

# Faculty of Engineering and Technology

September 2021

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(ARI) £4M allocated to LJMU, New Robotic Telescope (NRT), **Prof. Iain Steele (PI), Dr. Doug Arnold, Mr. David Copley, Dr. Chris Copperwheat, Dr. Eamonn Harvey, Dr. Helen Jermak, Mr. Adrian McGrath, Mr. Ali Ranjbar and Dr. Robert Smith.** Science and Technology Facilities Council (STFC), 2021-2025. The NRT is a £23M project to build a successor facility for LJMU's Liverpool Telescope, and is being developed by an international consortium, led by the Astrophysics Research Institute.

(FET) £296k allocated to LJMU, Clean Growth UK follow on funding, **Mr. Anthony Seaman (PI), Ms. Sharlene Whittle, Mr. Neale Davies and Mr. Nicholas Doran.** Research England, 2021-2023.

(GERI/LOOM/MEMARC/RCEEE) £26k allocated to LJMU, Co-designing the 15-minute city, **Prof. Trung Thanh Nguyen (PI), Mrs. Diane Fitch and Mr. Giorgos Tsapparellas.** DecarboN8 EPSRC Network Plus: Seedcorn Funding via University of Leeds, 2021-2022.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(LOOM) **Dr. Chia-Hsun Chang** delivered a speech "Maritime Autonomous Surface Ships", Universiti Malaysia Terengganu (UMT) and LJMU, 29<sup>th</sup> June 2021. Funded by the Chartered Institute of Logistics and Transport.

**Dr. Ching Pong Mark Poo and Prof. Zaili Yang** received the ICASL Conference Best Paper Award, for

their paper titled "Vulnerability Analysis of Cruise Shipping in ASEAN Countries facing COVID-19", (co-authored with Dr. Yui Yep Lau from Hong Kong Polytech University), 14<sup>th</sup> International Conference of Asian Shipping and Logistics (ICASL) Conference, Seoul, South Korea 27<sup>th</sup> August, 2021.

### RESEARCH IMPACT GENERATING ACTIVITIES

(LOOM) **Prof. Trung Thanh Nguyen, Mr. Alan Palin, Dr. Ahmed Makki, Mr. Neil Cook, Mr. Nick Croce and Dr. Igor Deplano,** as part of the UKRI-funded project IRIS2 have installed seven passenger count sensors at Liverpool Central Station, and developed a real-time passenger flow monitoring system, in partnership with Merseyrail. The system will help Merseyrail better assist rail passengers in Liverpool's busiest station, with an annual throughput of ~15.6 million passengers.

**Prof. Trung Thanh Nguyen, Mrs. Diane Fitch, Dr. Igor Deplano, Mr. Giorgos Tsapparellas, Mr. Neil Cook, and Ms. Amanda Wilson** as part of the ERDF-funded project LCR Sustainable Green Travel Corridors (SUD) are rolling out the next versions of two research and development products. The first product is the Smart Green Dashboard, an intelligent dashboard able to combine and correlate data from different sources to assist decision making. This product is currently being used by the LCR Combined Authority (LCR CA) and six local authorities. The

product is helping authorities to have greater insight of the traffic, air quality, and weather to make better policy and investment decision for active travel in the region.

The second product is the Smart Green Journey, a mobile app to encourage and incentivize citizens to do more active travel. This will be an integral part of the LCR CA's Active Travel campaign, and will be promoted accordingly. Discussions are also being held with various businesses and educational settings to use the app to promote a greener and healthier lifestyle.

**Prof. Trung Thanh Nguyen, Mrs. Diane Fitch and Mr. Giorgos Tsapparellas** are carrying out a pilot with

Sefton Council to evaluate a number of sensor technologies to evaluate air quality and air pollution, against DEFRA references. This research will help inform the authorities and decision makers of the most suitable technologies to use with respect to monitoring air pollution. The team are also carrying out a pilot with Sefton Council and some secondary schools to install their air quality monitoring solutions in schools. This pilot research is expected to provide schools with insight regarding air quality and ventilation, raising awareness regarding air pollution, and help schools improve health and safety in their COVID responses.

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(ARI) **Mr. Michael Healy, Ms. Charlotte Donohoe-Keyes, Mr. Thomas Sedgwick and Mr. Raffaele Rani** have all completed their PhD Vice-Voce Examinations in August 2021. **Mr. Healy** has just started an STFC funded PDRA position, working on Novae with **Dr. Matt Darnley**. **Mr. Sedgwick** has since started a postdoc position in Postdam, Germany and **Mr. Rani** will soon be starting a postdoc position in Taiwan.

**Mr. Stephen Molyneux, Ms. Gemma Gonzalez i Tora and Ms. Tutku Kolcu**, have all been offered places on the prestigious ESO studentship scheme.

(FET) The FET PGR Rep Society have now taken their positions for the new academic year as follows: **Mr. Andrew Spiteri** (ENR, President), **Mr. Stefanos Charkoutsis** (ENR, Vice-President), **Mr. Kieran Latham** (CBE Rep), **Ms. Evangelia Georgantzia**

(CBE Rep), **Mr. Karyono Karyono** (CBE Rep), **Mr. Hosein Abbasi** (CBE Rep), **Mr. Abbas Alatrany** (CSM Rep) and **Mr. Andrew Burgess** (ENR Rep). They will gain valuable feedback from FET's PGR Community and host events throughout the academic year. **Mr. Spiteri** and **Mr. Charkoutsis** will also represent PGRs at Faculty and University Research Degrees Committees.

**Prof. Zaili Yang** will host an in person Welcome Event for PGRs who have started LJMU since March 2020, as all Welcome Events/Inductions have been virtual for the past 18 months. PGR workspaces have also been re-arranged since the campus re-opened, to account for the changes to the GERI building and the influx of new starters.

(LOOM) **Dr. Ahmed Makki** has been awarded his PhD, many congratulations to **Dr. Makki**.

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(BEST) **Dr. Hu Du** is a Senior Lecturer in Building Services within the School of Civil Engineering and Built Environment. He teaches a Level-7 module 'Building Engineering Research and Design Project'. Before joining LJMU, **Dr. Du** was a Senior Research Fellow at the Welsh School of Architecture, Cardiff University, and the Principal Investigator of four research projects funded by the European Commission, British Council, Welsh Crucible and Welsh European

Funding Office. He has developed a portfolio of research projects worth £7m (over £500k as PI). Before his previous post, **Dr. Du** was a Senior Lecturer in Architecture and Energy Simulation at Oxford Brookes University. He led a postgraduate taught module (Modelling and Passive Design Strategies) and worked on eight Innovate UK projects on climate change adaptation, innovative refurbishment and building performance evaluation. He obtained his PhD from

Northumbria University with an EPSRC scholarship and investigated building performance under climate change within the COPSE project (EP/F038135/1).

(PROTECT) **Dr. Pavel Semukhin** joined the School of Computer Science and Mathematics in August 2021. He received his PhD in theoretical Computer Science from the University of Auckland, New Zealand, in 2008. Following his PhD study, he had several postdoctoral appointments at the National University of Singapore,

University of Regina (Canada) and Kurt Gödel Research Centre (Austria), where he worked on different projects in computational learning theory, computable model theory and automatic structures. Since 2015 he has been working on reachability problems in linear dynamical systems and matrix groups at Liverpool and then at Oxford Universities. He is also interested in probabilistic automata and model-checking problems in probabilistic systems.

## EXTERNAL COLLABORATION

(PROTECT) **Prof. Abir Hussain** and **Dr. Wasiq Khan** have started several international research collaborations during summer 2021, including: a research collaboration with academic colleagues at the University of California (LA, USA) and NHS research staff (UK). The project aims to investigate the major stress measures due to vaccination, its perception, and other psychological and social impacts within the UK

and USA. **Prof. Hussain** and **Dr. Khan** have also arranged video data collection for the animal activity recognition and behavior analysis at COMSATS University (Pakistan). A collaboration with local SME [Supply Well](#) is also underway, a research proposal has been prepared for submission to an upcoming round of Innovate UK Smart Funding.

## NOTABLE PUBLICATIONS

(ARI) **González-Torà, G., Davies, B.,** Kudritzki, R. P. and Plez, B. (2021) "The temperatures of red supergiants in low metallicity environments", *MNRAS*, Volume 505, Issue 3, pp.4422-4443, [DOI](#).

(ARI) **Medler, K., Mazzali, P. A., Teffs, J.,** Prentice, S. J., Ashall, C., Amenouche, M., Anderson, J.P., Burke, J., Chen, T. W., Galbany, L., Gromadzki, M., Gutiérrez, C. P., Hiramatsu, D., Howell, D. A., Insera, C., Kankare, E., McCully, C., Müller-Bravo, T. E., Nicholl, M., Pellegrino, C., Sollerman, J. (2021) "SN 2020cpg: an energetic link between Type IIb and Ib supernovae", *MNRAS*, Volume 506, Issue 2, pp. 1832–1849, [DOI](#).

(DSRC) Bacciu, D. (ed.), **Lisboa, P. J.G.** and Vellido, A. (2021) *Deep Learning in Biology and Medicine*. London: World Scientific Publishing Europe Ltd, [DOI](#).

(DSRC) **Reilly, B.,** Morgan, O., **Czanner, G.;** Robinson, M. A. (2021) "Automated Classification of Changes of Direction in Soccer Using Inertial Measurement Units", *Sensors 2021*, 21 (14), 4625, [DOI](#).

(EEE) **Mehedi, M., Tok, K.H., Ye, Z., Zhang, J.F.,** Ji, Z., **Zhang, W.,** and **Marsland, J.S.** (2021) "On the accuracy in modelling the statistical distribution of Random Telegraph Noise Amplitude", *IEEE Access*, Volume 9, pp.43551-43561, [DOI](#).

(LOOM) Yang Z.S., Wan C., Yu Q and **Yang Z.** (2021), "Using Bayesian network-based TOPSIS to aid dynamic port state control detention risk control decision", *Reliability Engineering and System Safety*, Volume 203, pp. 107784, [DOI](#).

(PROTECT) **Khan, W.,** Crockett, K., O'Shea, J., **Hussain, A.,** Khan, B., M. (2021) "Deception in the eyes of deceiver: A computer vision and machine learning based automated deception detection", *Expert Systems with Applications: Elsevier*, Volume 169, 114341, [DOI](#).

## OTHER ITEMS

(ARI) The ALMA Large Program “ACES” (ALMA CMZ Exploration Survey), led by **Prof. Steve Longmore** has been accepted and awarded 1195 hours or ~150 nights of observing time. ACES will map the physical, kinematic and chemical properties of gas in the inner hundred pc of the Galaxy at 1” (0.05pc) resolution to understand what drives the mass flows and energy cycles in the Galactic Centre.

Following a submission led by **Dr. Matt Darnley**, ARI has been granted the Athena Swan Bronze award. ARI’s award will be valid until August 2026.

(PROTECT) **Dr. Wasiq Khan** was interviewed by ACM News related to his work on “Deception Detection at Borders”. The interview has since been published and can be accessed online [here](#). **Dr. Khan** also delivered an online webinar, “AI and Data Science: Challenges and Issues for the Research Community”, University of Technology, Iraq, 26<sup>th</sup> June 2021.

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# Faculty of Engineering and Technology

July 2021

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(LOOM) £25k allocated to LJMU, Maritime Autonomous Ships: A UK-Taiwan joint cooperation in integrating the regulatory framework, **Dr. Chia-Hsun Chang (PI)**, **Dr. Christos Kontovas** and **Prof. Zaili Yang**. Economic and Social Research Council (ESRC) with Taiwan Ministry of Science and Technology, 2021-2022.

£30k allocated to LJMU, RAEng Visiting Professorship, VP in Marine Technology and Project Management (for Tony Graham), **Prof. Jin Wang**, **Prof Ian Jenkinson** and **Dr Ben Matellini**, 2021-2024.

£56k allocated to LJMU, Maritime Knowledge Hub Pre-Development, **Prof. Ian Jenkinson (PI)**, **Dr. Rob Darlington** and **Ms. Helen McCormack**. Liverpool City Region Combined Authority, 2021-2022.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(BEST) **Dr. Monower Sadique** delivered a keynote speech "Introducing Clean Brick Manufacturing in Bangladesh". Dr. Sadique showcased his findings from his GCRF project to all stakeholders in Bangladesh. The event was sponsored by ICE Bangladesh chapter and Institute of Engineers Bangladesh (IEB).

(PROTECT) **Dr. Áine MacDermott** delivered a guest lecture "A Security and Forensics Look at the Internet of Things (IoT)" at Ontario Tech for the Computer

Science students and staff, 1<sup>st</sup> April 2021. The presentation was attended by MSc students and discussed LJMU Computer Science and Mathematics Research and courses.

(RAISE) **Dr. Gabriela Czanner** co-chaired a session "The NIHR Statistics Group – the Ophthalmology Research Section – Statistics, Big Data and AI", [Annual Congress of Royal College of Ophthalmologists](#), 24<sup>th</sup> May 2021.

### RESEARCH IMPACT GENERATING ACTIVITIES

(RAISE) **Dr. Gabriela Czanner**, **Dr. Silvester Czanner** and collaborators from Aravind Eye Care System (India), Lancaster University and the University

of Ulster have received approval from the Aravind Eye Care System Ethical Committee to run a clinical study for automated detection of glaucoma.

### IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(ARI) **Ms. Sarah McDonald** gave her first talk at a major conference, the IAU symposium 361: Massive stars near and far. Ms. McDonald's talk was on 'Red Supergiants in M31: The Humphreys-Davidson limit at high metallicity'. Her talk was very well received, with

plenty of questions and discussion on the conference's Slack channel.

ARI has a new PhD student, **Mr. Callum McCall**, who was an MPhys student on the Joint Degree. Mr. McCall

started his PhD studies on 3<sup>rd</sup> June 2021 and is funded by the Faculty. He will be working with **Prof. Iain Steele** and **Dr. Helen Jermak** on blazar polarimetry.

**Mr. Conor Ransome** has been selected onto the Isaac Newton Group of Telescopes Support Studentship Programme in a highly competitive process. He will be one of 6 students on placement for a year on La Palma in the Canary Islands being trained as a Support Astronomer on the Isaac Newton (2.5m) and William Herschel (4m) telescopes. Mr. Ransome will get rare hands on experience using the telescope for both photometry and spectroscopy and supporting visiting astronomers taking their observations. He will spend 40% of his time carrying out training and telescope operations, whilst spending 60% of his time finishing his PhD thesis studies.

**Mr. Joaquín García de la Cruz** delivered an excellent talk as part of the ESO Hypatia Colloquium on 15<sup>th</sup> June 2021. These talks are highly competitive, with approx. 8 proposals to ESO for each one that is allocated. The talk is available to watch on YouTube [here](#) (36 minutes in).

(FET) Faculty Research Day was held virtually on Wednesday 19<sup>th</sup> May 2021. PGRs submitted posters, photos and papers which were circulated via online galleries ahead of the event. Live PGR 3 minute Pitch Presentations took place throughout the morning, with finalists progressing to the Final of the Competition after lunch. The event attracted 180 attendees and was very well received. **Professor Mike Riley** (Faculty Pro-Vice Chancellor) closed the day's events with a prize-giving ceremony. Awards were announced as follows:

#### Paper Competition

- 1st Place: **Mr. Sam Stafford** (ARI) for his paper titled "Exploring extensions to the standard cosmological model and the impact of baryons on small scales".
- 2nd Place: **Mr. Pedro Freitas** (EEE) for his paper titled "Impact of RTN and Variability on RRAM-Based Neural Network".
- 3rd Place: **Mr. Kang Ji** (EEE) for his paper titled "A Virtual Force-based Strategy for Multi-robot Deployment".

#### Photo Competition

- 1st Place: **Ms. Lauren Coan** (RAISE) for her photo titled "The Silent Thief Of Sight".

- 2nd Place: **Ms. Flo Wragg** (ARI) for her photo titled "A Galactic Bunch of Grapes".
- 3rd Place: **Ms. Jemima Briggs** (ARI) for her photo titled "A Virtual Universe: a Solution to the Formation of Dwarf Galaxies?"

#### Poster Competition

- 1st Place: **Mr. Jack Campbell** (MEMARC) for his poster titled "A Study of Turbulence and Heat Transfer in Pulsating Flows".
- 2nd Place: **Mr. Hosein Abbasi** (BEST) for his poster titled "Mandating the end of fossil-fuel heating systems in the UK houses: Sustainability assessment of alternatives and implications".
- 3rd Place: **Mr. Mohammad Umar Khan** (EEE) for his poster titled "Multiphase Battery-Converter Integrated Electric Vehicle Drivetrains".

#### Potential Impact Poster Competition

- 1st Place: **Ms. Nusrat Jannat** (BEST) for her poster titled "Development of bio-based unfired earthen material to improve indoor thermal comfort in tropics".
- 2nd Place: **Mr. Josh Cutler** (LOOM) for his poster titled "Performance Evaluation of a Combined Floating Offshore Energy System (CFOES) in Operational and Extreme Conditions".
- 3rd Place: **Mr. Hosein Abbasi** (BEST) for his poster titled "Mandating the end of fossil-fuel heating systems in the UK houses: Sustainability assessment of alternatives and implications".

#### Pitch Presentation Competition

- 1st Place: **Mr. Patrick Riley** (RAISE) for his pitch titled "Enhanced breast cancer detection using Machine Learning methods".
- 2nd Place: **Ms. Philippa McCabe** (RAISE) for her pitch titled "Diagnostic and Predictive Modelling In Osteoarthritis Using Statistical And Machine Learning Tools".
- Joint 3rd Place: **Mr. Shaun Brown** (ARI) for his pitch titled "Simulating the Universe" and **Mr. Kieran Latham** (BEST) for his pitch titled "Development of a Tactile Controller for Simulating Arterial Threading".

#### Faculty PVC's Awards for Best PhD Thesis 2021

- Dr. Silvia Martocchia (ARI) LS **Prof. Nathan Bastian**, thesis title, "Searching for multiple populations in massive young and intermediate age clusters".
- Dr. Igor Deplano (LOOM) LS **Prof. Trung Thanh Nguyen**, thesis title, "Operational Research and Machine Learning Applied to Transport Systems".

- Dr. Shamsudeen Hassan (LOOM) LS **Prof. Jin Wang**, thesis title, “Onshore Cross Country Pipelines Risk Assessment and Decision Making under Uncertainty”.
- Dr. Marko Slunjski (EEE), LS **Dr. Martin Jones**, thesis title, “Control of a nine-phase symmetrical PMSM with reduced rare earth material”.
- Dr. Arnon Lopez Marrero (GERI) LS **Prof. Mike Morgan**, thesis title, “A New Simulation Tool for the Predictive Assessment of Fluidized and Circulatory Granular Flow Behaviour”.
- Dr. Maisie Rashman (ARI) LS **Prof. Steven Longmore**, thesis title, “Terrestrial and Astronomical Applications of Uncooled Infrared Technology”.

The FET Three Minute Thesis Competition was held online via Microsoft Teams on 9<sup>th</sup> May 2021. Around 50 people attended the event where 8 PGRs presented their work. **Mr. Shawn Toh, Ms. Hannah Tang, Mr. Kieran Latham** and **Ms. Evangelia Georgantzia** were selected by FET judges as the top 4 of the Competition and went through to the LJMU final.

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(ARI) **Dr. Lee Kelvin** from Princeton University US has been conferred as a Visiting Research Fellow at LJMU for the next 3 years. Dr. Kelvin will be working with **Prof. Chris Collins** and **Dr. Aaron Watkins** on the data pipeline for the 2 billion dollar US Large Synoptic Survey Telescope (LSST: renamed Vera C. Rubin Observatory) to optimise the recovery of low surface brightness stellar emission from galaxies and clusters.

**Prof. Elena Pian** from INAF-Observatory of Astrophysics and Space Science in Bologna (Italy) has been conferred as a Visiting Lecturer for the next 3

years. She will be undertaking collaborative research and teaching of time-domain astrophysics.

(LOOM) **Dr. Shiqi Fan** has joined LOOM as a Research Fellow. Dr. Fan holds a BSc and a Dual PhD in Maritime and Mechanical Engineering from Wuhan University of Technology China and LJMU. Dr. Fan’s research focus on maritime safety and human factors/human reliability analysis, including maritime accident analysis, human errors, neuroimaging technology application and ship bridge simulation. Dr. Fan, as the leading author, has over 10 publications on various topics of maritime safety.

## EXTERNAL COLLABORATION

(BEST) **Dr. Monower Sadique** has been offered a Visiting Professor position at Chittagong University of Engineering & Technology, [CUET](#). LJMU have just

signed a MoU with this top-ranked Government University in Bangladesh.

## NOTABLE PUBLICATIONS

(ARI) **Longmore, S.**, Chevance, M., Kruijssen, D. (2021) "The Impact of Stellar Clustering on the Observed Multiplicity and Orbital Periods of Planetary Systems", *ApJL*, [DOI](#).

**Hill, A. D., Crain, R. A., Kwan, J., McCarthy, I. G.** (2021) “The morphology of star-forming gas and its alignment with galaxies and dark matter haloes in the EAGLE simulations”, *MNRAS*, Volume 505, 65, [DOI](#).

(EEE) Rubino, S., **Dordevic, O.**, Armando, E., Bojoi, R., **Levi, E.** (2021) “A Novel Matrix Transformation for Decoupled Control of Modular Multiphase PMSM Drives”, *IEEE Transactions on Power Electronics*, Volume: 36, Issue: 7, pp. 8088-8101, [DOI](#).

(LOOM) Yang, Y., **Bashir, M.**, Michailides, C., Mei, X., **Wang, J.** Li, C. (2021) “Coupled analysis of a 10 MW multi-body floating offshore wind turbine subjected to tendon failures”, *Renewable Energy*, Volume 176, pp. 89-105, [DOI](#).

Alremeihi, M.; Norman, R.; Pazouki, K.; Dev, A., **Bashir, M.** (2021) “Performance of an Advanced Intelligent Control Strategy in a Dynamic Positioning (DP) System Applied to a Semisubmersible Drilling Platform”, *Journal of Marine Science and Engineering*, Volume 9, Issue 4: 399, [DOI](#).

(RAISE) Adithya, V. K., Williams, B. M., **Czanner, S.**, Kavitha, S., Friedman, D. S., Willoughby, C. E.,

Venkatesh, R., **Czanner, G.** (2021) “EffUnet-SpaGen: An Efficient and Spatial Generative Approach to

Glaucoma Detection”, *Journal of Imaging*, 2021/6, 7 (6), 92 [DOI](#).

## OTHER ITEMS

(ARI) Work undertaken on E-MOSAICS simulations by current and former staff of ARI was highlighted in a recent BBC Sky at Night episode, focusing on the formation of the Milky Way. **Prof. Rob Crain, Prof. Nathan Bastian** and **Dr. Joel Pfeffer** have been working on this suite of simulations for the last few years. In the episode, their collaborator, Dr. Diederik Kruijssen, discusses the simulations and their ‘discovery’ of the Kraken, a dwarf galaxy that merged with the young Milky Way some 11 Gyr ago. The episode can be viewed [here](#) (E-MOSAICS features ~12 minutes in).

The ARI and the University of Liverpool Physics Department have been chosen to host the 2023 Conference for University Women in Physics (CUWiP). This will be a 3-day conference for women physicists from all around the UK. The submission was led by Prof. Tim Veal at UoL, with input from **Dr. Matt Darnley, Prof. Andy Newsam** and **Dr. Stacey Habergham-Mawson**. Dr. Helen Vaughan of UoL will be the lead host, but ARI will be heavily involved in the 3-day event.

**Prof. Andy Newsam, Dr. Stacey Habergham-Mawson** and **Dr. Jenny Claydon** delivered talks at IAU’s Virtual ‘Communicating Astronomy with the Public’ event (CAP), 24<sup>th</sup>–27<sup>th</sup> May 2021.

It is with great sadness that we report the death of Prof. Dave Carter, who was a professor in the Astrophysics Research Institute from 1996 to 2012. Prof. Carter was a driving force behind the development of the internationally successful Liverpool Telescope, still operating on the island of La Palma in the Canary Islands, and played a huge part in the development of the ARI. Prof. Carter had a hugely successful research career. Together with Dr. David Malin, he discovered “Shell Galaxies”, or “Malin-Carter Ellipticals”, and he made

major contributions to a diverse range of topics on galactic structure and content, with his last major programme being to lead an international consortium using the HST to survey galaxies in the Coma Cluster. He made equally important contributions to the development of astronomical observatories and instrumentation, working in Australia and La Palma before his move to LJMU. He was an outstanding scientist and colleague, who will be sadly missed.

(BEST) **Dr. Michaela Gkantou** has been successful as a secondary proposer at European Cost Action CA20109 (2021-2025) entitled “Modular Energy Islands for Sustainability and Resilience”. The action will work on the concept of modular energy islands and act as a platform to maximise collection and conversion of diverse renewable energy sources available and efficiently transfer them to the network.

(EEE) **Prof. Emil Levi** has been re-appointed to the post of Editor-in-Chief of the IEEE Transactions on Industrial Electronics for the second three-year term, which will run from January 2022 until December 2024.

(PROTECT) £1k allocated to LJMU, Parikh matrices and combinatorics of subsequences, **Dr. Paul Bell**. London Mathematical Society, 2021.

**Dr. Hoshang Kolivand** organised a non-benefit international conference as the General Chair in Erbil: [1<sup>st</sup> International Conference on Emerging, Technology Trends in the Internet of Things and Computing](#), Iraq, 6-8 June 2021. Dr. Kolivand has also been appointed as a Research Fellow at Staffordshire University, UK.

(RAISE) **Dr. Ivo Siekmann** has been invited to join the Editorial Board of MDPI Mathematics and is the Special Issue Editor for Stochastic Models in Mathematical Biology.

# Faculty of Engineering and Technology

May 2021

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### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

(FET/LCR 4.0 START) £1.2m allocated to LJMU, LCR Holistic: Development of dynamic, flexible and agile digital supply chains in Liverpool, **Mr. Anthony Walker (PI)**. LJMU as a consortium partner for the grant of £6m funded by the European Regional Development Fund, 2021-23.

£860k allocated to LJMU, C&W 4.0: Adoption of Industry 4.0 technologies in Cheshire & Warrington, **Mr. Anthony Walker (PI)**. LJMU as a consortium partner for the grant of £5m funded by the European Regional Development Fund, 2021-23.

(GERI) £19k allocated to LJMU, Go-GREEN: Next Generation Solder Materials for Power Electronics and Green Electric Transport, **Dr. Guangming Zhang (PI)** and **Prof. David Harvey**. LJMU as Coordinator for total grant of £50k with partners in Japan and Malaysia,

British Council COP26 Trilateral Research Initiative, 2021-22.

£287k allocated to LJMU, Under the skin of polishing - from nano to macro, **Prof. Xun Chen (PI)**. EPSRC, 2021-2023.

(LOOM) £15k allocated to LJMU, Popup Watch Tranche 2 - Monitoring and evaluating active travel on emergency popup routes in the Liverpool City Region, **Prof. Trung Thanh Nguyen (PI)**. Liverpool City Region Combined Authority (in partnership with Merseytravel), 2021-22.

(PROTECT) £19k allocated to LJMU (via JMU Services Ltd), Model Checking for Formal Verification of Space Systems, **Dr. Matt Webster (PI)**. N7 Space delivering European Space Agency Tender, 2021.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(BEST) **Prof. Hassan Al-Nageim** delivered a keynote speech “Assessing How We Can Prevent Potholes From Occurring In The First Place”. Public Policy Exchange Webinar Preventing Potholes and Improving Road Infrastructure: Developing a Sustainable Strategy to Maintain UK Roads, London (virtual), 23<sup>rd</sup> March 2021.

(GERI) **Dr. Andre Batako** delivered a keynote speech, 4<sup>th</sup> International Conference on Materials, Manufacturing and Modelling (ICMMM2021) Vellore Institute of Technology, India, 19-21<sup>st</sup> March 2021.

**Prof. Xun Chen**'s recent paper “Molecular dynamics simulation of the material removal in the scratching of 4H-SiC and 6H-SiC substrates” has been selected as the

best paper in the [International Journal of Extreme Manufacturing 2020](#).

(LOOM) **Dr. Musa Bashir** delivered a keynote address, “Damage Diagnosis and Prognosis of a Floating Offshore Wind Farm: A Case Study of Maintenance Strategy of A 10 MW Multi-Body Offshore Wind Turbine”, 5<sup>th</sup> Symposium on Damage Mechanism in Materials and Structures (SDMMS20.21) Penang, Malaysia, 8<sup>th</sup> March 2021.

(PROTECT) **Dr. Hoshang Kolivand** delivered an invited talk “Revenue of Augmented and Virtual Reality”, [International Conference on Artificial Intelligence & Data Analytics \(CAIDA\)](#), 6<sup>th</sup>-7<sup>th</sup> April 2021.

## RESEARCH IMPACT GENERATING ACTIVITIES

(BEST) **Prof. Andy Shaw**, Dr. Julie Connolly, **Dr. Patryk Kot**, **Dr. Abbie Romano** and **Dr. Jeff Cullen**, joined an expert multi-sector panel who contributed to an All-Party Parliamentary Carbon Monoxide Group (APPCOG) report [Carbon Monoxide Alarms: Tenants Safe and Secure in their Homes](#) (LJMU research cited on page 12). The report was a result of an APPGOC inquiry, led by MPs Barry Sheerman and Eddie Hughes, to provide evidence to government's review of the Smoke and Carbon Monoxide Alarm Regulations (England) 2015. The report has received impact at Select Committee level and now Government level. In January 2021, the Government announced that they have agreed with recommendations to require landlords to install the devices.

(LOOM) **Prof. Trung Thanh Nguyen**, **Mr. Alan Palin**, **Mr. Anthony Morris**, **Mr. Rinchen Tuladhar**, **Mr. Adam Withington**, **Mr. Ahmed Makki**, **Dr. Igor Deplano** and **Mr. Neil Cook** as part of the DfT/InnovateUK-funded project IRIS organized an event [Passenger First](#). The event attracted 115 registrations and garnered attention from media in the

rail industry, such as [Rail Business Daily](#) and [Rail Director](#).

**Prof. Trung Thanh Nguyen**, **Mr. Alan Palin** and **Mr. Ahmed Makki** are installing seven passenger count sensors at Liverpool Central Station. Once complete, the sensors will allow monitoring of the passenger flow in real-time. This will help Merseyrail analyse the capacity of the station during and after the pandemic, and to plan their operations more effectively.

**Prof. Trung Thanh Nguyen**, **Mrs. Diane Fitch**, **Dr. Igor Deplano**, **Mr. Giorgos Tsapparellas**, **Mr. Neil Cook**, and **Ms. Amanda Wilson** as part of LCR Sustainable Green Travel Corridors (SUD) have rolled out an R&D product, their intelligent dashboard is able to analyse data from different sources to assist decision making. The LCR Combined Authority and six local Councils have signed an agreement with LJMU to use this product. The product is expected to help authorities have greater insight of traffic, air quality, and weather, leading to investment for active travel in the region.

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(ARI) **Mr. Joaquín Garcia de la Cruz**, 4<sup>th</sup> year CDT Postgraduate Researcher (PGR), delivered a virtual talk about his recently published first-author paper, on the flaring of thick disc of galaxies: insights from simulations, at the Astrophysics Institute of Potsdam, Germany.

ARI have been allocated 3 new PhD studentships from STFC. The allocation comes from an algorithm that takes account of numbers of successful completions in the past; helped both by the FET match funding that increases the total numbers, and by the excellence and diligence of their past PGRs and supervisors. The STFC-calculated completion rate that was submitted into this algorithm was 94%. With the match funding from FET, ARI have been able to recruit 6 excellent PGRs, who will start their PhD studies in October 2021.

(BEST) Dr. Layth Kraidi was awarded his PhD in November 2020, Lead Supervisor **Dr. Raj Shah**.

(FET) **Faculty Research Day** will take place virtually on Wednesday 19<sup>th</sup> May 2021. PhD students from across the Faculty have been invited to present their work in photograph, poster, pitch or paper format. The event will be opened by **Prof. Jin Wang**, all posters and photos will be available to view from Monday 10<sup>th</sup> May, the Pitch presentations and Final will be judged live on the day. The Pitch final will be judged by Prof. Keith George, **Prof. Phil James** and **Dr. Princy Johnson**. Prize giving will hosted by **Prof. Mike Riley**, awards will be presented for Best PhD Thesis, Best Potential Impact, Best Pitch, Best Paper, Best Photo and Best Poster. The calendar invitation and programme have been circulated.

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(BEST) **Dr. Georgios Nikitas** has joined the School of Civil Engineering and Built Environment as a Lecturer specialising in Geotechnical Engineering. He holds an MEng, an MSc and a PhD. His experience and research portfolio centres around designing and

performing small-scale experiments. He has published numerous journal and conference papers, as well as book chapters on various topics of geotechnical engineering.

## REF UPDATE

Central to the University's preparations for REF2021 was its [code of practice](#), setting-out decision-making processes for:

- the fair and transparent identification of staff with significant responsibility for research,
- determining who is an independent researcher,
- the selection of research outputs (including support for staff with circumstances that have constrained their ability to work productively over the REF assessment period)

Research England has announced a complaints and investigation (C&I) process for individuals to make a formal complaint where they believe that the agreed processes set out within a university's REF2021 Code of Practice have not been followed. The C&I process opened on 1<sup>st</sup> April 2021 and closes in June 2021; full details are available on the [REF2021 Website](#).

## EXTERNAL COLLABORATION

(ARI) **Dr. Éamonn Harvey** is involved with an instrumentation project (MAAT) for the Gran Telescopio Canarias (GTC). They have just released their first press note to their respective institutes, with a video, which can be found [here](#). LJMU is part of the

international collaboration through **Dr. David Harvey**, who is in the process of choosing a few PhD students and a Postdoctoral Researcher to sponsor onto the science program.

## NOTABLE PUBLICATIONS

(ARI) **Taggart, K., Perley, D. A.** (2021) "Core-collapse, superluminous, and gamma-ray burst supernova host galaxy populations at low redshift: the importance of dwarf and starbursting galaxies", *MNRAS*, Volume 503, 3931, [DOI](#).

(BEST) **Kraidi, L., Shah, R., Matipa, W., Borthwick, F.** (2021) "Analysing Delay Impact from Potential Risk Factors on Project Delivery of Oil and Gas Pipeline: A Case Study in IRAQ" *Journal of Construction Research*, Vol 02, Issue 02, pp. 42-55, [DOI](#). This is key output from former PhD student Dr. Layth Kraidi, who has just completed his PhD.

(EEE) **Cervone, A., Slunjski, M., Levi, E., Brando, G.**, (2021) "Optimal Third-Harmonic Current Injection for

Asymmetrical Multiphase Permanent Magnet Synchronous Machines", *IEEE Transactions on Industrial Electronics*, Vol. 68, pp. 2772-2783, [DOI](#).

(LOOM) **Ancele Y., Ha, M.H., Lersteau, C., Matellini, B., Nguyen, T.T.** (2021) "Toward a more flexible VRP with pickup and delivery allowing consolidations", *Transportation Research Part C: Emerging Technologies*, [DOI](#). This is a major research output of a collaboration between FET and a local social enterprise.

(MEMARC) **Toh, S.M.S., Ashkanfar, A., English, R., Rothwell, G.**, (2021) "Computational method for bearing surface wear prediction in total hip replacements", *Journal of the Mechanical Behavior of Biomedical Materials*, Vol. 119, pp. 104507, [DOI](#).

## OTHER ITEMS

(ARI) **Prof. Andy Newsam** has been selected as a UK National Astronomy Education Coordinator (NAEC) for the International Astronomical Union (IAU). The NAECs in each country help to document and analyse how astronomy is used in teaching in that country, helping to create a link from the IAU to teachers interested in astronomy and in using astronomy as a tool for teaching science in primary and secondary school.

The first online Merseyside Astronomy Day was held on 27<sup>th</sup> March 2021. Including talks from astrophysicists and an "Ask the Astronomers" session, the event attracted an audience of over 100. Normally ran as an event in the World Museum by the Astronomy Distance Learning Programme. After the very positive feedback to this first remote MAD, the ARI will be looking at a suitable "blended" approach for future years.

**Dr. Jenny Claydon** has created a brilliant [video](#) linked to the National Schools Observatory, aimed at promoting the career paths available to those interested in physics, astronomy and space. The video showcases a wide range of the activities at the ARI, including our research areas.

**Prof. Steve Longmore** has been given observing time as PI on the James Webb Space Telescope, successor to the Hubble Space Telescope, due to be launched in October 2021. Dr. Ted Mackereth, a former PhD student, who is now Banting, CITA, and Dunlap Institute Fellow at the University of Toronto, Canada, has also been given time, with **Dr. Ricardo Schiavon**, Co-I. Also, **Dr. Renske Smit** has significant involvement in several other successful JWST applications.

**Dr. Matt Darnley** successfully competed for time on the NASA Swift observatory, to observe the recurrent nova in M31, which he, his students and collaborators have been following for several years now. Part of the interest

in this unique object is that it is one of the best candidates known for a system that may ultimately explode as a type Ia supernova. The Swift time will enable them to follow its latest eruption, which looks different from previous ones, at UV and X-ray wavelengths.

(BEST and Data Science Research Centre) **Dr. Badr Abdullah** and **Dr. Ian Jarman** have been allocated £5k as part of LJMU's first inter-disciplinary KTP, led by Dr. Lisa Newson, Faculty of Health. The 24 month KTP with Cobalt Housing 'Healthy Homes – Healthy Tenant – Healthy Community', aims to transform Cobalt's organisational culture and improve tenants' quality of life through engagement and community partnership models. The Team includes researchers from LBS with a total budget of £180k.

(GERI) **Dr. Guangming Zhang (PI) and Prof. David Harvey** work for Go-GREEN: Next Generation Solder Materials for Power Electronics and Green Electric Transport will be presented at the world COP26 climate change conference in Glasgow in November 2021 with up to 3,000 delegates!

(MEMARC) **Dr. Jing Guo** and **Prof. James Ren** presented the R&D outcome from "NuWeld" on "Data-Led structure analysis of simple and multicomponent carbides and phase nucleation", European Materials Modelling Council Workshop, March 2021. **Dr. Guo** has successfully completed her two-year LJMU fellowship and is working on a joint EU project in advanced aerospace materials with leading industries.

(PROTECT) **Dr. Hoshang Kolivand** has been appointed as a Visiting Professor at Bharath Institute of Higher Education and Research, India.

# Faculty of Engineering and Technology

March 2021

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

#### ARI

£1.2m allocated to LJMU, Astrophysics Research at LJMU, **Prof. Phil James, Dr. Matt Darnley, Dr. Éamonn Harvey, Prof. Steve Longmore, and Prof. Maurizio Salaris.** STFC Consolidated Grant, 2021-2024.

£20k allocated to LJMU, Drone Research Project, **Prof. Steve Longmore, Prof. Paul Fergus, Dr. Carl Chalmers, Dr. Frederic Bezombes,** and Prof. Serge Wich (SCS). Metropolitan Police, 2020-21.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(BEST) **Dr. Patryk Kot** delivered a Masterclass “Preparing effective research proposals to jumpstart your research career”, [British Council Virtual UK Masterclass Series](#), South East Asia, 1<sup>st</sup>-5<sup>th</sup> February 2021. The Masterclass attracted 600 attendee registrations, with 187 joining live. **Dr. Kot** also delivered a keynote speech, “Writing Effective Research Proposals”, [3<sup>rd</sup> Annual International Research Symposium \(AIRS\)](#), Colombo, Sri Lanka- 18<sup>th</sup> February 2021 and, along with **Dr. Tina Marolt-Cebasek**, acted as Chair and Co-Chair for the Construction Session.

(GERI) **Dr. Andre Batako** delivered a keynote speech, [20<sup>th</sup> International Conference on Computer, Control, Electrical, and Electronics Engineering 20 \(ICCEEE20\)](#), Khartoum, Sudan, 25<sup>th</sup>-28<sup>th</sup> February 2021.

(LOOM) **Prof. Zaili Yang** delivered a virtual keynote address, “Key Green Performance Indicators for Green Vehicle Evaluation”, 9<sup>th</sup> International Conference on Transport and Traffic Engineering, Naples, Italy, 29<sup>th</sup>-31<sup>st</sup> December 2020.

**Prof. Trung Thanh Nguyen** delivered a speech, “Presenting Cutting-Edge Innovations in UK Rail”, [Rail Innovation Exhibition 2021](#), 9<sup>th</sup>-12<sup>th</sup> February 2021. This event attracted over 1,100 registered participants and showcased some of the most exciting innovations and projects the rail sector has to offer.

(PROTECT) **Dr. Hoshang Kolivand** delivered a lecture, “3D Data Visualisation in Augmented and Virtual reality”, Department of Computer Graphics, [Politecnico Di Milano](#), Milan, Italy, February 2021.

**Dr. Matt Webster** co-organized the workshop “verification and regulatory issues for remote robotic inspection”, autonomy and verification network, 13<sup>th</sup> January 2021. This workshop brought together key stakeholders interested in the verification and regulation challenges faced when using robotic systems for remote inspection. A variety of speakers, from industry, regulatory organisations, and academia, presented the latest developments from their fields.

## RESEARCH IMPACT GENERATING ACTIVITIES

(LOOM) **Prof. Trung Thanh Nguyen, Mr. Alan Palin, Mr. Anthony Morris, Mr. Rinchen Tuladhar, Mr. Adam Withington, Mr. Ahmed Makki, Dr. Igor Deplano** and **Mr. Neil Cook** as part of the DfT/InnovateUK-funded project IRIS (Information System for Railway Staff) have been invited to be exhibitor in the Rail Innovation Exhibition 2021. The event attracted 46 visits, 10 links, and 6 social/website engagements. During the event, the project's product [website](#) also attracted visitors from 24 different countries across 5 different continents.

Their digital product IRIS has attracted [press attention](#). The product is currently being trialed by Merseyrail in 7 stations from Liverpool Central to Hunts Cross in the line connecting Central (Liverpool's busiest station) to South Parkway (Liverpool's multimodal hub). **Dr. Karl Jones, Mr. Alan Palin, Mr. Adam Withington, Ms. Carolyn Froment** and **Mr. James Kolonic** have also been working on creating promotional videos to understand how IRIS helps passengers on the Merseyrail network. Ms. Zoe Hands, Chief Operating Officer at Merseyrail, said, "This new technology will

enhance our passengers' experience in terms of the information we can provide to them quickly and efficiently, which is something we know is extremely important to Merseyrail passengers".

**Prof. Nguyen** has also been working with colleagues **Mrs. Diane Fitch, Mr. Giorgos Tsapparellas, Dr. Igor Deplano, Mr. Neil Cook, and Ms. Amanda Wilson** as part of the ERDF-funded project LCR Sustainable Green Travel Corridors (SUD) to continue developing digital innovations to promote active and sustainable travel in the region. For local authorities, the project team have provided a network of motion, air quality and weather sensors, as well as an intelligent dashboard that is able to combine and correlate data from different sources to assist decision making. For citizens, the project team have supplied a mobile app to help navigate the popup cycling routes (Popup Cycle Planner). A new version will be released imminently. The team will also release an interactive map that allows citizens to understand cycling usage, as well as popular areas for active travel in the region. Links to these products will be available shortly [here](#).

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

(ARI) **Mr. Tutku Kolcu and Ms. Flo Wragg** were awarded prizes for their posters at the online Armagh UKRI/STFC Introductory Astronomy School, 11<sup>th</sup> - 15<sup>th</sup> January 2021.

(FET) Faculty Research Day will take place virtually on Wednesday 19<sup>th</sup> May 2021. PhD students from across the Faculty will be invited to present their work in photograph, poster, pitch or paper format. Colleagues are requested to 'save the date' in their calendars, with more information to follow shortly.

## EXTERNAL COLLABORATION

(ARI) **Dr. Matt Darnley** has been appointed to the Armagh Observatory and Planetarium Management Committee for the next five years, to represent the interests of STFC (Science and Technology Facilities Council).

(PROTECT) **Dr. Áine MacDermott** has been appointed as an Adjunct Professor in the Faculty of Business and IT, Ontario Tech University, Canada. This role is in recognition of **Dr. MacDermott's** knowledge, skills and expertise in digital forensics and cyber security.

## NOTABLE PUBLICATIONS

(EEE) Cervone, A., Brando, G., and **Dordevic, O.** (2020) “Hybrid Modulation Technique With DC-Bus Voltage Control for Multiphase NPC Converters”, *IEEE Transactions on Power Electronics*, vol. 35, no. 12, pp. 13528-13539, [DOI](#).

(LOOM) **Chang, C. C., Kontovas, C.,** Qing Y., and **Yang, Z.** (2020) “Risk assessment of the operations of maritime autonomous surface ships”, *Reliability Engineering and System Safety*, Vol. 207, pp. 107324, [DOI](#).

Lersteau, C., **Nguyen, T.T.,** Le, T.T., Nguyen, H.N., Shen, W. (2021) “Solving the problem of stacking goods: mathematical model, heuristics and a case study in container stacking in ports”. *IEEEEXpolre*, Vol 9, pp. 25330, [DOI](#).

## OTHER ITEMS

(ARI) A new infrared camera has been commissioned on the Liverpool Telescope. It is a Raptor Photonics camera, based around an InGaAs detector. The instrument was put together by **Prof. Iain Steele** and the technology group, including PhD student **Mr. Kris Batty**.

(FET) The [UN Climate Change Conference UK 2021](#) will be held in Glasgow, 1<sup>st</sup>-12<sup>th</sup> November 2021. LJMU have a unique opportunity to be involved in the event next year. Proposals are invited from academia to “exhibit, form part of the panel discussion, host a bespoke event such as talk or a report launch, or provide some other sort of cultural service.” Colleagues are asked to share their ideas with **Ms. Sharlene Whittle** [S.K.Whittle@ljmu.ac.uk](mailto:S.K.Whittle@ljmu.ac.uk) on how FET could be involved and in what capacity, a proposal will then be drafted and submitted to the Cabinet Office for their perusal.

(FET) The Pump Priming 2021 awards have been confirmed as follows:

- (BEST) **Dr. Georgios Nikitas** (PI) **Dr. Michaela Gkantou, Dr. Tina Marolt-Cebasek and Dr. Ed Loffill** (CoIs), £5000. Identified call: Royal Society’s Research Grant.
- **Prof. Hassan Al Nageim** (PI) and **Dr. Tina Marolt Cebasek** (CoI), £5000. Identified call: Knowledge Transfer Partnership.
- **Dr. Ibijoke Idowu** (PI), **Prof. Andy Shaw, Dr. Khalid Hashim** and Dr. Richard Webster (Biological & Environmental Sciences) (CoIs), £5000. Identified call: BBNet.
- (EEE) **Mr. Colin Robinson** (PI) and Dr. Helen Burrell (Pharmacy & Biological Sciences) (CoI), £4500. Identified calls: House of Lords

“Transforming Forensic Science”, DASA Future of Policing call for ideas DASA.

- **Dr. Obrad Dordevic** (PI), £4900. Identified call: Clean sky 3.
- **Dr. Princy Johnson** (PI), **Dr. Martin Randles, Dr. John Marsland** and Dr. Quang Huy Nguyen (CoIs), £4272. Identified calls: KTP funding – Emerging and Enabling Technologies, Innovate UK - Future Smart Grants.
- (GERI) **Prof. Xun Chen** (PI) and **Dr. Tahsin Opoz** (CoI), £2275. Identified calls: Manufacturing Made Smarter innovation hub – Smart factory expressions of interest, EPSRC network grant, EPSRC standard research grant, manufacturing the Future.
- (LOOM) **Dr. Christos Kontovas** (PI), £2200. Identified call: EPSRC Standard Grant.
- **Dr. Musa Bashir** (PI) and **Dr. Xiaoxiao Liu** (CoI), £4950. Identified calls: EPSRC (Marine Wave Energy), Horizon 2020 (Innovative land-based and offshore renewable energy technologies and their integration into the energy system).
- (PROTECT) **Dr. Andrew Attwood** (PI), **Mr. Cliff Mayhew** and **Dr. David Lamb** (CoIs), £4590. Identified call: EPSRC New Investigator Award.
- **Dr. Fawaz Ghali** (PI) and **Prof. Abir Hussein** (CoI), £5000. Identified call: The Alzheimer’s Research UK Pilot Study Grant Scheme.
- **Dr. Liang Men** (PI) and **Prof. Abdennour El Rhalibi** (CoI), £4996. Identified call: EPSRC New Investigator Award.

- **Dr. Matt Webster** (PI), **Dr. Denis Reilly** and **Dr. Linghai Lu** (CoIs), £5000. Identified call: EPSRC New Investigator Award, Standard Grants and Calls.

(MEMARC) **Prof. Ian Jones** has now formally retired and been conferred as an Emeritus Professor.

(PROTECT) Warmest congratulations are offered to **Prof. Dhiya Al-Jumeily** who has been awarded the [Most Excellent Order of the British Empire \(O.B.E\) for services to Scientific Research.](#)

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Faculty of Engineering & Technology  
Liverpool John Moores University  
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FET Research & Knowledge Exchange Committee  
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# Faculty of Engineering and Technology

January 2021

## FET RESEARCH NEWSLETTER

### EXTERNAL RESEARCH GRANTS SECURED (THRESHOLD: £10K)

#### ARI

£50k allocated to LJMU, Galway Liverpool Imaging Polarimeter, **Prof. Iain Steele (PI), Dr. Eamonn Harvey**. STFC, 2020-2021.

#### BEST

US\$687k allocated to LJMU, Hand-held EM sensor for detection of insecticides on building surfaces, **Dr. Patryk Kot (PI), Dr. Magomed Muradov, Prof. Andy Shaw**. Bill & Melinda Gates Foundation, 2020-23.

UKRI recently made funding available to LJMU, to provide costed extensions for existing live research projects which have been disrupted by the COVID-19 pandemic. The following FET projects have been allocated funding:

#### (ARI)

**Prof. Steve Longmore, Prof. Paul Fergus, Dr. Carl Chalmers**, and Prof. Serge Wich (SCS), Using drones to protect biodiversity and spur economic growth in Madagascar, £161k.

Prof. Steve Longmore and Prof. Serge Wich (SCS), Astro-ecology: the solution from the skies to save Earth's biodiversity, £8k.

**Prof. Chris Collins** (PI, [full Co-I list](#)), STFC Consolidated Grant Renewal 2018-2021, £240k.

**Prof. Chris Collins**, UK Involvement in LSST Phase B, £27k.

**Prof. Iain Steele**, LT Ops 2020-2023, £112k.

**Prof. Andy Newsam**, Newton Fund STFC-NARIT: Using astronomy education as a motivator for long-term capacity building in STEM, £15k.

#### (LOOM)

**Prof. Trung Thanh Nguyen**, IRIS: Information system for railway station staff, £97k.

#### (MEMARC)

**Dr. Mehdi Seddighi**, On the Development of a Novel Approach in Modelling of Turbulent Pulsating Flows, £14k.

### AWARDS/PRIZES/KEYNOTE ADDRESSES (AT RECOGNISED INTERNATIONAL CONFERENCES)

(GERI) **Prof. David Harvey** and **Dr. Guangming Zhang** co-delivered a workshop “Smart Furniture and Wearables Workshop”, ReACTIVE Too International Workshop, Finland, 9<sup>th</sup> November 2020.

(LOOM) **Dr. Chia-Hsun Chang, Prof. Zaili Yang**, Prof. Jingjing Xu (Plymouth University) and Prof. Jingxin Dong (Newcastle University) received the Highly Commended Paper Emerald Literati Award for their publication “Selection of effective risk mitigation strategies in container shipping operations”, published in Maritime Business Review. **Prof. Yang** (Co-Authored with Dr. Chengpeng Wan, Dr. Jiale Tao, Dr. Jing Wu and Dr. Di Zhang) also received the ALRT Conference Best

Paper Award, “Evaluating recovery strategies for the disruptions in liner shipping networks: A resilience perspective”, at the [Asian Logistics Round Table 2020 Conference, Tasmania](#), 19<sup>th</sup>-20<sup>th</sup> November 2020.

(PROTECT) **Prof. Gyu Myoung Lee** delivered a talk “ITU-T’s standardization activities on 5G and IoT”, [5G and Internet of Things Thessaloniki Week 2020](#), co-organized by the H2020 TeamUp5G project, and the IEEE Communication Greece Chapter, 14<sup>th</sup>-18<sup>th</sup> December 2020.

**Dr. Hoshang Kolivand** delivered a keynote speech “Augmented and Virtual Reality in Robotics”, Artificial Intelligence and Robotics for Today & Tomorrow, 10<sup>th</sup>

November 2020. **Dr. Kolivand** also received the Best Paper Award, “Reimaging the Book ... Again! A New Framework for Smart Books Using Digital Twins

Technology”, [Ibero-american Congress on Smart Cities \(ICSC-CITIES 2020\)](#).

## IMPORTANT ITEMS FOR POSTGRADUATE RESEARCHERS INCLUDING PHD COMPLETIONS AND RESEARCH INITIATIVES AT FET

The PVC Research and Enterprise PhD Scholarships have been awarded, with six PhD projects led by FET colleagues.

1. (Data Science Research Centre) Mr. Ryan Bellfield, **Dr. Ivan Olier-Caparroso**, “Developing Artificial Intelligence Models for Predicting the Risk of Atrial Fibrillation in Hypertense Patients.”
2. (Data Science Research Centre) Ms. Martina Zubac, **Dr. Sandra Ortega-Martorell**, “Early Biomarker of Therapy Response in Glioblastoma: Decoding the Immune System with Advanced Machine Learning”.
3. (Data Science Research Centre) Mr. Bradley Walters, **Prof. Paulo Lisboa**, “Trust in AI for Decision Support in Medicine”.
4. (LOOM) Mr. Taylor Larsen, **Dr. Musa Bashir**, “Development of a Framework for Reliability and Survivability Design of Wave Energy Converters (WECs)”.
5. (MEMARC) Mr. Andrew Joseph Burgess, **Dr. Sean Malkeson**, “Computational and Physical Modelling of the Physics of Powder Flow during Additive Manufacturing”.
6. (MEMARC) Mr. Ciaran Pitt, **Dr. Ariyan Ashkanfar**, “Total Knee Replacement; why they fail prematurely and how to increase their lifespan?”

**Faculty Research and Knowledge Exchange Committee** are pleased to announce the awards for Faculty PVC PhD Scholarships (January-February 2021).

### Home/EU

1. (ARI) Mr. Dharmesh Mistry, **Dr. Chris Copperwheat**, “Extreme Binary Stars in a Target-Rich Environment”.
2. (LOOM) Ms. Carys-Anne Evans, **Prof. Trung Thanh Nguyen**, “Utilising Real-Time Sensor Data,

Simulation and Policy Inputs to Make Active Travel in the Liverpool City Region Safer and More Convenient”.

3. (LOOM) Mr. Joe Ford, **Dr. Sean Loughney**, “Sustainability in the Decommissioning Process of UK Offshore Installations and the Management of Hazardous Waste”.
4. (MEMARC) Mr. Tom Cottage, **Dr. Sean Malkeson**, “Novel Disruptive Mixing Strategies for Industrial Applications”.
5. (MEMARC) Mr. Stefanos Charkoutsis, **Dr. Mohamed Kara-Mohamed**, “Optimization of Nonlinear PID Controller for Nonlinear Robotic Systems”.
6. (Data Science Research Centre) Ms. Molly Hawker, **Dr Ivo Siekmann**, “Cracking the calcium code – modelling molecular determinants of calcium signalling in health and disease”.

### International

1. (BEST) Mr. Saman Hosseinzadeh, **Dr. Ana Armada Bras**, “Resilient Earth-Based Structures using Bio-Inspiring Solutions”.
2. (LOOM) Mr. Saeid Panahi, **Dr. Eddie Blanco-Davis**, “Hull-Propeller Interaction on Ships using Air Lubrication: A study into Enhancing Ship Design and Construction for an Environmentally Efficient Operation”.
3. (LOOM) Mr. Abdulkhaled Zareei, **Dr. Milad Armin**, “On Local and Universal Topology Optimisation of Merchant Ship Structural Design”.
4. (LOOM) Ms. Parisa Mostafazadeh, **Dr. Ben Matellini**, “Liquefied Natural Gas (LNG) Portfolio Optimisation” (Matchfunded Project with Cheniere Energy).
5. (MEMARC) Ms. Mehrnoush Kharghani, **Dr. Mehdi Seddighi**, “Investigation of Wall Shear Stress and Detailed Flow Behavior in Pulsating Blood Flows in Large Arteries with Atherosclerosis Disease”.

## INTRODUCTION TO NEWLY APPOINTED RESEARCH ACTIVE MEMBERS

(ARI) **Dr. Ivan Cabrera-Ziri**, an expert in stellar populations and globular clusters, has joined the ARI as an ERC funded PDRA. Dr. Cabrera-Ziri received his PhD in 2017 from LJMU/ARI and won the prize for Best Thesis in FET that year. After his PhD, Dr. Cabrera-Ziri received the prestigious Hubble Fellowship, which he held at Harvard University.

**Dr. Renuka Pechetti** joined the ARI as a new PDRA in December. Dr. Pechetti will be working with **Dr. Sebastian Kamann** in the UKRI-funded project "Star Clusters as the Nurseries of Black Holes", a Future Leaders Fellowship. Prior to joining the ARI, Dr. Pechetti was a graduate student at the University of Utah in Salt Lake City, where she gained her PhD earlier in 2020. In her PhD work, Dr. Pechetti studied the central

regions of nearby galaxies, and characterized the properties of the supermassive black holes and nuclear star clusters residing inside them. During her stay at the ARI, Dr. Pechetti will study the stellar kinematics in a sample of star clusters in the Milky Way and its nearest neighbouring galaxies. To this aim, she will exploit observations performed with the MUSE integral field spectrograph located at the Very Large Telescope in Chile. In combination with dedicated dynamical models that Dr. Pechetti will calculate, these observations will help answering the question which star clusters harbour massive black holes in their centres.

## NOTABLE PUBLICATIONS

(ARI) **Baldry, I. K., Sullivan, T., Rani, R., Turner, S.** (2021) “Compact galaxies and the size–mass galaxy distribution from a colour-selected sample at  $0.04 < z < 0.15$  supplemented by ugrizYJHK photometric redshifts”, *MNRAS*, Volume 500, Issue 2, pp. 1557-1574, [DOI](#).

(ARI) **García de la Cruz, J., Martig, M., James, P.** et al. (2021) “On the Flaring of Thick Disc of Galaxies: Insights from Simulations”, *MNRAS*, [DOI](#).

(EEE) **Brown, J., Zhang, J. F., Zhou, B., Mehedi, M., Freitas, P., Marsland, J. S.,** and Ji, Z. (2020) “Random-telegraph-noise-enabled true random number generator for hardware security”, *Scientific Reports*, Vol. 10, Article number: 17210, [DOI](#).

(GERI) Mohamad Zaimi, N. S., Mohd Salleh, M. A. A., Abdullah, M. M. A. B., Ahmad, R., Mostapha, M., Yoriya, S., Chaiprapa, J., **Zhang, G.,** and **Harvey D. M.** (2020) “Effect of Kaolin Geopolymer Ceramic Addition on The Properties of Sn-3.0Ag-0.5Cu Solder

(PROTECT) **Dr. Matt Webster** joined the School of Computer Science and Mathematics as a Senior Lecturer in Computing. Before joining LJMU, he was a Senior Postdoctoral Research Associate at the University of Liverpool. His research interests include verification of autonomous and critical systems, robotics, formal methods, simulation, IoT, and computer security. He is keen in collaborating with others in areas of mutual interest.

Joint”, *Materials Today Communications*, 25, 101469, pp.1-15, [DOI](#).

(GERI) **Harvey, D.,** Kar, H., Verma, S., and Bhadauria, V. (Eds.) (2020) “Advances in VLSI, Communication, and Signal Processing, 2020”, International Conference on VLSI, *Communication and Signal Processing (VCAS)*, Springer, [DOI](#).

(LOOM) **Fan, S., Blanco-Davis, E.,** Zhang, J., **Bury, A., Warren, J., Yang, Z.,** Yan, X., **Wang, J.** and Fairclough, S. (2020) “The Role of the Prefrontal Cortex and Functional Connectivity during Maritime Operations: An fNIRS study”, *Brain Behaviour*, 00:e01910, [DOI](#).

(PROTECT) **Kolivand, H.,** Saba, J., Mohd Shahrizal, S., and Tully, D. (2020) "A new framework for sign language alphabet hand posture recognition using geometrical features through artificial neural network (part 1)", *Neural Computing and Applications*, pp. 1-19, [DOI](#).

## OTHER ITEMS

(ARI) A further £10k has been awarded to **Prof. Iain Steele** and **Dr. Robert Smith** as part of a collaboration with QinetiQ for work on alternative (non-GPS) navigation systems.

Media coverage up to the 23<sup>rd</sup> November 2020 of **Dr. Ricardo** Schiavon’s and **Mr. Danny Horta Darrington’s** Heracles research reached an audience of more than 25 million. The research about a hidden ‘fossil galaxy’ discovered deep within the Milky Way featured in

many and varied publications, from BBC radio stations and websites, to international, national and local newspapers and magazines online.

This year the National Schools’ Observatory (NSO) took their Primary Christmas Lecture online and created ‘Santa’s Space Vacation’. The event was broadcast live to over 2,300 primary school pupils across 40 schools in the UK, and Italy. The event was themed around where to send Santa on his holiday in Space. Schools contributed

videos with their suggestions of where to send Santa. The live broadcast included a game of 'Mission Control says', making solar biscuits, and hula hooping like Saturn. The recording of the [event is available on YouTube](#).

(BEST) £4k allocated to LJMU, Adaptation and self-recovery solutions for housing flooding resilience, **Dr. Ana Armada Bras** (PI), Dr. Alexandre Gagnon. LJMU as lead partner for the grant of £20k from Royal Academy of Engineering, 2020-22.

£6k allocated to LJMU, Building coastal resilience infrastructure in Gwadar port, Pakistan, **Dr. Ana Armada Bras** (PI), **Prof. Andy Shaw**, (LOOM) **Dr. Christos Kontovas**, **Prof. Zaili Yang**. LJMU as lead partner for the grant of £20k from Royal Academy of Engineering, 2020-22.

£4k allocated to LJMU, Runoff: Remote worming - developing computer learning for high throughput identification of earthworm populations as an indicator of soil health, **Dr. Geoffrey Parker**. STFC, 2020-21.

(FET) LJMU announced Professorial and Readership conferments in December 2020. Warmest congratulations are offered to new Professors; **Prof. Robert Crain** (ARI), **Prof. Vida Maliene** (BEST), **Prof. Trung Thanh Nguyen** (LOOM), **Prof. Gyu Myoung Lee** (PROTECT) and **Prof. Paul Fergus** (PROTECT) and new Readers; **Dr. Gabriela Czanner** (Data Science Research Centre), **Dr. Princy Johnson** (EEE), **Dr. Andre Batako** (GERI), and **Dr. Christos Kontovas** (LOOM).

Five FET researchers have been allocated internal funding awards from the Research England QR Strategic Policy Fund. The aim of the fund is to support universities to link effectively with policy research priorities and opportunities, from the local to the international. The funding will be allocated from January to June 2021.

1. (LOOM) **Dr. Alan Bury** and **Mr. Abdul Khalique**, £10k, S.P.E.W.: The impact of Sea motion on Personnel working as Engineers on Windfarms.
2. (BEST) **Prof. Alison Cotgrave**, **Prof. Vida Maliene**, Dr Hannah Timpson (Faculty of Health), £10k,

*Measuring the Health, Wellbeing and Social Value Impact of Wirral Waters Development.*

3. (Data Science Research Centre) **Dr. Ian Jarman**, £5k, *The Effect of Ethnic Density on the rates of psychosis within the Pakistani and South Asian communities in East Lancashire.*
4. (LOOM) **Dr. Robyn Pyne**, **Prof. Ian Jenkinson** and **Dr. Dimitrios Paraskevadakis**, £8k, *Work Programmes associated with Maritime 2050 in Liverpool City Region.*
5. (LOOM) **Dr. Sean Loughney**, £10k, *Decommissioning - Benchmarking in the UK Offshore Waste Stream.*

Three FET researchers have been allocated internal funding awards from the QR Global Challenges Research Fund (GCRF). The aim of the funding is to enhance the University's capacity to undertake high quality collaborative research aligned to the aims of the GCRF.

1. (ARI) **Dr. Stacey Habergham-Mawson** £18,650.
2. (BEST) **Dr. Tina Marolt-Cebasek**, £30,000.
3. (BEST) **Dr. Monower Sadique**, £21,780.

(GERI) **Dr. Andre Batako** is guest editor for the Procedia of Manufacturing, Elsevier, the Journal of the Institution of Physics, IOP Conference Series: Materials Science and Engineering, and Springer, special issue. Paper contribution to these issues are welcome, up until the 15th Jan.2021. **Dr. Batako** and his international collaborators Institute of Physics, Russia and Georgia Technical University have secured \$140,000 from the Russian and Georgian research councils to work on resonance acceleration of plant growth and increased crop yielding. The Russian and Georgian partners have received \$40,000 each, however due to geopolitical differences the UK partner was set as overarching coordinator and will be included in all reports and journal publications.

(PROTECT) **Dr. Hoshang Kolivand** has organised two Special Issues as a main guest editor: (1) Lead Guest Editor, Artificial intelligence and machine learning for video coding in the Journal of Concurrency and Computation, 2021; and (2) Lead Guest Editor, Hybrid artificial intelligent in embedded system for smart industry, journal of Microprocessors and Microsystems, 2021.