

# Abhishek Prakash

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## Highlights

- Achieved "**The Architect**" status for Sloan Digital Sky Survey-IV for substantial contribution towards building one of the largest astronomical surveys ever.
- **Core member** of three of the largest ongoing and future generation surveys, **SDSS-III/IV** (2012-present), **DESI** (2018), and **LSST** (2020).
- **Reviewer** for internationally reputed astrophysics journal. Carried out **unbiased and critical assessment** of incoming research articles
- **Excellence** in research output culminated in **Arts and Sciences graduate fellowship** by School of Arts and Sciences at the Univ. of Pittsburgh (2015,2016)
- Successfully developed, optimized, and implemented new methods for selecting the most massive galaxies, **leading target selection efforts** for multi-million dollar current and future state of the art surveys (SDSS-IV and DESI).
- Obtained the least error results, currently available in the field, to estimate the distances of galaxies by developing and optimizing machine learning algorithms (**Random forest regression, Scikit-learn**).
- Created multiple data-sets, using the expertise in cross-matching large catalogs, which were **observed successfully** as part of the survey SDSS-III/IV.
- **Improved sample efficiency by 20%** while leading a team of astronomers conducting visual analysis of the observed data.
- Identified bad regions in the sky using **mathematical and statistical modeling** to establish error estimates in observations (**multivariate regression**).
- **Led scientific publications** and conference presentation on behalf of the collaboration.
- Achieved desired results (**target selection, error modeling**) while working with collaborators all over the world, primarily, **North America, Europe, Asia, and South America**.
- Proven track record (target selection for SDSS-III/IV and DESI ) in **handling and reducing large data sets**.
- Creative problem solver (**data visualization and modelling**) and skilled in troubleshooting (IDL and python codes).
- Comfortable working on all platforms like, **Mac OS, Linux, and Windows**.

## Education

- **University of Pittsburgh** Pittsburgh, PA  
*Ph.D. (A. B. D.) Physics* *2011 - 2017(expected)*
  - Thesis: Studying the large scale structure of the universe through LRGs
  - Advisor: Jeffrey A. Newman
- **Ohio University** Athens, Ohio  
*2010 - 2011(Transferred to PITT)*
  - Project: Leptonic and Hadronic models of Fermi-detected Blazars
  - Advisor: Markus Boettcher

- **University of Hyderabad** Hyderabad, India  
*M.Sc. Physics* *2007 - 2009*
  - Master’s Thesis: Quantum Mechanics in non-commutative spacetime.
  - Specialization in High-Energy Physics
- **IGNOU** New Delhi  
*B.Sc. Physics* *2003 - 2007*
  - Graduated with Honors

## Skills

- **Machine Learning**
  - Scikit-Learn
  - Random Forrest regression
  - Artificial Neural Networks
  - Support Vector Machines
- **Statistical Data Analysis**
  - Multivariate Regression
  - Mathematical modelling.
  - Receiver Operating Characteristic (ROC)
  - Bayesian Statistics
- **Programming Languages and Packages**
  - Python (Numpy, Scipy, Matplotlib, Pylab, Astropy)
  - Interactive Data Language (IDL)
  - Latex, MS Office, Keynote, Pages
  - Scikit-Learn
- **Big data and programming tools**
  - SSH, SQL, SVN, Git)

## Awards & Honors

School of Arts and Sciences Graduate Fellowship . . . . . 2015, 2016  
SDSS-IV/eBOSS Architect Status, The Sloan Digital Sky Survey IV . . . . . 2015  
Buhl Academy Science Fellowship . . . . . 2014

## Broader Activities

- **Referee, The Astrophysical Journal** Pittsburgh, PA  
*Reviewed articles to be published in the ApJ* *2016*
- **SDSS-IV/eBOSS** Pittsburgh, PA  
*Co-President, Early Career Scientist group (ECS)* *2014 - 2016*
  - Organizing various workshops for young or new members of the collaboration
- **Buhl Academy** Pittsburgh, PA  
*Science Fellow* *2014 - 2015*
  - Teaching Astronomy to high school students as Buhl Academy Science Fellow. Visiting classroom and teaching a part of curriculum in collaboration with a faculty member.

- **University of Pittsburgh** Pittsburgh, PA  
*President, Association of Physics and Astronomy Graduate Students (APAGS)* 2014 - 2016
  - Organizing various events for providing help to graduate students in their teaching and research duties.

## Conference Talks

- SDSS-IV collaboration meeting- Wisconsin, USA, 27-29 June, 2016,
  - The SDSS IV: Luminous Red Galaxy clustering using photometric redshifts
- DESI collaboration meeting- Durham, UK, 20-23 June, 2016
  - Improving Luminous Red Galaxy target selection for DESI using eBOSS LRGs
- SDSS-IV/ eBOSS collaboration meeting- Salt Lake City, UT, USA, 1-3 June, 2015
  - Luminous Red Galaxy early data analysis and overview for eBOSS
- DESI meeting - Fermi National Accelerator Lab, 27-29 May, 2015
  - Lessons learned from eBOSS LRGs
- 225th AAS meeting - Seattle, WA, 4-8 January, 2015, BOSS special session
  - The Start of SDSS-IV and eBOSS
- 225th AAS meeting - Seattle, WA, 4-8 January, 2015, BOSS special session
  - SDSS-IV: Exploring Large-Scale structure at High-Redshift using eBOSS LRGs
- SDSS-III/BOSS & eBOSS collaboration meeting- Cloudcroft, NM, USA, 4-6 Dec, 2014
  - Luminous Red Galaxy target selection overview for eBOSS
- WFIRS2014, Pasadena, CA, 16-20 Nov. 2014
  - Luminous Red Galaxies: Selection using optical and WISE photometry
- SDSS-III/IV collaboration meeting- Park city, UT, USA, 27-29 July, 2014,
  - The SDSS IV: Luminous Red Galaxy target selection for eBOSS
- SDSS-IV/ eBOSS collaboration meeting- NYU, NY, USA, 13-15 March, 2014,
  - Luminous Red Galaxies: Early data analysis from SDSS-III/ SEQUELS
- 223rd AAS Meeting - Washington D.C., 5-9 January, 2014
  - Improved LRG Selection Algorithms combining Optical and WISE (Infrared) Photometry
- Neighborhood Workshop on Astrophysics & Cosmology, Pennsylvania State University, 4-5 April, 2013
  - Luminous Red Galaxies: Target Selection for eBOSS and BigBOSS

## Workshops

- Summer School in Statistics for Astronomers - Penn State, USA, May 31-June 4, 2016
- SciCoder 2015 - New York City, 7-12 June., 2015
- Summer School on Dark Energy and Galaxy Redshift Surveys - Corfu, Greece, 12-20 Sept., 2014
- Neighborhood Workshop on Astrophysics and Cosmology, Pennsylvania State University, 4-5 April, 2013
- Winter School on Astroparticle Physics - TIFR and Bose Institute, Darjeeling, India, 10-22 Dec., 2009

## Observing Experience

- MzLS imaging (DESI), Kitt Peak (April 16-19, 2016)
  - Instrument: 4 meter Telescope
- Quasar spectroscopy, Kitt Peak (January 2011)
  - Instrument: MDM Observatory, 2.4 meter Hiltner Telescope

## Publications

- The SDSS-IV: Luminous Red Galaxies Target Selection for the Extended Baryon Oscillation Spectroscopic Survey.
  - The Astrophysical Journal Supplement Series, 224:34, 2016 June
  - Authors:- Abhishek Prakash, Tim Licquia, Jeffrey Newman, and eBOSS collaboration.
- Luminous Red Galaxies: Selection and classification by combining optical and infrared photometry.
  - The Astrophysical Journal, 803:105, 2015 April 20
  - Authors:- Abhishek Prakash, Tim Licquia, Jeffrey Newman, and Sandhya Rao.
- Leptonic and hadronic modeling of Fermi-detected blazars. .
  - The Astrophysical Journal, 768:54, 2013 May 1
  - Authors:- Markus Boettcher, A. Reimer, K. Sweeney, and Abhishek Prakash.
- The SDSS-IV: Quasar Target Selection for the Extended Baryon Oscillation Spectroscopic Survey.
  - arXiv:1508.04472. Published in The Astrophysical Journal Supplement)
  - Authors:- Adam Myers, Nathalie Palanque-Delabrouille, Abhishek Prakash, and eBOSS collaboration.
- The Extended Baryon Oscillation Spectroscopic Survey: Overview and early data.
  - arXiv:1508.04473 Published in The Astronomical Journal)
  - Authors:- Kyle Dawson, Will Percival, Jean Paul Kneib, and eBOSS collaboration.
- The SDSS-IV eBOSS emission-line galaxy pilot survey.
  - arXiv:1509.05045. Accepted in (Astronomy & Astrophysics)
  - Authors:- Johan Comparat, Temothee Delubac, Stephney Jouvel et al.
- Redshift Measurement and Spectral Classification for eBOSS Galaxies with the Redmonster Software.
  - arXiv:1607.02432 Accepted for publication in The Astronomical Journal
  - Authors:- Timothy A. Hutchinson, Adam S. Bolton, Kyle S. Dawson, and eBOSS collaboration.
- The Eleventh and Twelfth Data Releases of the Sloan Digital Sky Survey: Final Data from SDSS-III.
  - The Astrophysical Journal Supplement, 219:12, 2015 July 27.
  - Authors:- Shadab Alam, Franco D. Albareti, Carlos Allende Prieto, and the SDSS-III collaboration
- The Thirteenth Data Release of the Sloan Digital Sky Survey: First Spectroscopic Data from the SDSS-IV Survey MAPPING Nearby Galaxies at Apache Point Observatory.
  - arXiv:1608.02013 Under review (The Astrophysical Journal Supplement)
  - Authors:- Franco D. Albareti, Carlos Allende Prieto, and the SDSS-IV collaboration