Spencer Everett

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Summary of Qualifications

- 5+ years of observational cosmology research experience for SDSS, DES, and LSST
- Led a DES Task Force (Balrog) for 2+ years to characterize the photometric performance of DES Y3
- 6+ years experience using python and 2+ years using C++ for high performance scientific computing projects, primarily for developing cosmological survey pipeline infrastructure.
- 18 nights of observing experience on the 4m Victor Blanco Telescope at Cerro-Tololo International Observatory for DES.

Education

University of California, Santa Cruz — Santa Cruz, CA
Physics PhD; (MS conferred 2018) — *Sep 2016 - June 2021*

DePaul University — Chicago, IL
Bachelor of Science in Physics, Mathematics — *Sep 2012 - June 2016*

GPA: 4.0, graduated *summa cum laude*

Thesis: Line of Sight Lensing Mass Reconstructions in the Millennium Simulation

Research Experience

Graduate Student Researcher — Santa Cruz, CA
Department of Physics, University of California, Santa Cruz — *Jan 2017 - Present*

- Developed the synthetic object image injection pipeline `Balrog` for the DES Year 3 cosmological analysis to characterize the survey's transfer function, photometric performance, and facilitate calibration for various key projects including photometric redshifts and lens magnification.
- Created a very efficient C++ pipeline to handle the millions of high-dimensional integrations needed for the DES Year 3 clusters cosmology likelihood that simultaneously predicts cluster number counts and angular shear profiles.
- Characterized the centering performance of the redMaPPer cluster finder in DES Year 1 with archival X-ray observations of clusters from Chandra and validated with cross-sample from SDSS.

Undergraduate Researcher
SLAC National Accelerator Laboratory — *June 2015 - June 2016*

- Developed `Pangloss` software package to predict 3D mass maps inside lightcones using local shear & convergence measurements validated on 324 arcmin^2 of the Millennium Simulation

DePaul University — *June 2013 - June 2015*

- Detected evidence of baryonic acoustic oscillations (BAO) in the matter power spectrum from over 50,000 high redshift quasar spectra ($2.1 < z < 3.6$) in the Sloan Digital Sky Survey (SDSS) using wavelet analysis.

Major Presentations (Grad Only)

- **Plenary Talk**: "DES Y3 Balrog Results and Looking Ahead to Y6"; DES Collaboration Meeting, Remote (May 2020)
- Parallel Talk: "Balrog: Using Synthetic Object Injections for Cosmology in DES Year 3"; LSST-DESC Deblending Task Force, Remote (March 2020)
- **Plenary Talk**: "From Pixels to Redshifts; Using Balrog for Photometric Redshift Calibration"; DES Collaboration Meeting, University of Sussex (Nov 2019)
- **Plenary Talk**: "First results from Y3 Balrog Run1"; DES Collaboration Meeting, University of Pennsylvania (June 2019)
- Parallel Talk: "Using Y3 Balrog for Redshift and Magnification Calibrations"; DES Key Project Workshop, Universitat Autònoma de Barcelona (Mar 2019)
- Parallel Talk: "Updates and Preparations for Y3 Balrog Run"; DES Collaboration Meeting, Universidade Estadual de Campinas (Nov 2018)
- Parallel Talk: "Updates to Object Injection Pipeline from Y1 to Y3"; DES Key Project Workshop, University of Michigan (Oct 2018)
- Parallel Talk: "Developing a Joint Y3 Cluster Cosmology Model and New Coding Framework"; DES Collaboration Meeting, Texas A&M University (May 2018)
- Parallel Talk: "Characterizing redMaPPer Cluster Miscentering in DES Y1"; DES Collaboration Meeting, University of Queensland (Nov 2017)

Scholarships & Fellowships

- ARCS Fellowship (2020)
- Rev. Charles F. Shelby Endowed Physics Scholarship (2016)
- Briefs-Waters Memorial Scholarship (2016)
- James T. & Mary K. Schaefer Endowed Scholarship (2016)
- DePaul Dean's Undergraduate Research Fellowship (2015)
- DePaul Undergraduate Summer Research Fellowship (2013, 2014)
- James J Vasa Memorial Scholarship for Excellence in Physics (2013)
- DePaul Presidential Scholarship (2012)

Awards & Honors

- DES Builder since May 2019
- DePaul Physics Student of the Year (2016)
- DePaul Honors Student Conference Outstanding Presentation Award (2014)
- Dean's List (12 quarters, 2012-2016)

Observing Experience

- 18 nights on the 4m Victor Blanco Telescope at the Cerro-Tololo International Observatory (CTIO) for DES

Teaching and Academic Experience

Teaching Assistant Santa Cruz, CA
Department of Physics, University of California, Santa Cruz *Fall 2016, Spring 2017*

- Responsible for grading coursework and exams in addition to teaching and proctoring duties.
- Courses taught:
  Mathematical Methods in Physics II (Physics 116B, Spring 2017)
  Introductory Physics Laboratory I (Physics 6L, Fall 2016)

Teaching Assistant Chicago, IL
Department of Physics, DePaul University *Fall 2013 - Spring 2014*

- Responsible for grading coursework and exams in addition to teaching and proctoring duties.
- Courses taught:
  Introductory Physics I (PHY 170, Fall 2013)
  Introductory Physics II (PHY 171, Winter 2014)
  Introductory Physics III (PHY 172, Spring 2014)

Mathematics Instructor Chicago, IL
Mathnasium *Fall 2012 - Spring 2016*

- Taught students from pre-K to college on a variety of mathematical topics ranging from basic counting and arithmetic to calculus and group theory. Worked with 300+ students over four years.

Leadership, Service, and Outreach

Committee Member & Chair DES
DES Early Career Scientists (ECS) *Nov 2017 - Present, Chair May 2018 - June 2019*

- Organized four career panels & three professional development workshops, created a new onboarding procedure, and developed a mentoring program for DES.
- Increased administrative transparency by starting a regular "Town Hall" series with the DES director..

Facilitator Santa Cruz, CA
Physics Collaborative Group *Jan 2019 - Oct 2020*

- Led open tutorial sessions for introductory physics students in the inaugural quarter of the Physics Collaborative Group, and organized new remote sessions for the 20-21 academic year.

Scientist
DePaul University, DES Education & Public Outreach (EPO) *June 2015 - Present*

- Participation in multiple DES public outreach programs, including "Scientist of the Week", K-12 Q&A video series, and public forum at "Adler After Dark" at the Adler Planetarium
- Organized and hosted the DePaul physics department's Undergraduate Science Public Outreach event (2015).

Mentor Santa Cruz, CA
Society of Physics Students (SPS), Women in Physics and Astronomy (WiPA), Local group *Sep 2016 - Sep 2019*

- Mentored four UCSC physics undergraduate students through the local SPS & WiPA mentoring program. Currently co-advising three undergraduate students in the Jeltema Group at UCSC.

References

Tesla Jeltema tesla@ucsc.edu
PhD Advisor and Associate Professor; Department of Physics, University of California, Santa Cruz *(831)-459-2235*

Gary Bernstein garyb@physics.upenn.edu
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Staff Scientist; Jet Propulsion Laboratory *(626) 460-9834*

Publications

Lead Author:

[1] S. Everett et al. "Dark Energy Survey Year 3 Results: Measuring the Survey Transfer Function with Balrog". In: *arXiv e-prints*, arXiv:2012.12825 (Dec. 2020), arXiv:2012.12825. arXiv: 2012.12825 [astro-ph.CO].

Contributing Author: Being in the first tier of DES authors requires a significant contribution to the analysis and/or writing of the paper.

[2] T. M. C. Abbott et al. "Dark Energy Survey Year 1 Results: Cosmological constraints from cluster abundances and weak lensing". In: Phys. Rev. D 102.2, 023509 (July 2020), p. 023509.

[3] K. Eckert et al. "Noise from undetected sources in Dark Energy Survey images". In: MNRAS 497.3 (July 2020), pp. 2529–2539. DOI: 10.1093/mnras/staa2133. arXiv: 2004.05618 [astro-ph.IM].

[4] A. Farahi et al. "Mass variance from archival X-ray properties of Dark Energy Survey Year-1 galaxy clusters". In: MNRAS 490.3 (Dec. 2019), pp. 3341–3354. DOI: 10.1093/mnras/stz2689. arXiv: 1903.08042 [astro-ph.CO].

[5] Devon L. Hollowood et al. "Chandra Follow-up of the SDSS DR8 Redmapper Catalog Using the MATCha Pipeline". In: ApJS 244.2, 22 (Oct. 2019), p. 22. DOI: 10.3847/1538-4365/ab3d27. arXiv: 1808.06637 [astro-ph.CO].

[6] Y. Zhang et al. "Dark Energy Surveyed Year 1 results: calibration of cluster mis-centring in the redMaPPer catalogues". In: MNRAS 487.2 (Aug. 2019), pp. 2578–2593. DOI: 10.1093/mnras/stz1361. arXiv: 1901.07119 [astro-ph.CO].

[7] T. McClintock et al. "Dark Energy Survey Year 1 results: weak lensing mass calibration of redMaPPer galaxy clusters". In: MNRAS 482.1 (Jan. 2019), pp. 1352–1378. DOI: 10.1093/mnras/sty2711. arXiv: 1805.00039 [astro-ph.CO].

[8] J. Myles et al. "Dark Energy Survey Year 3 Results: Redshift Calibration of the Weak Lensing Source Galaxies". In: *arXiv e-prints*, arXiv:2012.08566 (Dec. 2020), arXiv:2012.08566. arXiv: 2012.08566 [astro-ph.CO].

[9] J. Elvin-Poole, J. Prat, et al. "Dark Energy Survey Year 3 results: Magnification modeling and measurement in galaxy clustering and galaxy-galaxy lensing". (In prep.)

[54] DES Collaboration et al. "Dark Energy Survey Year 3 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing". In: *arXiv e-prints*, arXiv:2105.13549 (May 2021), arXiv:2105.13549. arXiv: 2105.13549 [astro-ph.CO].

DES Builder Author: This special designation exists in DES by nomination to reward those who have contributed at least 2 full-time-equivalent (FTE) years on significant infrastructure contributions that facilitate the primary DES science goals. This allows builders to be included as coauthors on non-Key Project science papers that use DES data products and/or infrastructure tools given that the required 2 FTE years could have been spent on personal projects and publications. (Updated through October 2020)

[10] Y. Leung et al. "The Diffuse Light Envelope of Luminous Red Galaxies". In: *Research Notes of the American Astronomical Society* 4.10, 174 (Oct. 2020), p. 174. DOI: 10.3847/2515-5172/abbd8d. arXiv: 2005.13467 [astro-ph.GA].

[11] P. Vielzeuf et al. "Dark Energy Survey Year 1 Results: the lensing imprint of cosmic voids on the Cosmic Microwave Background". In: MNRAS (Oct. 2020). DOI: 10.1093/mnras/staa3231.

[12] M. dal Ponte et al. "Increasing the census of ultracool dwarfs in wide binary and multiple systems using Dark Energy Survey DR1 and Gaia DR2 data". In: MNRAS (Oct. 2020). DOI: 10.1093/mnras/staa3118. arXiv: 2001.11015 [astro-ph.SR].

[13] J. Muir et al. "DES Y1 results: Splitting growth and geometry to test ΛCDM". In: *arXiv e-prints*, arXiv:2010.05924 (Oct. 2020), arXiv:2010.05924. arXiv: 2010.05924 [astro-ph.CO].

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[15] Pedro H. Bernardinelli et al. "Testing the Isotropy of the Dark Energy Survey's Extreme Trans-Neptunian Objects". In: *The Planetary Science Journal* 1.2, 28 (Sept. 2020), p. 28. DOI: 10.3847/PSJ/ab9d80. arXiv: 2003.08901 [astro-ph.EP].

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[17] Yu-Ching Chen et al. "Candidate periodically variable quasars from the Dark Energy Survey and the Sloan Digital Sky Survey". In: MNRAS 499.2 (Sept. 2020), pp. 2245–2264. DOI: 10.1093/mnras/staa2957.

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[19] B. Henghes et al. "Machine Learning for Searching the Dark Energy Survey for Trans-Neptunian Objects". In: *arXiv e-prints*, arXiv:2009.12856 (Sept. 2020), arXiv:2009.12856. arXiv: 2009.12856 [astro-ph.EP].

[20] M. Hilton et al. "The Atacama Cosmology Telescope: A Catalog of > 4000 Sunyaev-Zel'dovich Galaxy Clusters". In: *arXiv e-prints*, arXiv:2009.11043 (Sept. 2020), arXiv:2009.11043. arXiv: 2009.11043 [astro-ph.CO].

[21] R. Morgan et al. "Constraints on the Physical Properties of GW190814 through Simulations Based on DECam Follow-up Observations by the Dark Energy Survey". In: ApJ 901.1, 83 (Sept. 2020), p. 83. DOI: 10.3847/1538-4357/abafaa. arXiv: 2006.07385 [astro-ph.HE].

[22] A. Palmese et al. "A Statistical Standard Siren Measurement of the Hubble Constant from the LIGO/Virgo Gravitational Wave Compact Object Merger GW190814 and Dark Energy Survey Galaxies". In: ApJ 900.2, L33 (Sept. 2020), p. L33. DOI: 10.3847/2041-8213/abaeff. arXiv: 2006.14961 [astro-ph.CO].

[23] M. Gatti et al. “Dark Energy Survey Year 3 results: cosmology with moments of weak lensing mass maps - validation on simulations”. In: MNRAS 498.3 (Aug. 2020), pp. 4060–4087. DOI: 10.1093/mnras/staa2680. arXiv: 1911.05568 [astro-ph.CO].

[24] E. J. Buckley-Geer et al. “STRIDES: Spectroscopic and photometric characterization of the environment and effects of mass along the line of sight to the gravitational lenses DES J0408-5354 and WGD 2038-4008”. In: MNRAS 498.3 (Aug. 2020), pp. 3241–3274. DOI: 10.1093/mnras/staa2563. arXiv: 2003.12117 [astro-ph.GA].

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[33] Hengxiao Guo et al. “Dark Energy Survey identification of a low-mass active galactic nucleus at redshift 0.823 from optical variability”. In: MNRAS 496.3 (June 2020), pp. 3636–3647. DOI: 10.1093/mnras/staa1803. arXiv: 2003.10457 [astro-ph.GA].

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