Dr Eram Rizvi

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Qualifications

1993 – 97 PhD, Bose-Einstein Correlations in Deep Inelastic Scattering at HERA, QMUL
1990 – 93 Manchester University BSc. Physics 1st class honours

Appointments

2018 – Deputy Dean for Research, Faculty of Science and Engineering – QMUL
2017 – Director of Training – DISCnet CDT in data intensive science
2016 – ATLAS Research Group Leader, Particle Physics Research Centre (PPRC) – QMUL
2013 – Reader in Particle Physics, Particle Physics Research Centre (PPRC) – QMUL
2013 – Director of Graduate Studies, School of Physics and Astronomy – QMUL
2007 – 17 Director of Admissions, School of Physics and Astronomy – QMUL
2010 – 13 Senior Lecturer, School of Physics and Astronomy – QMUL
2003 – 10 Lecturer, School of Physics and Astronomy – QMUL
1998 – 03 Postdoctoral research associate, University of Birmingham
1997 – 98 Research Fellow, DESY Particle Physics Research Laboratory, Hamburg, Germany

Distinctions

- **2018 –** CERN Electroweak Working Group Convenor – remit over 3 CERN intl. experiments
- **2017 –** Associateship at University of Durham for Particle Physics Phenomenology
- **2017 –** ATLAS Working Group convenor (directing 150 international physicists at CERN)
- **2016 –** Appointed to international ATLAS Collaboration Board (180 institutes)
- **2016 –** Appointed to national ATLAS-UK Collaboration Board (15 UK institutes)
- **2015** Consultancy for Siemens
- **2014 – 16** ATLAS UK Standard Model Working Group Convenor
- **2012** Consultancy to the Gatsby Charitable Foundation

Academic Supervision

- **PhD Student** | **Dates** | **Supervisor role** | **Comments / Publication**

Elisa Piccaro	10/2008 – 08/2012	Primary (95%)	PhD awarded 10/2012	[10]
Jack Goddard	10/2009 – 09/2013	Primary (95%)	PhD awarded 10/2013	[10]
Rob Hickling	10/2010 – 09/2014	Primary (95%)	PhD awarded 11/2014	[5]
Marc Cano Bret	10/2011 – 02/2015	Primary (95%)	PhD awarded 03/2015	[8,9]
Lewis Armitage	10/2012 – 09/2016	Primary (95%)	PhD awarded 11/2016	[1]
Andres Morales	12/2013 –	Primary (95%)	In progress	
Antony Fray	10/2014 –	Primary (95%)	In progress	
Francesco Guili	10/2016 –	Secondary (50%)	External supervisor (U. of Oxford)	
Jesal Mandalia	10/2017 –	Primary (95%)	In progress	

All PhD students submitted on-time. Secondary supervisor for 6 PhD students, contribution is 5%.

- **Postdoc** | **Dates** | **Comments**

Dr Alison Elliot	2018 –	New appointment
Dr Lewis Armitage	2016 – 2017	Precision triple differential Z production measurement [1]
Dr Rob Hickling	2014 – 2016	Precision high mass Drell-Yan measurement [5]
Dr Joseph Lilley	2012 – 2013	Physics measurement of proton structure at the LHC [10]
Dr John Morris	2015 – 2017	Developed ATLAS Trigger enhancements
Dr Dan Traynor	2004 – 2010	H1 collaboration (300 members) physics analysis

I have developed my own group and currently work with two postdocs on the ATLAS experiment at the Large Hadron Collider (LHC) working in two streams to deliver physics results, and detector enhancements, which benefit the entire experimental collaboration of 3000 physicists.

Research Grants

STFC consolidated/rolling grants name Head of Group as PI by convention, although majority funding is for ATLAS experiment under my leadership. Attributed income (based on FEC proportion awarded on grant) is on average £200,000 p.a.

Title	Dates	Principal Investigator	Co-investigators	Total Value	Attributed Value
STFC – DTP Studentships	01/10/17 30/09/21	E. Rizvi	4 SPA academics	£328 K	£ 82 K
IPPP Durham Associateship	01/09/17 31/08/18	E. Rizvi	–	£3000	£3000
STFC CDT in Data Intensive Science	01/10/17 30/09/22	M. Sullivan (U. of Soton)	E. Rizvi + 3 non-QM	£1.03 M	£137 K
STFC – DTP Studentships	01/10/15 30/09/20	E. Rizvi	12 SPA academics	£1.09 M	–
STFC – Consolidated Grant	01/10/15 30/09/19	Di Lodovico	E. Rizvi + 7 PPRC	£2.60 M	£286 K
Inst. Of Physics – Meeting Support	01/09/15	E. Rizvi	–	£500	£500
IPPP (U. of Durham) Meeting Support	01/09/15	E. Rizvi	–	£2000	£2000
STFC – DTP Studentships	01/10/14 30/09/18	E. Rizvi	4 SPA academics	£406 K	£406 K
STFC – Consolidated Grant	01/10/12 30/09/16	S. Lloyd	E. Rizvi + 7 SPA	£3.21 M	£356 K
STFC – Consolidated Grant (supplement)	01/10/12 30/03/14	S. Lloyd	E. Rizvi + 7 SPA	£16 K	£1.7 K
EPSRC – International Collaboration	08/08/11 31/03/12	E. Rizvi	–	£2500	£2500
Inst. Of Physics – Meeting Support	30/06/11 31/12/11	E. Rizvi	–	£500	£500
STFC – Rolling Grant	01/10/10 30/09/14	S. Lloyd	E. Rizvi + 7 SPA	£2.69 M	£408 K
STFC – Rolling Grant	01/10/09 30/09/10	S. Lloyd	E. Rizvi + 7 SPA	£1.09 M	£156 K
STFC – DTP Studentships	01/10/08 30/09/13	E. Rizvi	4 SPA Academics	£483 K	£161 K
STFC – Rolling Grant	01/10/06 30/09/11	S. Lloyd	E. Rizvi + 7 SPA	£5.50 M	£611 K

Research Administration

2019 ▪ Lead organiser of national ATLAS-UK meeting, 210 participants expected

2018 ▪ Lead organiser of international Standard Model Workshop, 100 delegates expected

2016 ▪ Group Leader for ATLAS research at QMUL managing the research activity of six academics and a team of 2 postdoctoral researchers and 12 PhD students

2015 ▪ Lead organiser of international workshop on QCD@LHC, with 150 participants

2011 ▪ Sole organiser of international workshop on TeV Scale Gravity, with 50 worldwide participants attending, including from South Africa, USA, Taiwan and Europe.

2007 ▪ Sole organiser of Working Group Meeting for 30 international collaborators from H1

2000 – 03 ▪ DESY Laboratory Graduate Student Lectures: Methods & Techniques in Experimental Particle Physics, annually given to 100 international students.

2001 ▪ Organised H1 Collaboration meeting at the U. of Birmingham for 100 collaborators.

External Recognition

2018 ▪ REF dry run research outputs externally rated 4*, 4*, 4*, 3*, 3*, 3*

2018 – ▪ Invited to formulate European Particle Physics Strategy, co-ord. by CERN council

2017 – ▪ Referee for Phys. Lett. B (IF=4.8); Phys. Rev. D (IF=4.6); Phys. Rev. Lett. (IF=8.5), Journal of Phys. G (IF=2.9); European Phys. Journal C (IF=5.3)

2017 – ▪ Referee for Nature Communications (IF=12.12)

2016 – ▪ Appointed External PhD supervisor to Francesco Guili (University of Oxford)

2013 – ▪ Reviewer for STFC grant applications

2015 – ▪ Appointed to International Organising Committee for QCD@LHC conference series

2013 ▪ Invited winter school lectures "Quantum Gravity at the LHC", University of Sussex.

2012 – ▪ Appointed as independent expert to six ATLAS Editorial Boards internally reviewing analyses for publication.

2012 ▪ REF dry run research outputs externally rated 4*, 4*, 4*, 3*.

2012 ▪ Invited plenary speaker at International Workshop, Rio de Janeiro, Brazil.

2011 ▪ Invited plenary speaker at International Conference, Spa, Belgium.

2009 – ▪ Nine appointments as external PhD examiner to Universities of Oxford, Manchester, Liverpool, Sussex, and Brunel

2007 – ▪ Four appointments as internal PhD examiner to UCL, RHUL, QMUL.

2003 – 12 ▪ Appointed H1 collaboration Physics Working Group Convenor responsible for analysis quality and steering all proton structure measurements to publication – 13 papers published, with group membership of 30 international physicists.

2008 ▪ Invited to deliver post-graduate summer school lectures "Parton Density Functions", Helmholtz Alliance Lecture Series, DESY, Berlin.

2006 – 08 ▪ Invited to join H1 Collaboration Executive Committee: ten senior physicists advising collaboration management on all matters related to the running, operation and funding of the experiment (300 international collaborators)

2005 – 06 ▪ Invited twice as tutor at the High Energy Physics Graduate Summer School for 80 UK particle physics graduate students – two week residential programme.

2004 ▪ Invited Working Group Convenor at the International Workshop on Deep Inelastic Scattering, Slovakia with 300 participants.

2003 – 12 ▪ Appointed H1 Collaboration Physics Working Group Convenor responsible for analysis quality and steering all proton structure measurements to publication – 13 papers published, with group membership of 30 international physicists.

Academic Visitors: I have received several short term academic visitors since 2010 including

- Dr Juan Rojo (National Institute for Subatomic Physics, Netherlands) – September 2015
- Prof. Glenn Starkman (Case Western Reserve University, USA) – December 2011
- Dr Alan Cornell (University of the Witwatersrand, South Africa) – December 2011
- Prof. Amanda Cooper-Sarkar (Oxford University, UK) – September 2010
- Prof. Lance Dixon (Stanford University, USA) – October 2010

Invited Visits: I have been invited to visit collaborators for one - two weeks covering travel costs

- Dr Sasha Glazov (DESY Research Lab, Hamburg, Germany) – February 2016
- Prof Marco Leite (University Sao Paulo, Sao Paulo, Brazil) – January 2016
- Prof Marco Leite (University Sao Paulo, Sao Paulo, Brazil) – May 2015
- Dr Katerina Lipka (DESY Accelerator Laboratory, Hamburg, Germany) – July 2012
- Prof. Stanisław Mikocki (Institute of Nuclear Physics, Cracow, Poland) – September 2011

Contributions to School, Faculty and College

School of Physics & Astronomy

2013 – ▪ Member of School Research Committee
2013 – ▪ Director of Graduate Studies / Chair of Graduate Degrees Committee
2010 – 12 ▪ Deputy Director of Graduate Studies
2009 – 17 ▪ Chair of Recruitment Committee
2007 – 17 ▪ Director of Undergraduate Admissions
2008 – 12 ▪ PhD Admissions Tutor for the Particle Physics Research Centre
2005 – 07 ▪ Deputy Director of Undergraduate Admissions

Director of Graduate Studies: I have held this major administrative role since 2013 overseeing a body of 110 PhD students within the school, including students on joint programmes with other institutes, and those based abroad for periods of 12-24 months. The role involves seeking, and allocating several sources of PhD funding maintaining balance across research groups; management of the STFC DTP (£400k/p.a.) including retaining accreditation and preparation of annual reports to STFC; student engagement in training (domain specific and transferrable skills); training academics in PhD supervision practice; biannual progress monitoring of students; and ensuring timely and successful submission of theses. I have **achieved** a rise in timely submission rates from 65% to **94%** for the latest cohort. I have **commissioned** a comprehensive data system providing accurate submission rate statistics, and an automated system to manage progress reporting, freeing considerable administrator time. I **created** the PhD Student Forum offering a voice to the student body, and through it have worked to improve the student experience as seen in the 2017 PRES survey results where SPA ranked **first in faculty** and second across all QMUL schools.

Director of Undergraduate Admissions: I held this major role for the decade to September 2017. I achieved year-on-year increases in enrolments, out-pacing sector average, reaching 162 enrolments in 2017 – an increase of 250%. This has been attained despite turbulent recruitment conditions including a 20% reduction in the 18 year old population since 2009, an increase in tuition fees in 2012, and the introduction of student number controls by HEFCE imposing financial penalties for over- and under-recruitment. I have met every annual recruitment target without reductions in average incoming A-level grades. I have achieved this by revising the school recruitment strategy, repositioning QMUL as a competitor to UCL and KCL in physics. This required discontinuation of several confusing and poorly recruiting programmes to a simpler structure (e.g. CFG0/F390/F391); raising entry requirements to AAB; adjusting the interview and selection process; implementing a successful unconditional offer-making process to attract high achievers; and designing a UCAS Clearing operation that was proven to be robust against critical IT failures.

Faculty of Science and Engineering

2013 – ▪ Member of Faculty Directors of Graduate Studies Group
2013 – 17 ▪ S & E International Recruitment & Partnerships Advisory Group
2012 – 17 ▪ S & E Admissions and Recruitment Working Group

At faculty level I participate in monthly meeting of faculty DGSs to promote best practice and discuss common sources of problems. In 2016 I raised the issue of mental health provision and support for PhD students as this is an important factor in students who fail timely submission. I am working to prepare more detailed resources on how to recognise and tackle this for both supervisor and PhD student. Current advice focuses on UG students and mental health first-aid. The situation with PhD students, often working long hours in isolation, requires a dedicated approach. This includes helping supervisors to recognise potential problems earlier, and academic regulation adjustments to limit damage caused by disruptive students, as has been the case in SPA.

QMUL

2016 – ▪ Membership of Postgraduate Research Fund Panel (intermittent)
2013 – ▪ Membership of Research Degree Programmes Exam Board (intermittent)
2015 – 17 ▪ Appointed to Project Review Board overseeing project to switch to electronic workflows in MySIS for the management of PhD students within the university
2009 & 11 ▪ Graduate Student Complaints Panel Member

As DGS, in 2015 I recognised the main causes of students failing to submit theses on time: incorrect calculation of submission rates, incorrect display of submission deadlines to students on MySIS, no

facility to submit theses on deadlines falling on weekends/holidays, and issues of mental health. PhD submission rates calculated by the Research Degrees Office were inconsistent with those used by RCUK. I instituted a change in this definition to give a consistent view as seen by all research councils (not just STFC/EPSRC). I proposed to RDPEB, RDO and VP for Research a method of allowing electronic thesis submission to improve PhD submission rates. This would allow submission on weekends and holidays consistent with QMUL's stated submission deadlines. I also highlighted the incorrect submission deadline presented to students on MySIS pages and have worked to fix this. I was appointed to the Project Review Board to oversee these changes to MySIS for PGR students which has now concluded its activity. However, I continue to work to achieve electronic PhD thesis submission which can only **increase** QMUL PhD submission rates.

Teaching 2010-2018

- **DISCnet Centre for Doctoral Training**: Director of Training, 2017−
  Six core modules at level 8, equivalent to 45 credits: 150 hours total, 30 PhD students
  Assessment: formative assessments in each session

  The DISCnet CDT in Data Intensive Science (STFC funded) commenced in Oct 2017 as a consortium of five universities. I was appointed Chair of the Training Committee and designed a training programme of six modules delivered to a distributed cohort as 3-day residential events. The modules are taught by a team of 12 academics across the consortium. Four sessions have been completed so far with good student feedback.

- **SPA5250 Physics of Energy and the Environment**: module organiser, 2017−
  Level 5 elective module, 15 credits: 3 lectures / week , 50 students
  Assessment: in-session assessments, coursework, 2½ hour final exam, final project essay

  I have overall responsibility for the design and delivery of the module. I am teaching this for the first time this academic year and have introduced a policy and ethics element to the module. A special invited lecture will be given by a climate policy specialist from Parliament.

- **SPA6300 Synoptic Physics**: module organiser, 2015−18
  Level 6 core module: 1 tutorial/week (8 students/group), 120 students
  Assessment: oral summative assessments in each session

  I had overall responsibility to design and deliver the module. I managed 10 academic tutors, having 2 contact hours per week discussing and solving general physics problems. From 2017/18 I stepped down as module organiser but remained as tutor for the module.

- **SPA6309 Radiation Detectors**: module organiser since 2013−15
  Level 6 core module, 15 credits: 3 lectures/week, 35 students
  Assessment: in-session assessments, group coursework, final project dissertation.

  I had overall responsibility to design and deliver this core module for F392/F393 Physics with Particle Physics BSc/MSci programmes. Since 2015/16 I am the deputy module organiser.

- **National High Energy Physics Graduate School Tutor**: 2005 & 2006
  Graduate Level core module, typically 3-5 students per group
  Teaching: 3 hour daily supervision
  Assessment: oral exam (30 minutes)

  Tutor at the High Energy Physics Graduate School for 80 UK particle physics PhD students on intensive two-week residential programme.

- **SPA6913 / 6776 / 7016U / 7015U Undergraduate Projects**: project supervisor since 2004
  Level 6/7 core module, typically 3-5 students annually
  Teaching: 1 hour weekly supervision/student
  Assessment: oral exam (30 minutes), final oral presentation and final written report

  In 2010 I innovated using external contacts to jointly supervise projects giving students access to environments/resources outside QMUL. The external supervisors have been from KCL Department of War Studies, and the Royal United Services Institute – defence policy think-tank. In 2011 I acted as external supervisor for a project student at the University of Cambridge.

Research Activity

[Refs. indicate highlighted publications]

ATLAS Electroweak Precision Measurements: 2010 –

I lead this area of activity as convenor of the 150 member working group on ATLAS which produces the highest precision measurements from ATLAS, allowing stringent tests of the Standard Model to be performed. Currently approximately 30 analyses are being conducted under my remit where I ensure high quality scrutiny and timely publication. This also includes my leadership of three teams performing new measurements and building on my publications [0,5,10]. My leadership role in this field has been recognised by the STFC grant panel review in 2009 and 2012, and by my appointment to the CERN Electroweak Working Group convenership where I direct and co-ordinate this international research effort across three experiments.

ATLAS Level 1 Calorimeter Trigger Development: 2011 –

The Level 1 Calorimeter Trigger is a critical component of the ATLAS detector, which decides online if a data collision event, should be rejected or recorded at 75 kHz rate, thus mistakes in the online trigger cannot be rectified to recover data. In particular the "missing ET" trigger (MET) is one important trigger component used in the discovery of the new Higgs boson. I developed and tested a trigger configuration resulting in a factor of ten improvement in the background rejection without sacrificing efficiency of recording interesting physics data. The proposed configuration was implemented for the complete 2012-13 data run and used in the Higgs boson searches. I am now continuing this work to achieve further performance enhancements for future LHC operation.

ATLAS Search for Quantum Gravity: 2012 – 2016

My knowledge of quantum gravity models from the BlackMax project leads naturally to an experimental search. The large ATLAS data set collected in 2012-13, and the improved "missing ET" trigger is ideal for searching for such new physics effects. Together with my PhD student we now lead the search for micro black hole production. Such searches at the highest attainable LHC energies are also very sensitive to uncertainties in the structure of the proton, where my additional expertise is valued in publication [8,9].

BlackMax: 2007 –

This project is a collaboration of 11 theoreticians and experimentalists from seven international institutes to produce a state-of-the-art simulation of quantum gravity models and micro-black hole production at the LHC, initially published in [19]. In 2010 I took leadership of the project and under my direction the simulation code has been adopted by the ATLAS and CMS collaborations and cited in their publications. BlackMax continues to be the most cited simulation programme of all competitors.

HERAPDF: 2008 –

I am a founder member of HERAPDF group of about 20 working members aiming to produce precise combinations of published H1 and ZEUS proton structure measurements and accurate extractions of phenomenological parameters. My detailed knowledge of H1 measurements is a central contribution to the project. In the first phase the group produced one highly cited paper [16]. With the completion of my H1 measurements published in [15], the second phase of the HERAPDF programme resulted in the legacy publication [7] and is used in all modern determinations of proton structure. These combined data will not be superseded for at least two decades and provide unique and stringent constraints relevant to all predictions at the LHC.

H1 Proton Structure Measurements: 1997 – 2012

This project has been the main focus of my research activity within the H1 collaboration of 300 physicists and is published in [1,6,9,11,14]. Since 2003-2012 I led a 17-member team from five institutes measuring the polarised High Q^2 Proton Structure Functions. I co-ordinated all aspects of the analysis: ensuring high data-taking quality during five years of accelerator operation; detailed statistical data analysis; 20 intermediate results released at conferences; phenomenological studies; and lead author of the final publication [15]. I have achieved a first ever measurement of one structure function and a factor of two reduction in the experimental uncertainty compared to earlier unpolarised measurements [18,20,23,25-29]. With no new accelerators planned, this legacy data set will not be superseded for at least a decade. During this time all future studies will derive from this measurement, including the HERAPDF group activity.

Highlighted Publications

Selected publications in which I have played a lead or central role. Citation counts for each entry are given as of March 2018. Publications in underlined typeface are those having received more than 100 citations to date. A full list of publications can be found online here

Articles

1. *Measurement of the Drell-Yan triple differential cross section Boson in pp collisions at √s=8 TeV.* JHEP 1712 (2017) 059, p1-78, ATLAS Collaboration
   Analysis team leader directing the complete analysis and a team of four PhD students and three international academics. This is a challenging precision measurement which will enable the theory community to extract a fundamental physics parameter (the weak mixing angle) achieving the world's best precision for this parameter. 1 citation.

2. *Search for the dimuon decay of the Higgs Boson in pp collisions at √s=8 TeV with the ATLAS detector.* Phys.Rev.Lett., (2017) 119, 051802, p1-20, ATLAS Collaboration
   My student and I contributed to estimation of largest uncertainty, equating to about 13% of total effort. This search for the rarest decay of the Higgs boson has improved sensitivity for the upcoming (Run-3) analysis on a larger dataset, to directly observe this decay for the first time. It tests a key prediction of how mass is generated in the universe. 17 citations.

3. *Precision measurement of the W^+, W^- and Z/γ^* production cross sections with the ATLAS detector,* Eur.Phys. J C77 (2017) 367, p1-62, ATLAS Collaboration
   This was a very large project combing four high precision measurements with direct contributions from 42 physicists and PhD students. My student and I contributed to the determination of the background, and efficiency measurements in one of the four analyses (Z/γ^* muon channel) contributing about 20% of total effort in this channel. This paper demonstrated that prior understanding of the strange-quark was incorrect and affects all future measurements of proton structure. 43 citations.

4. *Measurement of total and differential W^+W^- production cross sections in pp collisions at √s=8 TeV with the ATLAS detector and limits on anomalous triple gauge couplings*
   JHEP 1609 (2016) 029, p1-79, ATLAS Collaboration
   Appointed chair of the Editorial Board of senior expert physicists directing and reviewing the complete analysis over a two year period to final publication. I had leading input to the overall scope and direction of the measurement. In this paper a new area of fundamental physics was tested and a search for new physics performed. 51 citations.

5. *Measurement of the double differential high-mass Drell-Yan cross in pp collisions at √s=8 TeV with the ATLAS detector*
   JHEP 1608 (2016) 009, p1-61 ATLAS Collaboration
   Analysis team leader directing the complete analysis and a team of three PhD students and three international academics. This paper published first direct constraints on the photon content of the proton and had a dramatic effect on reducing the photon uncertainty. 31 citations.

6. *Measurement of the $W^\pm$ and Z boson production cross sections in pp collisions at √s=13 TeV with the ATLAS detector*
   Phys.Lett B759 (2016) p601-621, ATLAS Collaboration
   Contributed to development of W channel background estimation method amounting to approximately 10% total effort. This was a very rapid publication at the new higher collision energy of the LHC. 74 citations.

7. *Combination of measurements of inclusive deep inelastic $e^\pm p$ scattering cross sections and QCD analysis of HERA*
   Eur.Phys.J. C75 (2015) 580, p1-98, H1 and ZEUS Collaborations
   This paper is a combination and meta-analysis of several measurements I directed (see below) and is a major update of [16] to include [15] and other measurements. My contribution was to significantly improve understanding of uncertainties correlated between two independent experiments which is one of the two key aspects of this paper. This highly cited legacy paper forms the bedrock of all theory predictions in this field. 260 citations.

8. *Search for contact interaction and large extra dimensions in the dilepton channel using pp collisions at √s=8 TeV with the ATLAS detector*
   Eur.Phys. J. C74 (2014) 3134, p1-25, ATLAS Collaboration
   Member of analysis team measuring one of two channels, and provided low scale gravity interpretation of the measurement. This work with my PhD student amounted to about 25% of total effort, searching for indirect influence of new particles. 55 citations.

9. *Search for high mass dilepton resonances in pp collisions at √s=8 TeV with the ATLAS detector*
   Phys. Rev. D90 (2014) 052005, p1-30, ATLAS Collaboration
   Member of analysis team measuring the dimuon channel and provided low scale gravity interpretation of the measurement following from [8]. In this paper my contribution was about 10% searching for direct production of new fundamental particles. 352 citations.

10. *Measurement of the low mass Drell-Yan differential cross at √s=7 TeV with the ATLAS detector*
    JHEP 1406 (2014) 112, p1-45, ATLAS Collaboration
    Analysis team leader directing the complete analysis team of four academics, and four PhD students. This paper showed for the first time the failure of theory predictions to describe this new kinematic region of the data. 60 citations.

11. *Measurement of the Z/γ* boson transverse momentum distribution in pp collisions at √s=7 TeV with the ATLAS detector*
    JHEP 1409 (2014) 145, p1-46, ATLAS Collaboration
    I was appointed to an independent Editorial Board team of four expert senior physicists scrutinising and reviewing the complete analysis over a one year period to final publication.197 citations.

12. *Measurement of W^+W^- production in pp collisions at √s=7 TeV with the ATLAS detector and limits on anomalous WWZ and WWγ couplings*
    Phys. Rev D87 (2013) 112001, p1-29, ATLAS Collaboration
    Editorial Board member of four expert senior physicists scrutinising and reviewing the complete analysis over a one year period to final publication. 183 citations.

13. *Measurement of angular correlations in Drell-Yan lepton pairs to probe Z/γ* boson transverse momentum at sqrt(s)=7 TeV with the ATLAS detector*
    Phys. Lett B720 (2013) p32-51, ATLAS Collaboration.
    I was appointed to an independent Editorial Board team of four expert senior physicists tasked with performing a rigorous 10 month internal review of the complete analysis and provide oversight of the publication process on behalf of the ATLAS Collaboration. 80 citations.

14. *The quark and gluon structure of the proton*
    Reports on Progress in Physics v76 (2013) p1-108, E. Rizvi & E. Perez
    This invited review was well received by colleagues and journal referees written for a wide audience of particle physicists and PhD students. 44 citations.

15. *Inclusive Deep Inelastic Scattering at High Q^2 with Longitudinally Polarised Lepton Beams*
    Journal of High Energy Physics 1209 (2012) p1-121, H1 Collaboration
    This extensive analysis concludes the H1 Collaboration's proton structure programme measuring eight reactions using data collected over a five-year period. As project leader I co-ordinated the decade-long effort since 2002 leading an international team of 17 physicists from five institutes. The precise measurements in this paper form a legacy data set which are essential input for all high energy proton-proton reaction predictions at CERN's Large Hadron Collider, in particular for the predictions of Higgs boson production and other new particles, and are published in the highest impact factor journal of the field. The direct citations are now absorbed into the subsequent meta-analysis performed in [7] above. 93 citations.

16. *Combined Measurement and QCD Analysis of Inclusive ep Scattering Cross Sections*
    Journal of High Energy Physics 1001 (2010) p1-55, H1 and ZEUS Collaborations
    My involvement was central in combining the H1 and ZEUS measurements by assessing the treatment of the experimental uncertainties and correlations with the ZEUS data. Several of the data sets used in the combination are measurements I directly performed - see [18,20,23,25,27,28] below. 898 citations.

17. *Jet Production in ep Collisions at High Q^2 and Determination of α_S*
    Eur. Phys. J. C65 (2010) p363-383, H1 Collaboration
    My role was to ensure these measurements were consistent with other H1 measurements under my convenership of the H1 working group, and to ensure that detailed systematic uncertainties were treated coherently in both analyses. 87 citations.

18. *Measurement of Inclusive ep Scattering Cross Section at low Q^2 and x at HERA*
    Eur. Phys. J. C63 (2009) p625-678, H1 Collaboration
    This analysis was performed within the working group I convened and my role was to ensure the quality of the analysis before publication by providing regular and detailed scrutiny of the analysis as presented to the collaboration. 150 citations.

19. *BlackMax: A black-hole event generator with rotation, recoil, split branes, and brane tension*
    Phys. Rev. D 77 076007 (2008) p1-32, D. Dai et al
    In this publication a new simulation code was publicly released modelling quantum gravity effects and micro-black-hole production at the LHC. My input to this publication and to the project was to ensure the simulation code was fit for purpose and easily available to researchers in the field. I provided significant input in structuring the package, benchmarking and development. 161 citations.

20. *First Measurement of Charged Current Cross Sections with Longitudinally Polarised Positrons*
    Phys. Lett. B 634 (2006) p173-179, H1 Collaboration
    I led the complete measurement project. 40 citations.

21. *A Determination of Electroweak Parameters at HERA*
    Phys. Lett. B 632 (2006) p35-42, H1 Collaboration
    I helped direct this analysis and provided detailed scrutiny. 48 citations.

22. *Search for New Physics in eq Contact Interactions at HERA*
    Phys. Lett. B 568 (2003) p35-47, H1 Collaboration
    I provided scrutiny of the measurement, advice on experimental uncertainties and ensured consistency with other publications. 51 citations.

23. *Measurement and QCD analysis of Neutral and Charged Current Cross Sections at HERA*
    Eur. Phys. J. C30, (2003) p1-32, H1 Collaboration
    I led the complete measurement project. 356 citations.

24. *Search for Compositeness, Leptoquarks and Extra Dimensions in eq Contact Interactions*
    Phys. Lett. B 479 (2000) p358-370, H1 Collaboration
    I provided scrutiny of the measurement, and performed analysis cross checks. 81 citations.

25. *Measurement of Neutral and Charged Current Cross Sections in e^-p Collisions at High Q^2*
    Eur. Phys. J. C19 (2001) p269-288, H1 Collaboration
    I led the complete measurement project. 226 citations.

26. *xF3γZ in Charged Lepton Scattering*
    Eur. Phys. J. Direct C3, N2 (2001), p1-8, E. Rizvi and T. Sloan
    I performed the complete analysis. 9 citations.

27. *Measurement and QCD Analysis of Jet Cross Sections in Deep-Inelastic e^+p collisions*
    Eur. Phys. J. C19 (2001) p289-311, H1 Collaboration
    I contributed to the determination of experimental uncertainties and performed detailed cross checks. 120 citations.

28. *Measurement of Neutral and Charged Current Cross Sections in e^+p Collisions at Large Q^2*
    Eur. Phys. J. C13, (2000) p609-639, H1 Collaboration
    I performed the complete phenomenological analysis of the data. 289 citations.

29. *High Q^2 Deep Inelastic Scattering at HERA*
    J. Phys. G 25, (1999) p1387-1409, A. M. Cooper-Sarkar et al
    I wrote one chapter of this six chapter report. 12 citations.

30. *Bose-Einstein Correlations in Deep Inelastic ep Scattering at HERA*
Z. Phys. C75, (1997) p437-451, H1 Collaboration

I performed the complete analysis. 31 citations.

31. *A Study of the Fragmentation of Quarks in ep Collisions at HERA*
Nucl. Phys. B445, (1995) p3-24, H1 Collaboration

I performed calculations providing theory corrections to the measured data. 65 citations.

Knowledge Transfer and Consultancy

2018 ▪ Obtained expressions of interest from 50 commercial and public-sector organisations as partners for CDT bid incl. IBM, Oracle, ONS.

2016 ▪ Obtained in-kind support for industrial placements of 6 months for particle physics PhD students to use their expertise in statistical analysis to problems in the commercial or governmental sectors. Letters of support amounting to £90,000 of in-kind support have been obtained from IBM Data Analytics, TUI and the National Crime Agency.

2016 ▪ Siemens approached me to discuss the nature of time in relation to my work on the LHC.

2012 ▪ I provided consultancy to the Gatsby Charitable Foundation, set up by Lord Sainsbury, offering my views of assessment in science practical work for schools. The aim of the project is to provide recommendations to the main Awarding Bodies in England (AQA, Edexcel, OCR) to help them improve how science practical work is assessed at GCSE and at A Level.

2013 – ▪ Given my expertise in nuclear physics, the Parliamentary Office of Science and Technology requested my advice for a House of Commons Library research paper entitled "*Iran's Nuclear Programme: Current State of Affairs and Prospects for Change in 2013*". I am currently advising Parliament on specifics of the uranium fuel cycle and the production and uses of certain radioisotopes.

Engagement with Society & Impact Activity

I have developed my outreach activity giving media interviews and speaking about my research to the general public. I was approached by the Royal Institution of Great Britain in spring 2011 and asked to give an inaugural series of six 90-minute evening lectures on particle physics. This project was very well received and I was asked to repeat the series four times to spring 2015.

2018 ▪ I am in discussion with the Bishopsgate Institute – a respected local cultural and educational institution – to host a short-course in particle physics to the general public. This represents an opportunity to engage a new kind of audience in my public outreach portfolio, and an opportunity for the institute to widen it's scope of offering. There is a potential to grow this activity and build an on-going relationship between Bishopsgate and QMUL.

2017 ▪ Initiated a collaboration with Hyphen Theatre Company to develop theatre engaging new audiences with particle physics. I have supported the company playwright on a visit to the CERN research laboratory and held two initial workshops at QM to develop ideas, with additional advice from the School Outreach & Engagement staff. This project is under active development.

2016 ▪ Procured PhD industrial commercial and public sector training placements for PhD students amounting to £90,000 of in-kind support from IBM Data Analytics, TUI, The National Crime Agency (NCA), and Gresham House Investment.

2013 ▪ Live interview on BBC World Service (½ hour) on my research at the LHC.

2011 – 15 ▪ Invited by the Royal Institution to deliver six-part Lecture Series in Particle Physics. I designed the course for adults with an interest in science but no formal training. This short course was the first time the RI had attempted this. The success of the course led to repeat annual invitations up to 2015 and deep, sustained engagement with 150 members of the paying public. The feedback responses were overwhelmingly positive.

2012 ▪ Discovery of the Higgs – Talk to QMUL Undergraduate Physics Society

2011 ▪ Interview for CNN

2010 ▪ Nominated for British Science Association Lecture Awards

2010 ▪ Particle Physics Lecture to London school teachers, QMUL

2010 ▪ High Energy Physics – Talk to Exeter Physics Society

Scholarship

2018 ▪ Attendee of QMUL Teaching & Learning Conference, January 2018

2017 – ▪ Appointed Chair of DISCnet Training Committee. At short notice I designed a 45 credit programme of training for 30 PhD students from 5 institutes. This required an assessment of the needs of students given the time and facilities available, and avoiding duplication of material from existing courses from each consortium node. The programme started teaching in Sept 2017 and is progressing well.

2015 – 2017 ▪ Commenced project evaluating streaming in my Synoptic Physics module of undergraduate tutorials (SPA6300). I wanted to understand if tutorial groups which were randomly assigned, streamed, or anti-streamed (high and low ability students in one group) would help peer learning in discussions during the tutorials. This 3-year experiment was not completed as I moved teaching to SPA4250/SPA5250 this year.

2014 ▪ Attempted new format of teaching following the methods articulated by the Harvard educator and physicist, Eric Mazur with a strong emphasis on interactive learning, and students required to read basic material prior to class. Lectures were reserved for discussion of concepts which had not been understood, as illuminated with in-class formative assessment using real-time electronic voting. This method aimed at concentrating learning in areas which needed it, and not those which were well understood, and was a natural progression of my earlier scholarly activity.

2012 ▪ Awarded student prize for Innovation in Lecturing

2011 ▪ Secured £5000 School funding to purchase electronic voting system still used in my current teaching of ug modules SPA5250/SPA4250

2010 ▪ Early adopter of video recording lectures, subsequently fed-back on early trials of QReview and video recording suite before full roll-out.

2008 ▪ Delivered lecture to cross-campus academic colleagues on usage of electronic voting systems in class via the Educational and Staff Development unit (now CAPD)

Conferences 2010-2018

A list of recent conferences , workshops attended and seminars given.

9th March 2018	**University of Southampton Seminar**	Invited speaker
25th Jan 2018	**Institute of Particle Physics Phenomenology Seminar,** University of Durham	Invited speaker
13th July 2017	**CERN Theory Group – Collider Seminar –** CERN, Geneva	Invited speaker
19-22nd Mar 2017	**xFitter Workshop – University of Oxford**	Invited participant
22-26th Aug 2016	**QCD@LHC International Conference**, Zurich, Switzerland	Invited plenary talk
17-22nd Sep 2015	**HEPMAD International Workshop**, Antananarivo, Madagascar	Invited plenary talk
25-29th Aug 2014	**QCD@LHC International Conference**, Suzdal, Russia	Invited plenary talk
10-12th Feb 2014	**Quantum Gravity Signatures Workshop –** University of Sussex	Invited speaker
2-5th Sep 2013	**QCD@LHC International Conference**, Hamburg, Germany	Invited plenary talk
20-27th Oct 2012	**International Workshop on Neutrino Interactions**, Rio de Janeiro, Brazil	Invited plenary speaker
24-26th Sept 2012	**LHC Electroweak Working Group**, Durham, UK	Invited speaker
8th Oct 2012	**PDF4LHC Workshop**, CERN, Geneva, Switzerland	Invited speaker

4-11th July 2012	**International Conference on High Energy Physics**, Melbourne, Australia	Invited talk
21-27th July 2011	**Europhysics Conference on High Energy Physics**, Grenoble, France	Invited talk
4th July 2011	**PDF4LHC Workshop**, DESY, Hamburg, Germany	Invited speaker
10th April 2011	**Dept. of Physics Seminar**, University of Qatar, Doha, Qatar	Invited seminar
22-27th May 2011	**International Conference on Structure and Interactions of the Photon**, Spa, Belgium	Invited plenary talk
26th Jan 2011	**NExT Phenomenology Institute Meeting**, SEPnet Rutherford Lab, Oxfordshire, UK	Invited speaker
20th Jan 2010	**Dept. of Physics Seminar**, University of Birmingham, Birmingham, UK	Invited speaker

Professional Training

I have taken **professional training courses** in Fair Selection, Assessing Students, Time Management, E-Learning, Managing Research Projects, and E-Learning prior to 2010 in the Learning Institute. More recently I have also taken the following courses:

2016	High Potential Leaders Programme	QMUL	90 hours
2014	Unconscious Bias Training	QMUL	3 hours
2013	Leadership Skills	Institute of Physics	3 hours
2012	Mentoring Young People	Mayoral Mentoring Programme	16 hours
2012	Conducting Performance Appraisals	Institute of Physics	2 hours
2010	Basic Safety Training Level 1 & 2	CERN	2 hour
2010	Specific Risks in Hazardous Areas	CERN	1 hour
2010	Safety in the ATLAS Cavern	CERN	1 hour

In addition I have delivered the following lectures and presentations to the Learning Institute:

2010 Electronic Voting Systems: Experiences and Advantages
2010 Using Electronic Voting Systems
2008 Interactive Student Response Systems