

MPS Research Update

March and April 2019

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Staff have had mentions in the following press

Scientific American

Antony Lewis provided commentary on the article discussing the “Best-Yet Measurements Deepen Cosmological Crisis”. <https://www.scientificamerican.com/article/best-yet-measurements-deepen-cosmological-crisis/>

University of Sussex

A press release regarding Konstantin Blyuss’ recently published paper in the *Frontiers in Plant Science*. <https://www.sussex.ac.uk/news/media-centre/press-releases/id/48552>

BBC Radio Sussex

Steve Wilkins was featured on BBC Radio Sussex as part of the promotion for the Lewes STEM Fair. Over 800 visitors, mostly families with children aged <11, engaged with STEM related activities including several offering from the Department of Physics and Astronomy.

Awards and Recognitions

Jose Verdu Galiana has been awarded a DSTL PhD studentship for the development of "microwave quantum illumination with trapped electrons." The award is a contribution of £ 118,471 from DSTL plus an extra contribution of £ 40000 from Leonardo MW Ltd.

Dr Alessia Pasquazi and **Dr Juan Gongora** have been awarded with the ERC funded project – Proof of Concept.

The EPP group (PI **Simon Peeters**) has been awarded the STFC Consolidated Grant of £1.7M. This award provides the main funding for the group of 11 academics for the next three years. This award represents the same amount of money per year as was awarded previously: In the current funding climate, this is viewed as a great success and a recognition of the high-quality research output by the group.

Areas of Knowledge Exchange

No news reported in this area.

Talks delivered

“Cosmology with primordial black holes”

Invited talk by Chris Byrnes at the Sesto cosmology workshop in Italy and at invited seminar in Aachen.

“Dual readout calorimetry”

Talk by Iacopo Vivarelli on dual readout calorimetry at the workshop on Curcular Electron-Positron Collide.

“Soft b-tagging techniques”

Talk given by Iacopo Vivarelli at ATLAS, CERN.

“Special Functions and Orthogonal Polynomials: Some Spectral-Geometric Problems Pertaining to Lie Groups and their Symmetric Spaces”

Ali Taheri was an invited plenary speaker at International Conference on Orthogonal Polynomials, Special Functions and Computer Algebra, Rajasthan, India.

Yulia Kyrychko delivered an invited seminar talk at the University of Portsmouth.

Christian Byrnes' PhD student Pippa Cole presented a talk on "Primordial black holes and how to produce them" to seminars at ICG, Portsmouth and Imperial College London.

Antony Lewis was an invited speaker at the Gradnet meeting in Southampton and also gave a talk at the MSSL seminar.

Anastasia Fialkov was an invited speaker at Cosmology on Safari 2019, KwaZulu-Natal, South Africa, and contributed to the SKA meeting, Manchester.

Mark Sargent

MPIA Heidelberg and ASPECS team meeting; SKA science meeting and KSP workshop 2019 (SKA HQ, Jodrell; April 8-12) - 2 talks delivered:

- "SKA, synchrotron continuum SFR machine"
- "Update on the activities of the SKA extragalactic continuum science working group"

Anastasia Fialkov has also given talks at seminars located in Beijing, QMUL, The Geneva Observatory and at a Collaborative meeting in Cambridge (REACH).

Kathy Romer gave a talk at Ofer Lahav meeting.

Impact

No impact news reported.

Significant Research Outcomes

Konstantin Blyuss has a paper on practical applications of my theoretical work published in Frontiers on Plant Science (world's most cited journal in the research area of Plant Science) on the 17 April: <https://www.frontiersin.org/articles/10.3389/fpls.2019.00483/full>

Other news

Bertram Duering organised a minisymposium "Recent advances in PDE models describing emergent behaviour and collective dynamics" at the British Applied Mathematics Colloquium 2019, 24-26 April 2019, University of Bath, UK

Ali Taheri was an invited guest editor to

- 1) Orthogonal Polynomials and Special Functions OPSF2019.
- 2) Proceedings of the First International Conference on Orthogonal Polynomials, Special Functions, and Computer Algebra: Applications in Engineering. (To be published by Springer and DE GRUYTER, 2019 respectively.)

PI/Co-I	Principal Funder	Funder Programme	Project Title	Overall Applied Amount £	Notes
Submitted					
Calmet, Xavier	Royal Society	Newton Mobility Grant	Quantum gravity and the problem of ghosts and instabilities	12,000	
Dunningham, Jacob/Jimenez	ROYAL ACADEMY OF ENGINEERING (BEIS)	RAE UK IC Postdoctoral Research Fellowship	New frontiers in sensors: advancing quantum metrology for ground-breaking applications	200,249	
Hazard, Pierre	ROYAL ACADEMY OF ENGINEERING (BEIS)	RAE UK IC Postdoctoral Research Fellowship	Development of ultrafast characterisation techniques for optical frequency combs	200,193	
Hensinger, Winnie/Bostock	ROYAL ACADEMY OF ENGINEERING (BEIS)	RAE UK IC Postdoctoral Research Fellowship	RF and microwave trapped ion quantum sensor for counter-eavesdropping, explosives detection and radar	200,216	
Kiss, Istvan	Australian Research Council	AUSRC Discovery Program	Identifying network properties that govern dynamically spreading processes	34,200	
Kruger, Peter	EPSRC	EPSRC ISCF Faraday Battery Challenge: Battery Characterisation Call	Non-invasive electric vehicle current density mapping through magnetic field imaging	291,998	
Large, Matthew	Bill & Melinda Gates Foundation	GAT Grand Challenges Explorations Scheme	Ultra-cheap, Low-Power Wearable Medical Sensors for Infants Based on Graphene	68,601	

Lynch, Peter	Bill & Melinda Gates Foundation	GAT Grand Challenges Explorations Scheme	Emerging Technologies for New Solutions in Global Health Priority Areas – Printable Copper Hydroxide Glucose Sensor	68,600	
Madzvamuse, Anotida	Leverhulme Trust	Leverhulme Research Grant	A continuum differential equation formalism for modelling of DNA replication	318,335	2 h/wk participation in Tony Carr's application
Pasquazi, Alessia/Rowley	ROYAL ACADEMY OF ENGINEERING (BEIS)	RAE UK IC Postdoctoral Research Fellowship	Artificial intelligence solutions for portable optical frequency combs	198,976	
Salvatore, Fabrizio	European Union	H2020 - RISE	Big data Analysis innovation and Acceleration for Medicine and Physics	84,642	
Tripathi, Manoj	Bill & Melinda Gates Foundation	GAT Grand Challenges Explorations Scheme	Curcumin functionalized silk fibroin as an edible coating for preserving food stock at ambient conditions	68,601	
Vivarelli, Iacopo	Royal Society	Newton International Fellowship	Probing Dark Matter using tau leptons with the ATLAS	100,500	
Vivarelli, Iacopo	European Union	H2020 - RISE	Future Experiments seek Smart Technologies (FEST)	16,355	
Forecasted					
Banfi, Andrea	STFC	Ernest Rutherford Fellowship	From Higgs physics to dark matter searches: a quest for precision	509,503	
Hensinger, Winnie	US Department of Defence	Research Grant	Grant extension proposal - Development of microwave ion chip entanglement	213,108	

			architectures for quantum technologies		
Peccianti, Marco	European Union	Proof of Concept	THINK: TeraHertz emitting INK	120,964	
Awarded					
Dalton, Alan	ARCHENT NANOTECHNOLOGIES, S.L. (ARCHENT NANOTEC)	Consultancy	Training in automated spraying of silver nanowires	2,240	
Oiver, Seb	STFC	STFC Food Innovation Network	STFC Food Innovation Network - Vertical Farming Follow On	6,500	
Oiver, Seb	STFC	STFC Food Innovation Network	STFC Food Innovation Network - FACYNation Follow On Funding	6,500	

Department of Mathematics. Publications deposited in SRO in March and April 2019

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

Sussex Author	SRO ID	Status	Author(s)	Output Title	Volume Title
Cagnetti, Filippo	82312	Published	Cagnetti, Filippo; Dal Maso, Gianni; Scardia, Lucia; Ida Zeppieri, Caterina	Stochastic homogenisation of free-discontinuity problems	Archive for Rational Mechanics and Analysis
Dahlqvist, Antoine NS	82481	Published	Dahlqvist, Antoine	Free Energies and fluctuations for the unitary Brownian motion	Communications in Mathematical Physics
Dahlqvist, Antoine NS	82482	Published	Brydges, David C; Dahlqvist, Antoine; Slade, Gordon	The strong interaction limit of continuous-time weakly self-avoiding walk	
Dahlqvist, Antoine NS	82484	Published	Collins, Benoît; Dahlqvist, Antoine; Kemp, Todd	The spectral edge of unitary Brownian motion	Probability Theory and Related Fields
Dahlqvist, Antoine NS	82485	Published	Cébron, Guillaume; Dahlqvist, Antoine; Gabriel, Franck	The generalized master fields	Journal of Geometry and Physics
Dahlqvist, Antoine NS	82486	Published	Dahlqvist, Antoine; Diehl, Joscha; Driver, Bruce K	The parabolic Anderson model on Riemann surfaces	Probability Theory and Related Fields
Duering, Bertram	82416	Accepted	Düring, Bertram; Pitkin, Alexander	High-order compact finite difference scheme for option pricing in stochastic volatility with contemporaneous jump models	Progress in Industrial Mathematics at ECMI 2018

Giesl, Peter A	82638	Accepted	Giesl, Peter	Converse theorem on a global contraction metric for a periodic orbit	Discrete and Continuous Dynamical Systems - Series A
Jensen, Max	82508	Published	Jensen, Max; Majee, Ananta K; Prohl, Andreas; Schellnegger, Christian	Dynamic programming for finite ensembles of nanomagnetic particles	Journal of Scientific Computing
Koumatos, Konstantinos	83337	Accepted	Campos Cordero, Judith; Koumatos, Konstantinos	Necessary and sufficient conditions for the strong local minimality of C^1 extremals on a class of non-smooth domains	ESAIM: Control, Optimisation and Calculus of Variations
Morrison, George	83413	Accepted	Morrison, George; Taheri, Ali	Topology of twists, extremising twist paths and multiple solutions to the nonlinear system in variation $L[u] = ?P$	Topological Methods in Nonlinear Analysis
Scalas, Enrico	83114	Published	Eom, Cheoljun; Kaizoji, Taisei; Scalas, Enrico	Fat tails in financial return distributions revisited: evidence from the Korean stock market	Physica A Statistical Mechanics and its Applications

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Sussex Author	SRO ID	Status	Author(s)	Output Title	Volume Title
Abraham, Nicola L	82240	Published	Abraham, N L; Allbrooke, B; Asquith, L; Cerri, A; DeSanto, A; Salvatore, F; Shaw, K; Stevenson, T; Suruliz, K; Sutton, M; and 2 other(s)	Search for electroweak production of supersymmetric particles in final states with two or three leptons at $\sqrt{s}=1113$ TeV with the ATLAS detector	European Physical Journal C
Calmet, Xavier	82313	Published	Calmet, Xavier; Edholm, James; Kuntz, Iberê	Imprints of quantum gravity in the cosmic microwave background	European Physical Journal C: Particles and Fields
Ayres, Nicholas	82362	Accepted	Abel, C; Ayres, N; Ban, G; Bison, G; Bodek, K; Bondar, V; Chanel, E; Griffith, W; Harris, P; Thorne, J; and 0 other(s)	The n2EDM experiment at the Paul Scherrer Institute	
Falk, Elisabeth E	82400	Published	Adamson, P; Anghel, I; Aurisano, A; Barr, G; Bishai, M; Blake, A; Block, G J; Devenish, N E; Falk, E; Hartnell, J; and 1 other(s)	Search for sterile neutrinos in MINOS and MINOS+ using a two-detector fit	Physical Review Letters
Ogilvie, Sean P	82413	Published	Ogilvie, Sean Paul; Large, Matthew; O'Mara, Marcus; Lynch, Peter; Lee, Cheuk Long; King, Alice; Backes, Claudia; Dalton, Alan	Size selection of liquid-exfoliated 2D nanosheets	2D Materials
Carron, Julien	82418	Published	Ade, Peter; Aguirre, James; Ali, Aamir; Ahmed, Zeeshan; Alonso, David; Alvarez, Marcelo A; Arnold, Kam; Ashton, Peter; Austermann, Jason; Awan, Humna; and 4 other(s)	The Simons Observatory: science goals and forecasts	Journal of Cosmology and Astroparticle Physics

Bason, Mark G	82491	Published	Elfasson, Ottó; Heck, Robert; Lausten, Jens Schultz; Napolitano, Mario; Müller, Romain; Arlt, Jan; Sherson, Jacob F; Bason, Mark George	Spatially-selective in situ magnetometry of ultracold atomic clouds	Journal of Physics B: Atomic, Molecular and Optical Physics
Totero Gongora, Juan S	82493	Published	Bao, Hualong; Cooper, Adele; Rowley, Maxwell; Di Lauro, Luigi; Totero Gongora, Juan Sebastian; Chu, Sai T; Little, Brent E; Oppo, Gian-Luca; Morandotti, Roberto; Moss, David J; and 2 other(s)	Laser cavity-soliton microcombs	Nature Photonics
Romer, Kathy K	82920	Published	Banda-Huarca, M V; Camargo, J I B; Desmars, J; Ogando, R L C; Vieira-Martins, R; Assafin, M; da Costa, L N; Bernstein, G M; Carrasco Kind, M; Drlica-Wagner, A; and 9 other(s)	Astrometry and occultation predictions to trans-Neptunian and centaur objects observed within the Dark Energy Survey	Astronomical Journal
Romer, Kathy K	82949	Published	Abbot, T M C; Allam, S; Andersen, P; Angus, C; Asorey, J; Avelino, A; Avila, S; Bassett, B A; Bechtol, K; Bernstein, G M; and 7 other(s)	First cosmology results using type Ia supernovae from the Dark Energy Survey: constraints on cosmological parameters	Astrophysical Journal Letters
Romer, Kathy K	82952	Published	Raghunathan, S; Patil, S; Baxter, E; Benson, B A; Bleem, L E; Chou, T L; Crawford, T M; Holder, G P; McClintock, T; Reichardt, C L; and 5 other(s)	Mass calibration of optically selected DES clusters using a measurement of CMB-cluster lensing with SPTpol data	Astronomical Journal
Fonseca de la Bella, Lucia	83004	Published	Fonseca de la Bella, Lucia	The matter and halo power spectra in redshift space using effective field theory	
Abel, Christopher	83084	Published	Abel, C; Ayres, N J; Baker, T; Ban, G; Bison, G; Bodek, K; Bondar, V; Crawford, C B; Chiu, P-J; Chanel, E; and 6 other(s)	Magnetic-field uniformity in neutron electric-dipole-moment experiments	Physical Review A
Tripathi, Manoj	83157	Published	Garriga, R; Jurewicz, I; Seyedin, S; Tripathi, M; Pearson, J R; Cebolla, V L; Dalton, A B; Razal, J M; Muñoz, E	Two-dimensional oligoglycine tectomer adhesives for graphene oxide fiber functionalization	Carbon

Dunningham, Jacob A	83274	Published	Palge, Veiko; Dunningham, Jacob; Groote, Stefan; Liivat, Hannes	Maps generated by entangled momenta: exploring spin entanglement in relativity	Open Systems & Information Dynamics
Tripathi, Manoj	83314	Published	Valentini, Luca; Bittolo Bon, Silvia; Tripathi, Manoj; Dalton, Alan; Pugno, Nicola M	Regenerated silk and carbon nanotubes dough as masterbatch for high content filled nanocomposites	Frontiers in Materials