**Section c. Early Achievements Track-record (max. 2 pages)**

My (*NPR*) research focuses on implementing novel algorithms and techniques in order to discover and study the physical processes in quasars. After spending 7 years in the United States (working at Penn State, Lawrence Berkeley National Lab and then as an Assistant Research Professor at Drexel University) I returned to the U.K. with the award of an STFC Ernest Rutherford Fellowship, one of the most senior personal astrophysics fellowships in the UK, which has an application oversubscription of ~20:1 and is over £500,000 (€630,000) on award.

I have established myself as an independent lead investigator and have led the discovery of new types of quasars: the **Extremely Red Quasars**, (*NPR* et al. 2015, MNRAS) and with my research team leading the discovery of the first sample of the new **Changing Look Quasars** (MacLeod, *NPR* et al. 2016, MNRAS). My team has also led the production of the largest areal space-based survey using NASA’s *Spitzer Space Telescope* (Timlin, *NPR* et al. 2016, ApJS). This has led to the ground breaking and novel first measurement of infrared quasar clustering at high-redshift (Timlin, *NPR* et al. 2018, ApJ, accepted).

The PI led the team that was responsible for obtaining the quasar data necessary for the SDSS-III BOSS cosmology experiment, leading to the first measurement of baryon acoustic oscillations at high-redshift.

The PI’s leadership includes leading science teams such as the **SDSS-III BOSS Quasar Science Working Group** which has resulted in an *extremely high publication output including 118 peer-review journal articles with 15,000 citations and an h-index of 59 (SAO/NASA Astrophysics Data System).* This is world-leading for any astrophysicist and virtually unparalleled by my contemporaries at a similar career stage.

I am an expert in a suite of research methodologies in **data science** and machine learning. In particular, at the heart of my research with the SDSS-BOSS project, was anomaly detection in extremely large datasets. I was a co-founder and Chief Data Scientist of, **String Security *Inc*.** There I built a predictive threat detection and remediation platform for cyber security teams by applying machine learning and predictive algorithms. The PI is currently in discussion with the School of Informatics at the UoE on potential joint projects and research avenues.

**Relevant Selected Journal Publications***(N.B.* None with PhD supervisor, ***citations in red)***

Pâris, Isabelle; Petitjean, Patrick; **Ross, Nicholas P.** et al “*The Sloan Digital Sky Survey Quasar Catalog: Twelfth data release”,* [10.1051/0004-6361/201527999](http://dx.doi.org/10.1051/0004-6361/201527999), **[2017A&A...597A..79P](http://adsabs.harvard.edu/abs/2017A%26A...597A..79P) (96)** Production of the current state-of-the-art quasar catalogue with associated metadata.

Hamann, Fred; Zakamska, Nadia L.; **Ross, Nicholas P.** et al. *“Extremely red quasars in BOSS”*, [10.1093/mnras/stw2387](http://dx.doi.org/10.1093/mnras/stw2387), **[2017MNRAS.464.3431H](http://adsabs.harvard.edu/abs/2017MNRAS.464.3431H)**, **(13)** Follow-up analysis to the Ross et al. (2015) discovery paper.

Timlin, John D.; **Ross, Nicholas P.** et al. “*SpIES: The Spitzer IRAC Equatorial Survey",*  [10.3847/0067-0049/225/1/1](http://dx.doi.org/10.3847/0067-0049/225/1/1) **[2016ApJS..225....1T](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2016ApJS..225....1T&db_key=AST&link_type=ABSTRACT&high=598ce4a29f24727)**, **(13)** Survey paper and catalogue for the largest areal *Spitzer Space Telescope* programme.

MacLeod, Chelsea L.; **Ross, Nicholas P** et al. “*A systematic search for changing-look quasars in SDSS”,* [10.1093/mnras/stv2997](http://dx.doi.org/10.1093/mnras/stv2997), **[2016MNRAS.457..389M](http://adsabs.harvard.edu/abs/2016MNRAS.457..389M),** **(43)** Field-leading paper for CLQ studies; first systematic search with detailed theoretical interpretation.

**Ross, Nicholas P.** et al. *“Extremely red quasars from SDSS, BOSS and WISE: classification of optical spectra”*, [10.1093/mnras/stv1710](http://dx.doi.org/10.1093/mnras/stv1710) **[2015MNRAS.453.3932R](http://adsabs.harvard.edu/abs/2015MNRAS.453.3932R)**, **(25)** The discovery paper for the new class of “Extremely Red Quasars”.

Font-Ribera, Andreu; Kirkby, David; Busca, Nicolas; Miralda-Escudé, Jordi; **Ross, Nicholas P.** et al. “*Quasar-Lyman α forest cross-correlation from BOSS DR11: Baryon Acoustic Oscillations”,* [10.1088/1475-7516/2014/05/027](http://dx.doi.org/10.1088/1475-7516/2014/05/027) **[2014JCAP...05..027F](http://adsabs.harvard.edu/abs/2014JCAP...05..027F)** **(166)** Ground-breaking first detection of the “Baryon Acoustic Oscillation” phenomena in the quasar population.

Pâris, Isabelle; Petitjean, Patrick; Aubourg, Éric; **Ross, Nicholas P.** et al. “*The Sloan Digital Sky Survey quasar catalog: tenth data release”* [10.1051/0004-6361/201322691](http://dx.doi.org/10.1051/0004-6361/201322691), **[2014A&A...563A..54P](http://adsabs.harvard.edu/abs/2014A%26A...563A..54P)** **(153)** Key “v2.0” data release of the SDSS-III BOSS quasar data and associated data products.

**Ross, Nicholas P.** et al. “*The SDSS-III Baryon Oscillation Spectroscopic Survey: The Quasar Luminosity Function from Data Release Nine”,* [10.1088/0004-637X/773/1/14](http://dx.doi.org/10.1088/0004-637X/773/1/14) [2013ApJ...773...14R](http://adsabs.harvard.edu/abs/2013ApJ...773...14R)**, (99)** Critical demographic “1-point” measurement of the BOSS quasar Sample (was a BOSS “Key Project”).

**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](http://dx.doi.org/10.1088/0067-0049/199/1/3), [2012ApJS..199....3R](http://adsabs.harvard.edu/abs/2012ApJS..199....3R) **(179)** Overview of the work my team lead and a opus of using novel machine learning techniques for astrophysics research.

Pâris, I.; Petitjean, P.; Aubourg, É.; Bailey, S.; **Ross, Nicholas P.**et al. “*The Sloan Digital Sky Survey Quasar Catalog: Ninth Data Release”*, [10.1051/0004-6361/201220142](http://dx.doi.org/10.1051/0004-6361/201220142),[2012A&A...548A..66P](http://adsabs.harvard.edu/abs/2012A%26A...548A..66P) **(184)** Production of the first catalogue and data release from the SDSS-III BOSS Quasar Survey.

Schneider, Donald P.; Richards, Gordon T.; Hall, Patrick B.; Strauss, Michael A.; Anderson, Scott F.; Boroson, Todd A.;, **Ross, Nicholas P.** et al. “*The Sloan Digital Sky Survey Quasar Catalog. V. Seventh Data Release”,* [10.1088/0004-6256/139/6/2360](http://dx.doi.org/10.1088/0004-6256/139/6/2360), [2010AJ....139.2360S](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2010AJ....139.2360S&db_key=AST&link_type=ABSTRACT) **(588)** Production of the previous state-of-the-art quasar catalogue, with associated metadata.

**Ross, Nicholas P et al.** *“Clustering of Low-redshift (z <= 2.2) Quasars from the Sloan Digital Sky Survey,* [10.1088/0004-637X/697/2/1634](http://dx.doi.org/10.1088/0004-637X/697/2/1634), **[2009ApJ...697.1634R](http://adsabs.harvard.edu/abs/2009ApJ...697.1634R)** **(158)** Critical demographic `2-point’ measurement of the SDSS Quasar Sample (was SDSS Quasar “Key Project”).

**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*

**SELECTED LEADERSHIP**

2018 P.I. Liverpool Telescope program: *The Optical Monitoring of IR-variable Quasar*s

2018 - P.I. *JWST* Cycle 1 GO program: *Quasar Physics with the MIRI MRS* (to be submitted)

2017 - P.I. WISE W4 Compendium (WW4C)

2016 - 2017 Co-founder and Chief Data Scientist of *String Security Inc.*

2014 - 2019 P.I., STFC Ernest Rutherford Fellowship

2013 - 2016 Co-P.I., *Spitzer Space Telescope* program “SpIES: The Spitzer-IRAC Equatorial Survey'”

2012 - 2014 Co-P.I., *Hubble Space Telescope,* program “High-Luminosity Obscured Quasars at ***z~***2.5”

2011 Chapter Editor, *BigBOSS* NOAO Proposal, [arxiv.org/abs/1106.1706v1](http://livepage.apple.com/)

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

**SELECTED PRESENTATIONS**

2017 Nov *Dealing With Data 2017 Workshop,* Selected Oral Contribution

2017 Jul Unveiling the Physics Behind Extreme AGN Variability, Conference Summary

2017 May University of Cambridge Galaxies Discussion Group

2017 Apr University of Glasgow Weekly Seminar

2016 Jun JWST@ROE conference Contributed talk

2016 May University of Michigan Astrophysics Seminar

2016 May Great Lakes Quasar Symposium Oral Contribution

2016 April Liverpool John Moores University Astrophysics Seminar

2015 Sep Multiwavelength AGN Conference, Crete, Invited Review

2015 Jun ICG, Portsmouth Cosmology Colloquium

2015 Apr Adler Planetarium, Chicago, Astrophysics Seminar

2015 Jan 225th AAS, Seattle Special Session talk

2014 Sep Princeton University Invited talk “Heritage of Stripe 82” meeting

2014 May Harvard University HEAD talk

2014 Apr University of Pennsylvania Astrophysics Seminar

2013 May Stanford University KIPAC Talk

2013 Jan University of Washington Colloquium

2012 Jan New York University Plenary Talk, BOSS Collaboration meeting

2011 Jul Oxford University BICAP Cosmology Seminar

2011 May Yale University YCAA Seminar