al. *Mapping Magnetic Fields in Star Forming Regions with BLASTPol*, 2016, *AAS*, 227

[41] Setiawan, H. et al. *The Half Wave Plate Rotator for the BLAST-TNG Balloon-Borne Telescope*, 2016, *AAS*, 227

[42] **Galitzki**, N. et al. *Submillimeter Dust Polarimetry with the BLAST-TNG Telescope*, 2015, *AAS*, 225

[43] Fissel, L. M. et al. *Detailed Magnetic Field Morphology of the Vela C Molecular Cloud from the BLASTPol 2012 flight*, 2015, *AAS*, 225

[44] Santos, F. P. et al. *Comparing polarized submm emission and near-infrared extinction polarization in the Vela C giant molecular cloud*, 2015, *AAS*, 225

[45] **Galitzki**, N. et al. *The Balloon-borne Large Aperture Submillimeter Telescope for Polarimetry-BLASTPol: Performance and Results from the 2012 Antarctic Flight*, 2014, *Proc. of SPIE*, 9145, doi:10.1117/12.2054759

[46] Dober, B. J. et al. *The next-generation BLASTPol experiment*, 2014, *Proc. of SPIE*, 9153, doi:10.1117/12.2054419

[47] Soler, J. D. et al. *Thermal design and performance of the balloon-borne large aperture submillimeter telescope for polarimetry BLASTPol*, 2014, *Proc. of SPIE*, 9145, doi:10.1117/12.2055431

[48] Gandilo, N. N. et al. *Attitude determination for balloon-borne experiments*, 2014, *Proc. of SPIE*, 9145, doi:10.1117/12.2055156

[49] Benton, S. J. et al. *BLASTbus electronics: general-purpose readout and control for balloon-borne experiments*, 2014, *Proc. of SPIE*, 9145, doi:10.1117/12.2056693

[50] Matthews, T. et al. *2010 BLASTPol Observations of the Magnetic Field of the Filamentary Galactic Cloud 'Lupus I'*, 2013, *AAS*, 222