

# MPS Research Update

## February, March & April 2018

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## Staff mentions in the press, Public Engagement

**The Science Museum exhibition of quantum computing technology** was presented by Dr Seb Weidt and colleagues from the Ion Quantum Technology group. It starting 07 February 2018 and runs for four months in the “Tomorrow’s World” gallery. Live events ran from 13 to 15 February 2018.

**The Lewes STEM Fair** was organised by Dr Stephen Wilkins at Lewes Town Hall, 28 April 2018. This is a free festival for local people promoting STEM research. This year it featured the Webb Telescope and the UoS inflatable planetarium. <http://www.lewesstemfest.co.uk/>

## Awards and Recognitions

**Prof Antonella De Santo** was recently awarded an IPPP Associateship with the Institute of Particle Physics Phenomenology in Durham to explore synergies and complementarity between the High-Luminosity LHC and future colliders.

**Prof Anotida Madzvamuse** was recently appointed to the editorial board of the Royal Society Open Science Journal as an Associate Editor under the Mathematics Sections.

For 2018, **Prof Michael Melgaard** has obtained an **Asa Briggs Visiting Fellowship** for Prof Wenming Zou from Tsinghua University to work together on *Variational Methods and Applications to Nonlinear Partial Differential Equations*.

**Prof James Hirschfeld** has been awarded the 2016 Euler medal by the ICA (Institute of Combinatorics and its Applications) which “*recognizes distinguished lifetime career contributions to combinatorial research.*”

**Prof Istvan Kiss**, together with joint grant holder **Dr Masoumeh Dashti**, has recently been awarded a three year grant from the Leverhulme Trust, *Bayesian Inference and Approximations of High-Dimensional Network Models*. The grant starts September 2018, with a value of £301,665, and is seen as a very significant grant for Mathematics Department.

**Laura Murphy** won a poster prize at the recent 60th British Applied Mathematics Colloquium (BAMC) in St Andrews. Laura received her SIAM UKIE prize for the poster ‘*A mechanochemical model for cell motility*’.

## Areas of Knowledge Exchange

**The Mathematics department** recently held a three-day workshop *New Perspectives in Analysis, Probability and Applications* funded by a small grant from the London Mathematical Society. This celebrated the new appointments of Drs Kostas Koumamos, Andrew Duncan and Vlad Vysotskiy). Held 24 – 26 Jan 2018.

**Dr Luiz Vale Silva** reports KE in Rare B- and K-meson decays; perturbative calculations in an extended basis of operators, with the goal to constrain physics beyond the Standard Model of particle physics; sources of CP violation beyond the SM (impacting direct CP violation in the sector of kaons).

**Dr Omar Lakkis reports:** “In January 2018 I participated in the Power Networks Industry Days (organised by Max Jensen, Andrew Duncan and Enrico Scalas). I got interesting exchanges with engineers from Williams regarding mathematical models in battery lifetime modelling. With Vanessa Styles, we thought it might be interesting to follow up this with a view to apply for a joint project.”

**Dr Sebastian Jaeger** informs that TPP group have won a grant from the first round of DIVA awards ( <https://www.ippp.dur.ac.uk/diva> ), a scheme to support international visitors to particle physics research facilities in the UK. Professor Lee will visit Sussex this summer.

**Dr Steve Wilkins** has recently been announced as STFC Leadership Fellow in Public Engagement.

## Talks delivered (outside own research groups)

**Prof Alan Dalton** gave a talk at Cambridge Graphene Centre in Cambridge, 02 February 2018.

### “Generalized Knots”

A presentation by Dr Roger Fenn at “Knotted embeddings in Dimensions 3 & 4”, at CIRM, Marseille-Luminy, France, 12-16 February 2018

### “Convergent semi-Lagrangian methods for the Monge-Ampère equation on unstructured grids”

A research seminar delivered by Dr Max Jensen at the Department of Mathematics, University of Leicester, 15 February 2018.

### “Made to measure: using quantum to see more”

A public talk by Prof Jacob Dunningham, 15 February 2018 at the University of Sussex.

### “Digi Drop in: Is Quantum Computing the Next Big Thing?”

A public talk by Dr Seb Weidt, 16 February 2018, at the The FuseBox (Digital Catapult Centre), Brighton.

**Davide Cuszeddu**, Marie Skłodowska-Curie Researcher, won a third prize for his poster presentation, '*Wave pinning mechanism in a 3d bulk-surface model*', which he presented at the International Symposium on Measuring and Modelling Cell Migration, held in Vienna 22-23 February 2018.

**“The Science of Ultrafast Photonics”**

A public talk by Prof Marco Peccianti at the Cafe Scientific, Brighton, 10 March 2018.

**“Clusters of Galaxies: the shy giants of the cosmos”.**

Public talk by Prof Kathy Romer, 15 March 2018, at the University of Sussex.

**Dr Andrea Banfi** gave an invited talk at SCET 2018 Workshop, University of Amsterdam, 19-22 March 2018.

**“Random matrix theory and log-correlated Gaussian fields”**

Dr Nick Simm delivered a total of 4 hours of talks on his research at a “mini-school” at the University of Science & Technology, Hefei, China (USTC), 26-27 March 2018. (<http://math.ustc.edu.cn/new/bencandy.php?fid=34&aid=3165>). This has resulted in an on-going collaboration with an academic (Associate Professor) at USTC.

**Dr Iacopo Vivarelli** gave a 25 minute talk at the Fermilab workshop on HL/HE LHC, 04-06 April 2018.

<https://indico.fnal.gov/event/16151/overview>

**“The Emergent World: linking large-scale phenomena with the underlying small-scale dynamics”**

A public talk by Dr Sara Aceituno, 12 April 2018, at the University of Sussex.

**“Small-scale galaxy dynamics: the pairwise velocity dispersion”**

A presentation by Dr Jon Loveday at Statistical Challenges for Large-Scale Structure in the era of LSST. 18-20 April 2018, Oxford, UK.

**Talk to Foredown Astronomers.**

A public talk by Dr Iacopo Vivarelli, 19 April 2018.

**Prof Jacob Dunningham** was an invited speaker at the "NUDT-Oxford Workshop on Quantum Technologies" in Oxford on 25 April 2018.

**“Hunting Dark Matter: searches for new phenomena in particle physics”**

A public talk by Dr Iacopo Vivarelli, 26 April 2018, at the University of Sussex.

## Impact

An **STFC Impact Acceleration award** (2018) for a value of £100,000 has been won by MPS (Seb Oliver). The award will run until January 2019. The purpose of STFC IAA awards is to support commercialisation of STFC-funded research, support concept studies, training of staff on KE and commercialisation, carry out market surveys and hold showcase events for user or develop proposals for STFC innovation funding.

An **ESRC IAA proposal** for £48,000 to support Creative, Digital and Tech business has been successful and will be contracted to Wired Sussex (Seb Oliver).

**Dr Istvan Kiss** informs that following a feasibility project funded by the RDF last year, AVIVA have agreed to 50% fund an **Industrial PhD studentship** in the Mathematics Department. This is seen as a precursor to developing Impact case studies.

### **Potentially life-saving 'health monitor' technology designed by University of Sussex physicists (Prof Alan Dalton)**

"Sick babies in remote parts of the world could be monitored from afar, thanks to new wearable technology designed by Prof Alan Dalton and his team" (09 Jan 2018). <http://www.sussex.ac.uk/staff/newsandevents/index?page=6&id=43180>

### **Prof Alan Dalton reports:**

On the 12-13 of March 2018 the Material Physics group (Manuela Meloni, Dr Matthew Large, Dr Peter Lynch, Sean Ogilvie) exhibited at the Materials Research Exchange 2018 event in London. The two-day event aimed to bring academic researchers together with industry to foster greater knowledge transfer and collaborative innovation. As a result the group has engaged with four businesses in order to develop specific materials solutions as well as ongoing research partnerships.

Members of the group (Prof. Dalton, Dr Alice King, Dr Matthew Large, Sean Ogilvie, Seb Nufer) attended the ACS National Meeting in New Orleans between the 18 and 22 of March 2018, presenting work ranging from emulsification of layered nanomaterials to interactions of cells with nanostructured scaffolds.

Meanwhile, on the 19 March 2018, Reuters UK published a video article discussing the group's earlier work on flexible smart device touchscreens (featuring Dr Matthew Large). (Video link: <https://uk.reuters.com/video/2018/03/08/unbreakable-phone-screen-prototype-will?videoId=407170393>)

Sussex visited Malaysia and Singapore to strengthen partnerships and provide opportunities for staff and students in one of the most dynamic regions. Professor Alan Dalton presented to guests the cutting-edge research in nanotechnology by the Materials Physics Group. (News item: <http://www.sussex.ac.uk/broadcast/read/44321>)

**James Waterfield** has been awarded an RSE/STFC Enterprise Fellowship until September 2018.

**Konstantin Blyuss reports:** “A joint paper with colleagues from Ukraine is currently being prepared (planned submission May/June), which contains details of experiments on crops, motivated by my 3 published mathematical papers on RNA interference.”

**Istvan Kiss update:**

We have a PhD student on placement at a commercial company currently and we are hoping to get some of our methods implemented by the end of next year, maybe earlier. We published our first paper, this is a direct result of the interactions with the industry, <http://sro.sussex.ac.uk/id/eprint/74274>. We also submitted a second paper to KDD 2018, currently under review. “*Inferring the time-varying functional connectivity of large-scale computer networks from emitted events*”

**Colin Hayhurst:**

A workshop for PhD students was run by Colin Hayhurst and Julia Shalet. 09 February 2018. The topic was how to take forward innovations from their research.

**Dr Luiz Vale Silva:**

Discussions with visitors (M. Chala, Durham) and collaborators (V. Bernard, S. Descotes-Genon (Paris-Sud), S. Fajfer, N. Kosnik (Jozef Stefan Inst.)) outside my own research group here in Brighton. Also, I participated in the Kaon Forum held in Edinburgh in February (<https://indico.ph.ed.ac.uk/event/35/>).

**Jose Verdu Galiana reports** that the research contract with Leonardo UK has concluded. A final report has been delivered. Currently we are awaiting the filing of a (possibly joint) patent on the results.

**Dr Omar Lakkis:**

Philip Townsend, a PhD under the EPSRC-CASE award scheme (the backbone of my REF Impact Case) has successfully discussed his viva, with corrections to be imported on his thesis.

We have also met with Ambiental to discuss the realisation of impact ensuing from this research. The research on stochastic flood modelling is ongoing, we are in the last phases of developing a one dimensional multilevel Monte Carlo solver (academic version).

## **Significant Research outcomes – results**

**Dr Nicholas Simm:**

With collaborators in Bristol (Prof. Francesco Mezzadri) and University College Dublin (Dr Fabio Deelan Cunden and Prof. Neil O'Connell), we discovered objects in random matrix theory which mimic behaviour of the Riemann zeta function: they obey a functional equation and have zeros on a critical line.

This involves a new connection between random matrices and hypergeometric orthogonal polynomials (of Askey-Wilson type). This is a substantial work, we believe of significant novelty. Many of these results emerged in the last few months.

***High-energy terahertz surface optical rectification***, a publication by Luke Peters and colleagues. "We have found that it is practically possible to create terahertz in significant amounts by illuminating ultrathin electronic semiconductors, which could simply be placed upon any surface."

<https://doi.org/10.1016/j.nanoen.2018.01.027>

<http://www.sussex.ac.uk/staff/newsandevents/?id=44372>

**The ATLAS collaboration** has released a new search for stops decaying to charm quarks. Two members of the Sussex ATLAS group, Dr Kerim Suruliz and Sam Jones contributed to the analysis. Details: <http://atlas.cern/updates/physics-briefing/charming-susy-running-out-places-hide>

**Neil Sherborne**, together with Dr Konstantin Blyuss and Prof Istvan Kiss, have published a possible explanation of how people's behaviour during epidemic outbreaks can cause multiple waves of high disease prevalence.

*Bursting endemic bubbles in an adaptive network*, *Physical Review E* 97, 042306 (2018).

## Other news

The sixth **Postgraduate Research Conference** for PGR students in MPS took place in the Creativity zone, University of Sussex, 28 March 2018.

<http://www.sussex.ac.uk/math/about/newsandevents/?id=44608>

### **Dr Omar Lakkis:**

I have been awarded a new EPSRC-CASE to continue the ongoing collaboration with Ambiental. I have two candidates.

**Dr Andrea Banfi** was an invited participant in the "UK input to the European Particle Physics Strategy Update". This is reserved for experts in the field. The European strategy for particle physics lasts seven years and gives the main research direction (and hence funding) in the field. 16-18 April 2018.

**Department of Mathematics. Publications deposited in SRO in February, March & April 2018.**

To view the paper enter the SRO ID as <http://sro.sussex.ac.uk/nnnnn>

<b>Sussex Author</b>	<b>SRO ID</b>	<b>Status</b>	<b>Author(s)</b>	<b>Output Title</b>	<b>Volume Title</b>
Dashti, Masoumeh	73489	Accepted	Agapiou, Sergios; Burger, Martin; Dashti, Masoumeh; Helin, Tapio	Sparsity-promoting and edge-preserving maximum a posteriori estimators in non-parametric Bayesian inverse problems	Inverse Problems
Düring, Bertram	75216	Accepted	Düring, Bertram; Pitkin, Alexander	Efficient hedging in Bates model using high-order compact finite differences	Recent Advances in Mathematical and Statistical Methods
Fatehi Chenar, Farzad	73297	Published	Fatehi Chenar, Farzad; Kyrychko, Sergey; Ross, Aleksandra; Kyrychko, Yuliya; Blyuss, Konstantin	Stochastic effects in autoimmune dynamics	Frontiers in Physiology
Fatehi Chenar, Farzad	75024	Published	Fatehi Chenar, F; Kyrychko, Y N; Blyuss, K B	Mathematical model of immune response to hepatitis B	Journal of Theoretical Biology
Jensen, Max	73725	Accepted	Jensen, Max	Numerical solution of the simple Monge–Ampe`re equation with non-convex dirichlet data on non-convex domains	Numerical methods for Hamilton-Jacobi equations in optimal control and related fields
Jensen, Max	73726	Accepted	Jensen, Max; Smears, Iain	On the notion of boundary conditions in comparison principles for viscosity solutions	Numerical methods for Hamilton-Jacobi equations in optimal control and related fields
Kiss, Istvan Z	73577	Published	Rost, G; Vizi, Z; Kiss, I Z	Pairwise approximation for SIR type network epidemics with non-Markovian recovery	Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science
Kiss, Istvan Z	74274	Accepted	Message, Antoine; Parisi, George; Harper, Robert; Tee, Philip; Kiss, István Z; Berthouze, Luc	Network Events in a Large Commercial Network: What can we learn?	NOMS 2018 - IEEE/IFIP AnNet
Koumatos, Konstantinos	73653	Accepted	Koumatos, Konstantinos; Spirito, Stefano	Quasiconvex elastodynamics: weak-strong uniqueness for measure-valued solutions	Communications on Pure and Applied Mathematics
Makridakis, Charalambos	73728	Published	Georgoulis, Emmanuil H; Hall, Edward; Makridakis, Charalambos	An a posteriori error bound for discontinuous Galerkin approximations of convection-diffusion problems	IMA Journal of Numerical Analysis
Makridakis, Charalambos	74084	Accepted	Makridakis, Charalambos G	On the Babuška-Osborn approach to finite element analysis: L2 estimates for unstructured meshes	Numerische Mathematik
Merino Aceituno, Sara	73683	Published	Merino-Aceituno, Sara	Isotropic wave turbulence with simplified kernels: Existence, uniqueness, and mean-field limit for a class of instantaneous coagulation-fragmentation processes	Journal of Mathematical Physics



Merino Aceituno, Sara	73685	Published	Degond, Pierre; Frouvelle, Amic; Merino-Aceituno, Sara; Trescases, Ariane	Quaternions in collective dynamics	Multiscale Modeling & Simulation
Merino Aceituno, Sara	73688	Published	Mellet, Antoine; Merino-Aceituno, Sara	Anomalous energy transport in FPU- $\beta$ chain	Journal of Statistical Physics
Merino Aceituno, Sara	73696	Published	Degond, Pierre; Liu, Jian-Guo; Merino-Aceituno, Sara; Tardiveau, Thomas	Continuum dynamics of the intention field under weakly cohesive social interaction	Mathematical Models and Methods in Applied Sciences
Merino Aceituno, Sara	73700	Published	Degond, Pierre; Frouvelle, Amic; Merino-Aceituno, Sara	A new flocking model through body attitude coordination	Mathematical Models and Methods in Applied Sciences
Palombaro, Mariapia	74301	Accepted	Alicandro, Roberto; Dal Maso, Gianni; Lazzaroni, Giuliano; Palombaro, Mariapia	Derivation of a linearised elasticity model from singularly perturbed multiwell energy functionals	Archive for Rational Mechanics and Analysis
Simm, Nicholas J	73303	Published	Mezzadri, F; Simm, N J	Moments of the transmission eigenvalues, proper delay times, and random matrix theory I	Journal of Mathematical Physics
Simm, Nicholas J	73392	Accepted	Lambert, Gaultier; Ostrovsky, Dmitry; Simm, Nick	Subcritical multiplicative chaos for regularized counting statistics from random matrix theory	Communications in Mathematical Physics
Taheri, Ali	73498	Published	Day, Stuart; Taheri, Ali	A class of extremising sphere-valued maps with inherent maximal tori symmetries in $SO(n)$	Boundary Value Problems

**Department of Physics & Astronomy. Publications deposited in SRO in February, March & April 2018.**

**To view the paper enter the SRO ID as <http://sro.sussex.ac.uk/nnnnn>**

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Allbrooke, Benedict MM	73528	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for dark matter in association with a Higgs boson decaying to two photons at $\sqrt{s}=13$ TeV with the ATLAS detector	Physical Review D
Allbrooke, Benedict MM	73529	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for an invisibly decaying Higgs boson or dark matter candidates produced in association with a Z boson in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	Physics Letters B
Allbrooke, Benedict MM	73531	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for new phenomena with large jet multiplicities and missing transverse momentum using large-radius jets and flavour-tagging at ATLAS in 13 TeV pp collisions	Journal of High Energy Physics
Allbrooke, Benedict MM	73532	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Evidence for the $H \rightarrow b\bar{b}$ decay with the ATLAS detector	Journal of High Energy Physics
Allbrooke, Benedict MM	73534	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Measurements of top-quark pair differential cross-sections in the lepton+jets channel in pp collisions at $\sqrt{s}=13$ TeV using the ATLAS detector	Journal of High Energy Physics
Allbrooke, Benedict MM	73535	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for direct top squark pair production in final states with two leptons in $\sqrt{s}=13$ TeV pp collisions with the ATLAS detector	The European Physical Journal C - Particles and Fields
Allbrooke, Benedict MM	73538	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Measurement of the cross-section for producing a W boson in association with a single top quark in pp collisions at $\sqrt{s}=13$ TeV with ATLAS	Journal of High Energy Physics
Allbrooke, Benedict MM	73540	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Measurement of lepton differential distributions and the top quark mass in $t\bar{t}$ production in pp collisions at $\sqrt{s}=8$ TeV with the ATLAS detector	The European Physical Journal C: Particles and Fields
Allbrooke, Benedict MM	73541	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for additional heavy neutral Higgs and gauge bosons in the ditau final state produced in 36 fb <sup>-1</sup> of pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	Journal of High Energy Physics
Allbrooke, Benedict MM	73543	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Femtoscropy with identified charged pions in proton-lead collisions at $\sqrt{s_{NN}}=5.02$ TeV with ATLAS	Physical Review C (PRC)
Allbrooke, Benedict MM	73545	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Study of ordered hadron chains with the ATLAS detector	Physical Review D

Allbrooke, Benedict MM	73554	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Measurement of the $t\bar{t}$ production cross section in proton-proton collisions at $\sqrt{s}=8$ TeV with the ATLAS detector	Journal of High Energy Physics
Allbrooke, Benedict MM	73556	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Determination of the strong coupling constant $\alpha_s$ from transverse energy-energy correlations in multijet events at $\sqrt{s}=8$ TeV using the ATLAS detector	European Physical Journal C: Particles and Fields
Allbrooke, Benedict MM	73557	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for squarks and gluinos in events with an isolated lepton, jets, and missing transverse momentum at $\sqrt{s}=13$ TeV with the ATLAS detector	Physical Review D
Allbrooke, Benedict MM	73558	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for pair production of vector-like top quarks in events with one lepton, jets, and missing transverse momentum in $\sqrt{s}=13$ TeV pp collisions with the ATLAS detector	Journal of High Energy Physics
Allbrooke, Benedict MM	73559	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M; Vivarelli, I; and 0 other(s)	Measurement of the exclusive $\mu^+\mu^-$ process in proton-proton collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	Physics Letters B
Allbrooke, Benedict MM	73560	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for new phenomena in high-mass diphoton final states using 37 fb <sup>-1</sup> of proton-proton collisions collected at $\sqrt{s}=13$ TeV with the ATLAS detector	Physics Letters B
Allbrooke, Benedict MM	73562	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for diboson resonances with boson-tagged jets in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	Physics Letters B
Allbrooke, Benedict MM	73563	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for dark matter produced in association with a Higgs boson decaying to $b\bar{b}$ using 36 fb <sup>-1</sup> of pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	Physical Review Letters (PRL)
Allbrooke, Benedict MM	73565	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Measurement of differential cross sections of isolated-photon plus heavy-flavour jet production in pp collisions at $\sqrt{s}=8$ TeV using the ATLAS detector	Physics Letters B
Allbrooke, Benedict MM	73567	Published	Allbrooke, B M M; Asquith, L; Cerri, A; Chavez Barajas, C A; De Santo, A; Salvatore, F; Santoyo Castillo, I; Suruliz, K; Sutton, M R; Vivarelli, I; and 0 other(s)	Search for heavy resonances decaying into WW in the $e^+\mu^-$ final state in pp collisions at $\sqrt{s}=13$ TeV with the ATLAS detector	European Physical Journal C: Particles and Fields
Allbrooke, Benedict MM	73638	Published	DeSanto, Antonella; Cerri, Alessandro; Allbrooke, Benedict; Asquith, Lily; Shaw, Kate; Suruliz, Kerim; Sutton, Mark; Vivarelli, Iacopo; The ATLAS Collaboration,	Search for B-L R-parity-violating top squarks in $\sqrt{s}=13$ TeV pp collisions with the ATLAS experiment	Physical Review D
Calmet, Xavier	74289	Published	Calmet, Xavier; Latosh, Boris	Three waves for quantum gravity	European Physical Journal C: Particles and Fields
Cole, Philippa	73579	Published	Cole, Philippa S; Byrnes, Christian T	Extreme scenarios: the tightest possible constraints on the power spectrum due to primordial black holes	Journal of Cosmology and Astroparticle Physics

Duivendoorden, Steven	74188	Published	Duivendoorden, S; Oliver, S; Scudder, J M; Greenslade, J; Reichers, D A; Wilkins, S M; Buat, V; Chapman, S C; Clements, D L; Cooray, A; and 20 other(s)	Red, redder, reddest: SCUBA-2 imaging of colour-selected Herschel sources	Monthly Notices Of The Royal Astronomical Society
Fernandez Lorenzo, Samuel	73609	Published	Fernández Lorenzo, Samuel; Dunningham, Jacob A; Porras, Diego	Heisenberg scaling with classical long-range correlations	Physical Review A
Fratta, Giuseppe	75255	Published	Istif, Emin; Hernández-Ferrer, Javier; Urriolabeitia, Esteban P; Stergiou, Anastasios; Tagmatarchis, Nikos; Fratta, Giuseppe; Large, Matthew J; Dalton, Alan B; Benito, Ana M; Maser, Wolfgang K	Conjugated polymer nanoparticle-graphene oxide charge-transfer complexes	Advanced Functional Materials
Hindmarsh, Mark B	73597	Published	Hindmarsh, Mark	Sound shell model for acoustic gravitational wave production at a first-order phase transition in the early Universe	Physical Review Letters
Hurley, Pete D	74709	Published	Pearson, W J; Wang, L; Hurley, P D; Malek, K; Buat, V; Burgarella, D; Farrah, D; Oliver, S J; Smith, D J B; van der Tak, F F S	Main sequence of star forming galaxies beyond the Herschel confusion limit	Astronomy and Astrophysics
Jaeger, Sebastian	73550	Published	Jäger, Sebastian; Leslie, Kirsten; Kirk, Matthew; Lenz, Alexander	Charming new physics in rare B decays and mixing?	Physical Review D
Jaeger, Sebastian	74391	Published	Jaeger, Sebastian; Leslie, Kirsten; Kirk, Matthew; Lenz, Alexander	Charming new physics in rare B decays and mixing?	Physical Review D (PRD)
Keller, Matthias K	73592	Published	Kajita, Masatoshi; Gopakumar, Geetha; Abe, Minori; Hada, Masahiko; Keller, Matthias	Test of mp/me changes using vibrational transitions in N2+	Physical Review A
Loveday, Jonathan N	74448	Published	Barsanti, S; Owers, M S; Brough, S; Davies, L J M; Driver, S P; Gunawardhana, M L P; Holwerda, B W; Liske, J; Loveday, J; Pimblett, K A; and 1 other(s)	Galaxy and mass assembly (GAMA): impact of the group environment on galaxy star formation	Astrophysical Journal
Ogilvie, Sean P	74975	Accepted	Nufer, Sebastian; Fantanas, Dimitrios; Ogilvie, Sean P; Large, Matthew J; Winterauer, Dominik J; Salvage, Jonathan P; Meloni, Manuela; King, Alice A K; Schellenberger, Pascale; Shmeliov, Aleksey; and 7 other(s)	Percolating metallic structures templated on laser-deposited carbon nanofoams derived from graphene oxide: applications in humidity sensing	ACS Applied Nano Materials
Peters, Luke	73364	Published	Peters, L; Tunesi, J; Pasquazi, A; Peccianti, M	High-energy terahertz surface optical rectification	Nano Energy
Romer, Kathy K	73580	Published	Diehl, H T; Buckley-Geer, E J; Lindgren, K A; Nord, B; Gaitsch, H; Gaitsch, S; Lin, H; Allam, S; Collett, T E; Furlanetto, C; and 14 other(s)	The DES bright arcs survey: hundreds of candidate strongly lensed galaxy systems from the Dark Energy Survey Science Verification and year 1 observations	Astrophysical Journal Supplement
Romer, Kathy K	73581	Published	The LIGO Scientific Collaboration, and other collaborations; Abbott, B P; Romer, A K; others,	Multi-messenger observations of a binary neutron star merger	Astrophysical Journal Letters

Romer, Kathy K	73583	Published	Cowperthwaite, P S; Berger, E; Villar, V A; Metzger, B D; Nicholl, M; Chornock, R; Blanchard, P K; Fong, W; Margutti, R; Romer, A K; and 0 other(s)	The electromagnetic counterpart of the binary neutron star merger LIGO/Virgo GW170817. I. discovery of the optical counterpart using the Dark Energy Camera	Astrophysical Journal Letters
Romer, Kathy K	73588	Published	Cowperthwaite, P S; Berger, E; Villar, V A; Metzger, B D; Nicholl, M; Chornock, R; Blanchard, P K; Fong, W; Margutti, R; Soares-Santos, M; and 2 other(s)	The electromagnetic counterpart of the binary neutron star merger LIGO/Virgo GW170817. II. UV, optical, and near-infrared light curves and comparison to kilonova models	Astrophysical Journal Letters
Romer, Kathy K	73589	Published	The LIGO Scientific Collaboration, and other collaborations; Abbott, B P; Romer, A K; others,	A gravitational-wave standard siren measurement of the Hubble constant	Nature
Romer, Kathy K	73615	Published	Palmese, A; Hartley, W; Tarsitano, F; Conselice, C; Lahav, O; Allam, S; Annis, J; Lin, H; Soares-Santos, M; Tucker, D; and 1 other(s)	Evidence for dynamically driven formation of the GW170817 neutron star binary in NGC 4993	Astrophysical Journal Letters
Romer, Kathy K	73626	Published	Agnello, A; Lin, H; Buckley-Geer, L; Treu, T; Bonvin, V; Courbin, F; Lemon, C; Morishita, T; Romer, A K; others,	Models of the strongly lensed quasar DES J0408-5354	Monthly Notices of the Royal Astronomical Society
Romer, Kathy K	73628	Published	Prat, J; Sánchez, C; Miquel, R; Kwan, J; Blazek, J; Bonnett, C; Amara, A; Bridle, S L; Clampitt, J; Croce, M; and 9 other(s)	Galaxy bias from galaxy–galaxy lensing in the DES science verification data	Monthly Notices of the Royal Astronomical Society
Romer, Kathy K	74193	Published	Smith, M; Sullivan, M; Nichol, R C; Galbany, L; D'Andrea, C B; Inserra, C; Lidman, C; Rest, A; Schirmer, M; Filippenko, A V; and 20 other(s)	Studying the ultraviolet spectrum of the first spectroscopically confirmed supernova at redshift two	Astrophysical Journal
Romer, Kathy K	74194	Published	Chang, C; Pujol, A; Mawdsley, B; Bacon, D; Elvin-Poole, J; Melchior, P; Kovács, A; Jain, B; Leistedt, B; Romer, A K; and 0 other(s)	Dark energy survey year 1 results: curved-sky weak lensing mass map	Monthly Notices Of The Royal Astronomical Society
Romer, Kathy K	74195	Published	Wethers, C F; Banerji, M; Hewett, P C; Lemon, C A; McMahon, R G; Reed, S L; Shen, Y; Romer, A K; The DES Collaboration, ; Others,	UV-luminous, star-forming hosts of $z \sim 2$ reddened quasars in the dark energy survey	Monthly Notices Of The Royal Astronomical Society
Romer, Kathy K	74821	Published	Garcia-Fernandez, M; Sanchez, E; Sevilla-Noarbe, I; Suchyta, E; Huff, E M; Gaztanaga, E; Aleksic, J; Ponce, R; Castander, F J; Hoyle, B; and 1 other(s)	Weak lensing magnification in the dark energy survey science verification data	Monthly Notices Of The Royal Astronomical Society
Romer, Kathy K	74822	Published	Baxter, E J; Raghunathan, S; Crawford, T M; Fosalba, P; Hou, Z; Holder, G P; Omori, Y; Patil, S; Rozo, E; Abbott, T M C; and * other(s)	A measurement of CMB cluster lensing with SPT and DES year 1 data	Monthly Notices of the Royal Astronomical Society
Rooney, Philip J	74659	Accepted	Ford, Elizabeth; Lupton, Grace; Rooney, Philip; Oliver, Seb; Cassell, Jackie	Development of a model for finding unlabeled cases of rheumatoid arthritis in UK primary care patient records	
Rooney, Philip J	74679	Published	Ford, Elizabeth; Greenslade, Nicholas; Paudyal, Priya; Bremner, Stephen; Smith, Helen; Banerjee, Sube; Sadhwani, Shanu; Rooney, Philip; Oliver, Seb; Cassell, Jackie	Predicting dementia from primary care records: a systematic review and meta-analysis	PLoS ONE

Sargent, Mark	69917	Published	Daddi, E; Jin, S; Strazzullo, V; Sargent, M T; Wang, T; Ferrari, C; Schinnerer, E; Smolcic, V; Calabró, A; Coogan, R; and 7 other(s)	Radio selection of the most distant galaxy clusters	Astrophysical Journal
Sargent, Mark	73714	Published	Sargent, Mark	"Super-deblended" dust emission in galaxies. I. The GOODS-North catalog and the cosmic star formation rate density out to redshift 6	Astrophysical Journal
Sargent, Mark	73715	Published	Violino, Giulio; Ellison, Sara L; Sargent, Mark; Coppin, Kristen E K; Scudder, Jillian M; Mendel, Trevor J; Saintonge, Amelie	Galaxy pairs in the SDSS - XIII. The connection between enhanced star formation and molecular gas properties in galaxy mergers	Monthly Notices of the Royal Astronomical Society
Sargent, Mark	73716	Published	Gobat, R; Daddi, E; Magdis, G; Bournaud, F; Sargent, M; Martig, M; Jin, S; Finoguenov, A; Béthermin, M; Hwang, H S; and 5 other(s)	The unexpectedly large dust and gas content of quiescent galaxies at $z > 1.4$	Nature Astronomy
Sargent, Mark	73717	Published	Brusa, M; Cresci, G; Daddi, E; Paladino, R; Perna, M; Bonigiorno, A; Lusso, E; Sargent, M T; others,	Molecular outflow and feedback in the obscured Quasar XID2028 revealed by ALMA	Astronomy & Astrophysics
Sargent, Mark	73718	Accepted	Sargent, Mark	Molecular gas in AzTEC/C159: a star-forming disk galaxy 1.3Gyr after the Big Bang	Astronomy & Astrophysics
Sargent, Mark	73719	Published	Sargent, Mark; Molnar, Daniel Csaba	The infrared-radio correlation of spheroid- and disc-dominated star-forming galaxies to $z \sim 1.5$ in the COSMOS field	Monthly Notices of the Royal Astronomical Society
Sargent, Mark	73720	Accepted	Leslie, S K; Sargent, M T; Schinnerer, E; Groves, B; van der Wel, A; Zamorani, G; Fudamoto, Y; Lang, P; Smolcic, V	Probing star formation and ISM properties using galaxy disk inclination I: Evolution in disk opacity since $z \sim 0.7$	Astronomy & Astrophysics
Verdu Galiana, Jose L	74521	Published	Verdu, Jose	Novel penning traps	Physics with trapped charged particles
Verdu Galiana, Jose L	74526	Published	Verdu Galiana, Jose	Trapped electrons as electrical (quantum) circuits	Physics with trapped charged particles
Vinton, Luke	74542	Published	Vinton, Luke	Measurement of muon neutrino disappearance with a NOVA experiment	

Principal Investigator	Principal Funder with Reference	Programme	Title	Value	Start Date
<b>AWARDED</b>					
Sebastian Jaeger	ROYAL SOCIETY	RSOC Newton International Fellowships	Flavour Probes of Unified Theories in the LHC/LHCb/Belle2 Era (External Applicant)	99000	30-Mar-17
Seb J Oliver	STFC	STFC Food Innovation Network	Making vertical farming stack-up	8000	16-Apr-18
Seb J Oliver	STFC	Official Development Assistance (ODA) Institutional Awards	STFC Official Development Assistance (ODA) Institutional Awards	15000	17-Apr-18
Sebastian Jaeger	DURHAM UNIVERSITY (DIVA)	DU IPPP Associateships	Strongly coupled new physics at LHCb and beyond	5000	24-Apr-18
Seb J Oliver	PUBLIC HEALTH ENGLAND	None	Testing the feasibility of applied Bayesian probabilistic modeling to maximize the public health value of electronic health record data	15651	07-Mar-18
Seb J Oliver	STFC	GCRF - Foundation Award 2017	Applying Astronomy Data Analysis to enhance disaster forecasting	33,882.36	01-Apr-18
Iacopo Vivarelli	ROYAL SOCIETY	RSOC International Exchanges Scheme	Direct stau production with the ATLAS detector at the LHC	11,400	01-Apr-18
Seb J Oliver	STFC	STFC Food Innovation Network	Forecasting Agricultural Crop Yields at National scales (FACYNation)	8,000	01-Apr-18
Konstantinos Koumatos	London Mathematical Society	Celebrating New Appointment	Mathematics in Material Science	600	24-Jan-18
Simon Peeters	ROYAL SOCIETY	RSOC International Exchanges Scheme	Neutrino physics using pioneering liquid scintillator detector technology	10,000	01-Mar-18
Seb J Oliver	STFC	Official Development Assistance (ODA) Institutional Awards	Official Development Assistance (ODA) Institutional Awards	15000	01-Apr-18
Vladislav Vysotskiy	London Mathematical Society	Celebrating New Appointment	Random Walks and Markov Chains Day	600	25-Jan-18
Seb J Oliver	STFC	STFC Impact Acceleration Account	STFC Impact Acceleration Account (IAA) 2018	100,000	05-Jan-18
<b>FORECASTED</b>					
Seb J Oliver	STFC	None	Big Data techniques applied to Earth Observation for Pastoralism	111432	23-Apr-18
Matthias Keller	Innovate UK/EPSRC	Commercialisation of Quantum Technologies 4	IOTA: Compact Ion Clock for Precision Timing Applications	250,855.	01-May-18
Matthias Keller	EPSRC via Oxford Hub		Ultra-High Vacuum Fibre Feedthroughs for Quantum Technologies	111,986.	01-May-18
<b>SUBMITTED</b>					
Stephen Wilkins	STFC	STFC Public Engagement Spark Awards	An animated introduction to the James Webb Space Telescope	15000	25-Apr-18
Peter Giesl	LEVERHULME TRUST	Leverhulme Research Project Grant	Automatic analysis of attractors in dynamical systems	295,781	01-Feb-19
Peter Thomas	EUROPEAN UNION	H2020 - Marie Curie ITN: Europ Train Netw (ETN)	Cosmo2020: Grand Challenges in Computer Simulation of the Universe: ESR Training in High Performance Computing and Data Intensive Science	0	01-Jan-19
Peter Krueger	INNOVATE UK (TSB)	None	Current Density Imaging in EV battery modules	116141	28-Mar-18
Stephen Wilkins	ROYAL SOCIETY	RSOC Leverhulme Trust Senior Research Fellowships	Exploring the Epoch of Reionisation with the James Webb Space Telescope	37,441	01-Jan-19

Daniel Litim	ROYAL SOCIETY	RSOC Newton International Fellowships	Four-dimensional conformal field theories for physics beyond the Standard Model (External applicant)	99,000	01-Nov-18
Daniel Litim	ROYAL SOCIETY	RSOC Newton International Fellowships	Four-dimensional conformal field theories for physics beyond the Standard Model (External applicant)	99000	27-Mar-18
Alan Dalton	ROYAL SOCIETY	RSOC Leverhulme Trust Senior Research Fellowships	Interfacial Assembly of Two-Dimensional nanomaterials	40,920	01-Oct-18
Winfried Hensinger	EUROPEAN UNION	H2020 - FET Flagships	iQSim: Trapped Ion Quantum Simulators	373,506.5	01-Aug-18
Winfried Hensinger	EUROPEAN UNION	H2020 - FET Flagships	Microwave driven ion Trap quantum Computing	221,931.5	01-Aug-18
Alice King	EUROPEAN UNION	H2020 - FET Flagships	Nanomaterials for Life Sciences: Developing the Nano-Bio Interface for Health and Wellbeing	393,934.2	01-Oct-18
Veronica Sanz	ROYAL SOCIETY	RSOC Newton International Fellowships	Probing CP violation in the Higgs sector using artificial neural networks [external]	99,000	01-Jan-19
Kate Shaw	STFC	STFC Leadership Fellows in Public Engagement	Public Engagement in Particle Physics and its Impact	99,494	01-Mar-19
Jose Verdu	EUROPEAN UNION	H2020 - FET Flagships	QMM: Quantum Microwave Microscope	1,443,460	01-Jan-19
Max Jensen (9%), Spyros Skarvelis-Kazakos	EPSRC	EPSRC UK Energy Research Centre (UKERC)	Resilient, Reliable, Intelligent, Integrated Energy Systems (R2I2-EnerSys)	49,825	30-Jun-18
Barry Garraway	EUROPEAN UNION	H2020 - FET Flagships	SAGNAC: SAGnac Gyroscope for Navigation based on Atom Chips	446,564	01-Aug-18
Seb J Oliver	EUROPEAN UNION	H2020 - Industrial Leadership: Space	STARWAY: STudents, Astronomy and Research: Widening Access for Young people	98663	08-Mar-18
Simon Peeters	STFC	STFC PPGP Experiment 2018 - Consolidator Grant	STFC Experimental Particle Physics 2018 Consolidated Grant	481,605.8	01-Oct-19
Antonella De Santo	ROYAL SOCIETY	RSOC Leverhulme Trust Senior Research Fellowships	Synergies and Complementarity between the High-Luminosity Large Hadron Collider and Future Colliders	48,670	01-Oct-18
Seb Oliver (10%), Tim Hitchcock (90%)	LEVERHULME TRUST	Leverhulme Research Centres	The Leverhulme Centre for the Future of the Archive	179,036.25	01-Jan-19
Andrea Banfi	ROYAL SOCIETY	RSOC Leverhulme Trust Senior Research Fellowships	Theory and phenomenology of hadronic jets in Quantum Chromo-Dynamics	49,961	03-Sep-18
Peter Krueger	EUROPEAN UNION	H2020 - FET Flagships	Topological Kondo Junctions (TopKonJunction)	166,707.5	01-Oct-18
Barry Garraway	US DEPT OF DEFENSE (IBOP)	None	Travel grant USA Army	3507	13-Apr-18