

### c. Early Achievements Track-record

Nicholas Ross is an STFC Ernest Rutherford Fellow at the University of Edinburgh whose research specializes in implementing algorithms and novel techniques to discover quasars, and studying the physical processes in these extreme extragalactic objects. After just over 7 years in the United States (working at Penn State, the Lawrence Berkeley National Lab and then as an Assistant Research Professor at Drexel University) Nic returned to the U.K. with the award of an STFC Ernest Rutherford Fellowship, the most senior personal astrophysics fellowship in the UK, which has an application oversubscription of ~20:1 and is over £500,000 (€630,000) on award.

Nic's research has involved using the datasets garnered from large astronomical surveys to achieve his science aims and goals. Nic's leadership including leading Science Teams such as the SDSS-III BOSS Quasar Science Working Group has led to him maintaining an extremely high publication output including over 115 peer-review journal articles with 1,000 citations and an *h*-index of 59. This is world-leading for any astrophysicist and virtually unparalleled in his field by his contemporaries at a similar career stage. A brief summary of Nic's research contributions is given below with an emphasis on areas specifically related to the current proposal.

Nic has been involved in the discovery of two new types of extragalactic objects. He discovered the **Extremely Red Quasars**, a unique obscured quasar population with extreme physical conditions related to powerful galaxy-scale outflows. Dr Ross also co-led the first systematic search for **Changing Look Quasars**, quasars that exhibit dramatic changes in their observed properties over the course of only weeks to years. They are important since they offer a direct observational probe into the physical processes of the inner galactic central engine.

**Data Science:** Dr. Ross has become an expert in a suite of research methodologies that encompass what is now general taken to be and called data science and machine learning. In particular, at the heart of Dr. Ross's research with the SDSS-BOSS project, is essentially anomaly detection in extremely large datasets. This was achieved by employing a set of machine learning tools and algorithms. Dr. Ross was a co-founder and Chief Data Scientist of, **String Security Inc.**, a tech start-up based in the San Francisco Bay Area. There he built a predictive threat detection and remediation platform for cyber security teams by applying novel machine learning and predictive algorithms. Nic left String Security after the start-up pivoted to the cyber insurance market, but the techniques, experience and professional network that he built up is a critical basis of the current ERC Consolidator proposal.

### Relevant Selected Journal Publications

Pâris, Isabelle; Petitjean, Patrick; **Ross, Nicholas P.** and 43 co-authors, *The Sloan Digital Sky Survey Quasar Catalog: Twelfth data release*, [10.1051/0004-6361/201527999](https://arxiv.org/abs/10.1051/0004-6361/201527999), **2017A&A...597A..79P** **88 citations**

Hamann, Fred; Zakamska, Nadia L.; **Ross, Nicholas**; and 12 co-authors, *Extremely red quasars in BOSS*, [10.1093/mnras/stw2387](https://arxiv.org/abs/10.1093/mnras/stw2387), **2017MNRAS.464.3431H**, **13 citations**

Timlin, John D.; **Ross, Nicholas P.** and 19 co-authors, *SpIES: The Spitzer IRAC Equatorial Survey*, [10.3847/0067-0049/225/1/1](https://arxiv.org/abs/10.3847/0067-0049/225/1/1) **2016ApJS..225....1T**, **13 citations**

MacLeod, Chelsea L.; **Ross, Nicholas P** and 11 co-authors, *A systematic search for changing-look quasars in SDSS*, [10.1093/mnras/stv2997](https://arxiv.org/abs/10.1093/mnras/stv2997), **2016MNRAS.457..389M**, **42 citations**

**Ross, Nicholas P.** and 12 co-authors *Extremely red quasars from SDSS, BOSS and WISE: classification of optical spectra*, [2015MNRAS.453.3932R](https://arxiv.org/abs/2015MNRAS.453.3932R), [10.1093/mnras/stv1710](https://arxiv.org/abs/10.1093/mnras/stv1710), **25 citations**

Font-Ribera, Andreu; Kirkby, David; Busca, Nicolas; Miralda-Escudé, Jordi; **Ross, Nicholas P.** and 38 co-authors, *Quasar-Lyman  $\alpha$  forest cross-correlation from BOSS DR11: Baryon Acoustic Oscillations*, [10.1088/1475-7516/2014/05/027](https://arxiv.org/abs/10.1088/1475-7516/2014/05/027) **2014JCAP...05..027F** **164 citations**

Pâris, Isabelle; Petitjean, Patrick; Aubourg, Éric; **Ross, Nicholas P.**; and 46 co-authors, *The Sloan Digital Sky Survey quasar catalog: tenth data release* [10.1051/0004-6361/201322691](https://arxiv.org/abs/10.1051/0004-6361/201322691) **2014A&A...563A..54P** **153 citations**

**Ross, Nicholas P.** and 41 co-authors, *The SDSS-III Baryon Oscillation Spectroscopic Survey: The Quasar Luminosity Function from Data Release Nine*, 2013, [10.1088/0004-637X/773/1/14](https://arxiv.org/abs/10.1088/0004-637X/773/1/14) **2013ApJ...773...14R**, **98 citations**

**Ross, Nicholas P.** and 38 co-authors, *The SDSS-III Baryon Oscillation Spectroscopic Survey: Quasar Target Selection for Data Release Nine*, 2012, [10.1088/0067-0049/199/1/3](https://arxiv.org/abs/10.1088/0067-0049/199/1/3), **2012ApJS..199....3R** **177 citations**

Pâris, I.; Petitjean, P.; Aubourg, É.; Bailey, S.; **Ross, Nicholas P.** and 70 co-authors *The Sloan Digital Sky Survey Quasar Catalog: Ninth Data Release*, [10.1051/0004-6361/201220142](https://arxiv.org/abs/10.1051/0004-6361/201220142) **2012A&A...548A..66P** **182 citations**




Schneider, Donald P.; Richards, Gordon T.; Hall, Patrick B.; Strauss, Michael A.; Anderson, Scott F.; Boroson, Todd A.; **Ross, Nicholas P.** and 41 co-authors; *The Sloan Digital Sky Survey Quasar Catalog. V. Seventh Data Release*, [10.1088/0004-6256/139/6/2360](https://arxiv.org/abs/10.1088/0004-6256/139/6/2360) **2010AJ....139.2360S** **585 citations**

**Ross, Nicholas P et al.** “*The SDSS-III Baryon Oscillation Spectroscopic Survey: Quasar Target Selection for Data Release Nine*”, [10.1088/0067-0049/199/1/3](https://arxiv.org/abs/10.1088/0067-0049/199/1/3), **2012ApJS..199....3R**, **178 citations**

**Ross, Nicholas P et al.** “*Clustering of Low-redshift ( $z \leq 2.2$ ) Quasars from the Sloan Digital Sky Survey*”, [10.1088/0004-637X/697/2/1634](https://arxiv.org/abs/10.1088/0004-637X/697/2/1634), **2009ApJ...697.1634R** **158 citations**

**Ross, Nicholas P et al.** “*The 2dF-SDSS LRG and QSO Survey: the LRG 2-point correlation function and redshift-space distortions*”, [10.1111/j.1365-2966.2007.12289.x](https://arxiv.org/abs/10.1111/j.1365-2966.2007.12289.x) **2007MNRAS.381..573R**, **180 citations**

## **PRIZES AND AWARDS**

2014 - 2019  STFC Ernest Rutherford Senior Fellowship  
 2009 - 2016  Architect SDSS-III: Baryon Oscillation Spectroscopic Survey (BOSS)  
 2003 - 2008  PPARC Student Fellowship, *Durham University*

## **SELECT LEADERSHIP**

2014 - 2019 P.I., STFC Ernest Rutherford Fellowship  
 2013 - 2016 Primary Co-I, *Spitzer Space Telescope*, Cycle 9 GO program  
 “SpIES: The Spitzer-IRAC Equatorial Survey”  
 2012 - 2014 Scientific P.I., *Hubble Space Telescope*, Cycle 20,  
 “The Host Galaxies of High-Luminosity Obscured Quasars at  $z \sim 2.5$ ”  
 2011 Chapter Editor, *BigBOSS* NOAO Proposal, [arxiv.org/abs/1106.1706v1](https://arxiv.org/abs/1106.1706v1)  
 2011 P.I., SDSS-IV: BOSS-Plus (accepted Nov 2011; merged into SDSS-IV: eBOSS)  
 2009 - 2012 Chair, SDSS-III BOSS Quasar Working Group  
 2008 - 2010 Lead, SDSS-III BOSS Quasar Target Selection Group

2008 - 2010     P.I., NASA *Swift* Cycle 5 Long-term local AGN monitoring program

**RECENT SELECTED PRESENTATIONS**

2014 May	Harvard University	HEAD talk
2014 April	Drexel University	Physics Colloquium
2014 April	University of Pennsylvania	Astrophysics Seminar
2014 March	Princeton University	Invited talk, “Heritage of Stripe 82” meeting
2013 November	University of Florida	Colloquium
2013 July	Durham University	“Ripples in the Cosmos” conference
2013 May	Stanford University	KIPAC Tea Talk
2013 January	University of Washington	Colloquium
2012 July	Durham University	ICC, Seminar
2012 April	UC, Irvine	Seminar
2012 April	Trieste, Italy	“Interacting Galaxies and Binary Quasars”
2012 January	New York University	Plenary Talk, BOSS Collaboration meeting
2011 November	UC, Santa Cruz	FLASH Seminar
2011 July	Oxford University	BICAP Cosmology Seminar
2011 May	Yale University	YCAA Seminar
2010 October	IMPU, Tokyo	Galaxies and AGN Workshop
2010 September	Cambridge University	IoA Seminar