



# CASL Quarterly

Newsletter of the Complex and adaptive Systems Laboratory



Sep 2014 - Dec 2014

Welcome to the latest issue of CASL Quarterly where we bring you the latest news from the Complex & Adaptive Systems Laboratory (UCD CASL).

In this issue we note the landmark event of CASL's move from its off-campus location in 8 Belfield Office Park to our new home in the UCD O'Brien Centre for Science (East). Already this new location, in close proximity to our colleagues in Science and more broadly in UCD, is paying dividends.

The move is a significant event, which took considerable planning and energy. CASL are sincerely grateful in particular for the hard work that our support team of Tara, Elva and Róisín put into this endeavour. Without them it simply wouldn't have been possible. Also, we are most grateful to Prof Joe Carthy, and Elaine Murphy and her team for their support before, during and since the move.



Prof Michael O'Neill  
February 2015

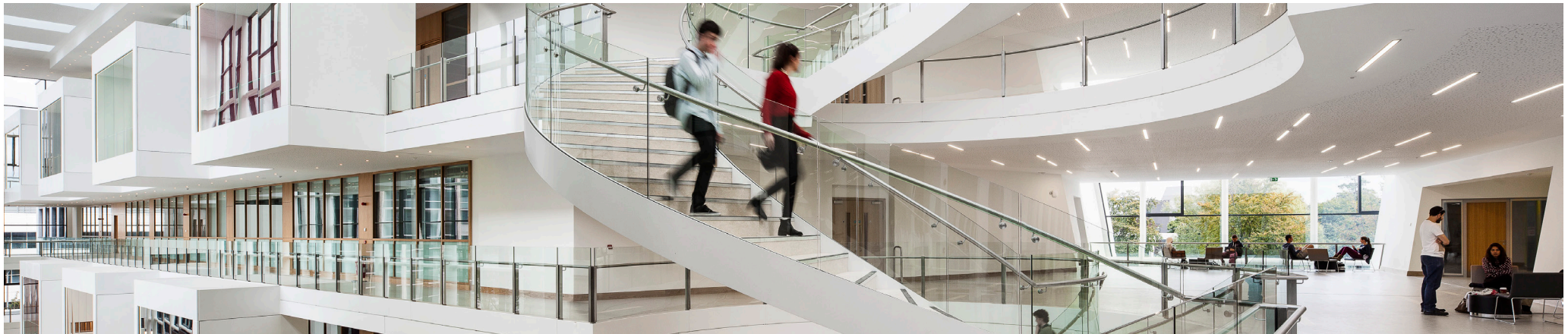


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# MAJOR RESEARCH PROGRAMMES AND THEMES



*O'Brien Centre for Science*

A landmark goal was achieved this quarter. The CASL Institute finalized a 2-phase move from Belfield Office Park to the O'Brien Centre for Science. The move went extremely well and excellent support was received from Elaine Murphy and her team. Prof. Chris Bean is a Co-PI of the new Irish Centre for Research in Applied Geoscience (iCRAG) and was the lead PI for the initial stage of the proposal in 2013. This Centre has secured €26m in funding, is coordinated in UCD and started operation in January 2014. The CASL Executive Committee met on 6th October 2014 to review the CASL Annual Plan prior to its submission to UCD Research for inclusion in the overall UCD Research Strategy. CASL have been championing the Smart Systems & Simulation component of the UCD ICT strategy development process at recent Steering Committee meetings. Prof. Joao Marques-Silva, Dr Pavel Gladyshev and Prof Michael O'Neill are part of the Lero3 award - the Irish Software Engineering Research Centre ([www.lero.ie](http://www.lero.ie)).

The Lero project is scheduled to commence in January 2015. Following appointment of Prof Michael O'Neill to the ICON Chair of Business Analytics, two ICON Lecturers in Business Analytics have been advertised, interviews conducted and offers made. An ICON postdoctoral researcher post is currently advertised. The UCD Natural Computing Research & Applications Group (NCRA) has been growing as part of the Science Foundation Ireland funded "Applications of Evolutionary Design" project (led by Prof Michael O'Neill). 3 PhD students and 3 postdoctoral researchers have joined CASL this quarter as a result. A new strategic partnership is being developed between SAS Institute and UCD (School of Business, CASL and Innovation) in the domain of Business Analytics.

# DIVERSIFICATION OF FUNDING

## Awards



**Dr. Andrew Parnell** obtained an EI Innovation Partnership with Clavis Insight – for Automatic dynamic product classification. €103,711 from Enterprise Ireland (EI) and €27,275 from Clavis Insight.



**Prof. Michael O'Neill** won funding as part of the Science Foundation Ireland-funded LERO Software Research Centre in November 2014.



**Prof. Frederic Dias** was awarded the Emilia Valori Prize 2014: The French Académie des sciences awards prizes each year for research applications in the areas of Mathematics, Physics, Mechanical Sciences, and Computer Sciences of the Universe, Chemistry, Integrative Biology, Molecular and Cell Biology, Genomics and Human Biology and Medical Sciences.



**Dr. Lennon O'Náirigh** received an ICHEC Facilities Award (Class B license, project entitled “Towards a complete theoretical and numerical description of three-dimensionality in phase separation”).

**Dr. Nicolae-Viorel Buchete** received an ERC Proposal Preparation Grant from Enterprise Ireland (€3,523).

**Dr. Enrique Salvador** started his 2-year IRC Post-Doctoral Fellowship project entitled Regime-switches in the economy and its influence on the studies in empirical finance in October 2014.

**Dr. Enrique Salvador** made an application to the UCD Seed Funding Call 2015 for Disseminations and Outputs.

**Dr. Eberhard Mayerhofer** was granted a Habilitation in Mathematics by the University of Vienna in November 2014.

**Dr. Eberhard Mayerhofer** applied for a University Research Fellowship from the Royal Society in September 2014.



*Awarding bodies*

## Horizon 2020 applications



**Dr. Seán McGarraghy** is preparing a MSCA (Marie Skłodowska Curie Actions) ETN (European Training Network), application, for submission on 13th January, 2015. Title: Semantic Aware Software Synthesis and Improvement (SASSI).



**Dr. Lennon O'Náirigh** is preparing an ERC (European Research Council) Starter Grant for submission on 3rd February 2015. Title: High-end Computation and theory for two-phase flows (HECATES).



**Dr. Kathleen Curran** is preparing an ERC Consolidator Grant for submission on 5th February, 2015. Title (provisional): Musculoskeletal Injury Modelling and Tractography for the Ageing Athlete (iTract).



**Dr. Miguel Bustamante** is preparing an ERC Consolidator Grant on 5th February, 2015. Title: tbc.



**Dr. Nicolae-Viorel Buchete** has a proposal in preparation: ERC Consolidator Grant 2015

## IRC Post-Graduate Applications

The following five people are applying for Irish Research Council Postgraduate Scholarships, which are due on February 11th:

### Post-Doctoral

Dr. Tarsis Gesteira (PI Nicolae-Viorel Buchete)

### Post-Graduate

Loi Cao Van (PI James McDermott)

Babak Habibnia (PI Pavel Gladyshev)

Shane Walsh (PI Miguel Bustamante)

Carly Bodkin (PI Eimear Byrne)

Austin MacDonald (PI Eimear Byrne)

### SFI

**Prof. Chris Bean** has submitted a proposal in collaboration with University of Ulster and Scripps Oceanographic Institute to the US-Ireland SFI funding scheme.



### Other

**Donal MacKernan** is submitting an e-infrastructures proposal for Horizon 2020 on January 14th under the Call H2020-EINFRA-2015-1. Title: E-CAM: An e-infrastructure for Software, Training and Consultancy.



# RESEARCH INFRASTRUCTURE



Dr. Léan Ní  
Chléirigh



Dr. Kate  
Collins



Mr. Aleksandar  
Gubic



Dr. Elva  
O'Sullivan

The Institute has been growing as part of UCD's continuing commitment to invest in an incubator for interdisciplinary success. To this end CASL has hired **Dr. Léan Ní Chléirigh** for the position of CASL Grants Coordinator and **Dr. Kate Collins** for the post of CASL PhD Training Coordinator. **Mr Aleksandar Gubic** has been appointed as the CASL IT & Media Coordinator. **Dr. Elva O'Sullivan** is also serving as the CASL InSTITUTE Manager (temporary). We welcome them all to the CASL team.

# PEOPLE (EDUCATION AND TRAINING)

**Lợi Cao Văn** (PhD student) started, working on his Ph.D. in Genetic Programming for Network Security. He is co-supervised by James McDermott and Miguel Nicolau.

**Stefan Forstenlechner, Leo Dawson and David Lynch** began their PhD programs supervised by Michael O'Neill.

**Dr. Róisín Loughran, Dr. Michael Fenton and Dr. David Fagan** joined CASL as postdoctoral researchers in Prof Michael O'Neill's team.

Several PhD students supervised by NCRA members graduated in September including **David Fagan, Eoin Murphy, Zheng Yin, Patrick O'Sullivan, Michael Phelan and Richard McGee**.

**Dr. Patrick O'Sullivan and Dr. Richard McGee** graduated on 2 September 2014 and have taken up lectureships in the University of Southampton.



Lợi Cao Văn



Stefan  
Forstenlechner



Leo Dawson



Dr. Róisín  
Loughran



Dr. Michael  
Fenton



David Lynch



Dr. David Fagan



**Dr. Colm Doyle** successfully defended his thesis in November 2014 and took up a position at Aegon as a Hedge Operations Analyst.

**Dr. Abhinav Anand** joined as a Postdoctoral Researcher in October 2014 and will be working under the supervision of Prof John Cotter.

**Elena Green** submitted her thesis entitled Analysis and Modelling of Financial Logarithmic Return Data using Multifractal and Agent-Based Techniques in October 2014.

**Dr. Marko Weber** completed his internship at IBM and successfully defended his PhD thesis in December 2014.

**Dr. Andrea Meireles Rodrigues** joined DCU as a Lecturer and Researcher in September 2014 partly funded by FMC2.

A new PhD student, **Luca Bernardinelli**, also started at DCU under the supervision of Prof Paolo Guasoni/FMC Cluster in September 2014.

## REPUTATION AND OUTREACH

**CASL Collaborative Seminar Series:** The CASL Seminar Series continued throughout the quarter with the following presentations:



Oct 23 2014: **Scott Rickard** “High-Impact Innovation: Reflections on creating the CASL, a hedge fund, the world’s ugliest music & working for the world’s most innovative company”



Oct 30 2014: **Michael Fenton** “Structural Engineering Optimisation in Grammatical Evolution”



Nov 06 2014: **Seán J McGarraghy** “Metaheuristics in Supply Network optimisation”

Nov 13 2014: **Konstantinos Drakakis** “Building a successful hedge fund on signal processing principles”

Nov 20 2014: **Eimear Byrne** “Broadcasting with Coded Side Information”

Nov 27 2014: **Carlos Mencia** “Minimal corrections of over-constrained systems”

Dec 4 2014: **Jens Carlsson** “The Fishy Science in Area 52”



## Events, Presentations & Professional Activities

### Invited Talks

Prof. Michael O'Neill gave two invited talks this quarter:

Applications of Evolutionary Design (App'ED). University of York (24 November 2014)

Applications of Evolutionary Design (App'ED). University of Exeter (1 December 2014)

### Workshops

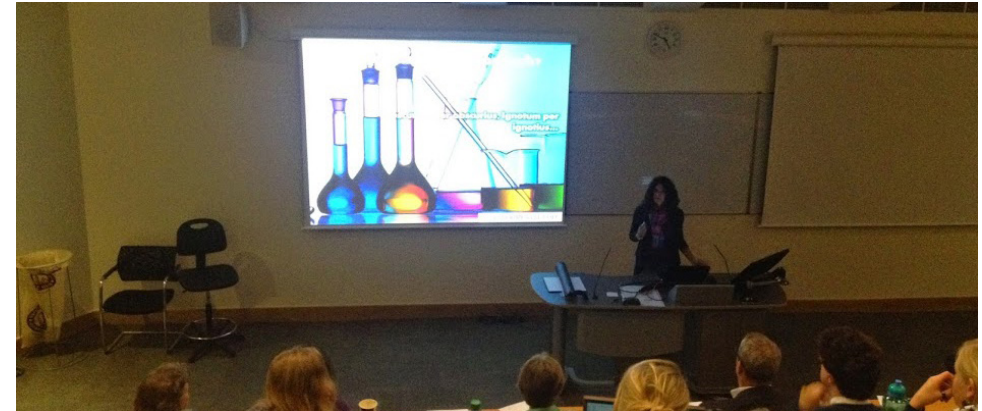
**Prof. Chris Bean** organised a workshop on **Seismic phenomena** associated with volcanic activity for the European Seismological Commission and IASPEI/IAVCEI Inter-Association Commission on Volcano Seismology in In November. [http://earth.leeds.ac.uk/esc\\_wg/Wshop/work2014.htm](http://earth.leeds.ac.uk/esc_wg/Wshop/work2014.htm)

**Prof. Chris Bean** hosted a **Marie Curie ITN** workshop on **INVERSE METHODS IN GEOPHYSICS AND VOLCANOLOGY** IN SEPTEMBER 2014. This included a public open day on volcano research with approximately 180 local primary school children in attendance.

[http://www.nemoh-itn.eu/index.php?option=com\\_content&view=article&id=374:nemoh-schools-in-ireland&catid=178:nemoh-schools-in-ireland](http://www.nemoh-itn.eu/index.php?option=com_content&view=article&id=374:nemoh-schools-in-ireland&catid=178:nemoh-schools-in-ireland)

**CECAM-IRL** conducted a workshop on "Molecular and coarse-grained modelling of interactions at bio-nano interface" in the UCD Science Centre on September 22-24, 2014.

The organisers were Vladimir Lobaskin, Donal Mac Kernan UCD CASL, Nick Quirke (Imperial College) & Alexander Lyubartsev (Stockholm University).



*Marie Curie ITN workshop*

### Conferences

In December, 6 members of the UCD Geophysics Group (Chris Bean) presented their work at the **American Geophysics Union** in San Francisco. Group members also participated in several public outreach events; school visits in Dublin leading to primary school presentation at the BT young science exhibition, articles in the US school science magazines Science World and Super Science, public art-science exhibition in Donegal.

#### **Financial Crises: Transmission and Consequences**

Maynooth University, 24 September 2014

Speakers: G.P. Dwyer (Clemson University), A. Murgoci (Copenhagen Business School),

M. Dungey (University of Tasmania and University of Cambridge) and D. Cronin (CBI)



## FMC2/UCD Smurfit Seminars

**Ronan Lyons** (Trinity College Dublin): A Housing Price Index for Dublin 20 November 2014.

**Richard Taffler** (Warwick Business School): Emotional Finance: Theory and Application 13 November 2014.

**John Turner** (Queens University Belfast): Banking in Crisis: The Rise and Fall of British Banking Stability? 6 November 2014.

**Phil Molyneux** (Bangor University): Non-Interest Income Activities and Bank Lending, 30 October 2014.

**Thomas Flavin** (Maynooth University): A regime-switching analysis of contagion from the US sub-prime mortgage-backed security market. 23 October 2014.

**Philip Bourke** (UCD): Bank business models and bank failure 16 October 2014.

**Alexander McNeil** (Heriot-Watt University): Multivariate economic scenario sets for stress testing 9 October 2014.

**Lammerjan Dam** (University of Groningen): Market clearing and stock returns of levered firms when equity supply is fixed. 2 October 2014.

## Industry Engagement

**John Cotter** and **Irene Ward** attended a **National Innovation for Industry Showcase** on 2 December 2014 jointly organised by SFI, Enterprise Ireland and the IDA. This event took place in the Convention Centre and brought all Irish State-supported research centres of scale under one roof for the first time. Damian English opened the event and Richard Bruton delivered a closing address. The event was well attended by industry participants and state funded bodies, with a focus on innovation, start-ups and job creation.

**Dr. Lennon O’Náirigh** was the group leader in the 102nd **European Study Group with Industry** in UCD (June 2014).

The CASL Institute hosted the **L’Oreal Research** team on 10th September 2014. A report has been sent to L’Oreal outlining the expertise available in CASL that could be of potential benefit to L’Oreal Open Research.

The FMC Cluster is organising and sponsoring an **Internship Showcase Event** at UCD Smurfit on 19 February 2015 for companies and MSc students interested in taking part in the 2015 Summer Internship programme. The Internship Programme runs for MSc Finance, MSc Quantitative Finance and MSc Energy and Environmental Finance students.

**John Cotter** met with Coralytics, a new company based at NovaUCD, on 11 December 2014.

# IMPACT

All CASL activities reported above are centred around maximising Impact, examples include:

- Prof. Michael O'Neill was featured in the Irish Times on 20 October 2014 promoting the new BSc Business Analytics starting at UCD in September 2015 <http://www.irishtimes.com/sponsored/winning-through-sophisticated-data-analytics-1.1967678>



*Prof. Michael O'Neill*

- Prof Michael O'Neill featured in the UCD Faces of Research series of short films. <http://www.ucd.ie/research/people/videowall/> <https://www.youtube.com/watch?v=bDi701RgbsQ>
- Prof Frederic Dias was awarded the Emilia Valori Prize 2014: The French Académie des sciences awards prizes each year at a ceremony in the Institut de France Académie des sciences in Paris. The 2014 presentation took place on the 14 October and Frederic Dias, UCD Mathematical Sciences Professor and UCD Earth Institute member, was awarded the Emilia Valori Prize for the application of science.

The prizes reward research applications in the areas of Mathematics, Physics, Mechanical Sciences, and Computer Sciences of the Universe, Chemistry, Integrative Biology, Molecular and Cell Biology, Genomics and Human Biology and Medical Sciences. <http://earth.ucd.ie/newspost/prof-frederic-dias-awarded-the-emilia-valori-price-2014/>

- Dr. Lennon O'Náirigh released software: <http://sourceforge.net/u/onaraigh/profile/>
- Two recent SFI Funded PI Awards for two CASL PI's Prof Michael O'Neill and Prof Gary McGuire. Prof Michael O'Neill's project involved a new collaboration with Alcatel Lucent Bell Labs commencing this past quarter.
- CASL PIs Prof. Joao Marques-Silva, Dr Pavel Gladyshev and Prof Michael O'Neill are part of the recent national SFI Centre Award for Lero - the Irish Software Engineering Research Centre – ([www.lero.ie](http://www.lero.ie)).
- Leading EU consortia under Horizon 2020 (e.g., current ETN and COST Action proposals)

High impact publications

For example; Frédéric Dias's recent publication Instabilities, Breathers and Rogue Waves in Optics in Nature Photonics. <http://www.nature.com/nphoton/journal/v8/n10/abs/nphoton.2014.220.html> and C.J. Bean, et al. (2015), Segmented lateral dyke growth in a rifting event at Bárðarbunga volcanic system, Iceland, NATURE, Vol. 517, 191-195, doi: 10.1038/nature14111.

Dr. Colm Doyle successfully defended his thesis in November 2014 and took up a position at Aegon as a Hedge Operations Analyst.

Engagement in research activity throughout the entire research spectrum from fundamental to commercialisation.

Engagement with the UCD and wider community through, for example, the CASL Quarterly Newsletter and the CASL Collaborative Seminar Series.

## Publications

- Sigmundsson, F., A. Hooper, S. Hreinsdóttir, K.S. Vogfjörð, B.G. Ófeigsson, E.R. Heimisson, S. Dumont, M. Parks, K. Spaans, G.B. Gudmundsson, V.Drouin, T. Árnadóttir, K. Jónsdóttir, M.T. Gudmundsson, T. Högnadóttir, H.M. Fridriksdóttir, M. Hensch, P. Einarsson, E. Magnússon, S. Samsonov, B. Brandsdóttir, R.S. White, T. Ágústsdóttir, T. Greenfield, R.G. Green, Á.R. Hjartardóttir, R. Pedersen, R.A. Bennett, H. Geirsson, P.C. La Femina, H. Björnsson, F. Pálsson, E. Sturkell, C.J. Bean, M. Möllhoff, A.K. Braiden and E.P.S. Eibl (2015), Segmented lateral dyke growth in a rifting event at Bárðarbunga volcanic system, Iceland, *NATURE*, Vol. 517, 191-195, doi: 10.1038/nature14111.
- M. Romensky, V. Lobaskin, T. Ihle, Tricritical points in a Vicsek model of self-propelled particles with bounded confidence, *Physical Review E* 90, 063315 (2014)
- A. C. Kemp and C. E. Bernhardt and B. P. Horton and R. E. Kopp and C. H. Vane and W. R. Peltier and A. D. Hawkes and J. P. Donnelly and A. C. Parnell and N. Cahill, Late Holocene sea- and land-level change on the U.S. southeastern Atlantic coast, *Marine Geology*, 357:90-100 (2014)
- Salvador, E., Floros, C. and Arago, V. (2014) Re-examining the risk-return relationship in Europe: linear or non-linear trade-off? *Journal of Empirical Finance*, Vol: 28, p.60-77
- Gnaboa, J, Hvozdyk, L, and Lahayee, J (2014) System-wide tail comovements: A bootstrap test for cojump identification on the S&P 500, US bonds and currencies, *Journal of International Money and Finance*, Vol: 48, Part A, p.147-174
- Avino, D., Lazar, E., Varotto, S. (2015) Time varying price discovery, *Economics Letters*, Vol: 126, p.18-21
- Mayerhofer, E., Cuchiero, C., Keller-Ressel, M. and Teichmann, J. (2014) Affine Processes on Symmetric Cones, *Journal of Theoretic Probability*.
- Mayerhofer, E. and Keller-Ressel, M. (2015) Exponential Moments of Affine Processes, *Annals of Applied Probability*.
- Gusoni, P. and Wang, G. (2014) Hedge and Mutual Funds' Fees and the Separation of Private Investments, *Finance and Stochastics*.
- Guasoni, P., Muhle-Karbe, P. and Xing, H. (2014) Robust Portfolios and Weak Incentives in Long Run Investments, *Mathematical Finance*.
- Guasoni, P. and Rasonyi, M. (2014) Fragility of arbitrage and bubbles in local martingale diffusion models, *Finance and Stochastics*.
- Mayerhofer, E. and Guasoni, P. (2014) The Limits of Leverage
- Botshekan, M. and Lucas, A. (2014) Long-Term versus Short-Term Contingencies in Asset Allocation. Submitted to *Journal of Financial and Quantitative Analysis*.



## Conference Presentations and publications

- Dr. Vladimir Lobaskin gave an Invited talk “Multiscale modelling of biological fluids” and discussion leader at CECAM-IRL Workshop: “Advanced Simulation/Modelling in Food”, December 4-5, 2014, UCD.
- Conlon, T. and Cotter, J. Eurozone Bank Resolution and Bail-In – Intervention, Triggers and Writedowns, European Banking Union: Prospects and Challenges Conference, University of Buckingham, 21-22 November 2014.
- E. Salvador, J. Cotter. The non-linear relationship between return and risk: a regime-switching multi-factor framework. XXII Finance Forum, Zaragoza, Spain, 20-21 November 2014.
- Dr. Vladimir Lobaskin acted as member of the Program Committee for the Workshop: Nanoinformatics for Environmental Health and Biomedicine (NanoInfo2014), November 2-5, Belfast, UK.
- Dr. Vladimir Lobaskin acted as a member of Soft Matter Modelling Working group at European Material Modelling Council meeting, November 5, European Commission, Brussels Belgium.
- Dr. Vladimir Lobaskin gave an Invited talk “Coarse-grained simulations of nanoparticle protein corona formation” at SoftComp Workshop “Proteins & Nanoparticles @ Membranes”, October 19-22, Jülich, Germany.

- Eimear Byrne served as Program Chair for the special track on Coding for Emerging Wireless Networks in BodyNets: International Conference on Body Area Networks 29 September – 1 October 2014, London, United Kingdom.
- McGeever, Niall and Cotter, John (2014) Stock returns around public holidays. Irish Society of New Economists, NUI Galway, September 2014.

## Seminars

- Dr. Nicolae-Viorel Buchete gave an invited seminar on Dec. 11, 2014, in the Laboratory Computational Biology, NHLBI, National Institutes of Health, Rockville, MD, USA.
- Dr. Vladimir Lobaskin gave an Invited seminar “Coarse-grained simulations of the adsorption of human blood proteins onto charged nanoparticles” at Physics Department, Mainz University, 2 December, Mainz, Germany.
- Dr. Lennon O’Náirigh spoke at the Adwell Seminar at the International Research Institute of Stavanger Norway (December 2014). Topic: “Agglomeration and transport of drilling generated particles in the oil well”.
- Dr. Lennon O’Náirigh was an invited speaker at the University of Limerick MACSI seminar (November 2014). Topic: “CFD, two-phase flow and the TPLS solver”.

- McGeever, N. The term structure of bond market integration, PhD Symposium, 24 November 2014.
- Mayerhofer, E. Limits of Leverage, University of Vienna, 12 November 2014.
- Mayerhofer, E. Limits of Leverage, University Marie-Curie, Paris, 10 October 2014.
- Dr. Nicolae-Viorel Buchete gave an invited seminar on Oct. 3, 2014, in the Photonics Laboratory, Physics Department, Angers University, Angers, France.
- Dr. Nicolae-Viorel Buchete gave an invited seminar on Dec. 10, 2014, in the Laboratory Chemical Physics, NIDDK, National Institutes of Health, Bethesda, MD, USA.

## Media Engagement

The screenshot shows a sponsored article on The Irish Times website. The article title is "Winning through sophisticated data analytics" and it is dated Wednesday, January 21, 2015. The article text states: "New UCD business analytics degree feeds into industries crying out for talented graduates". The article features a photograph of Prof. Michael O'Neill smiling. To the right of the article, there are two promotional images: one for a Samsung Galaxy Note 4 smartphone with the text "Powerful performance that matters the most to you" and another for a red sports car.

**SPONSORED**

### Winning through sophisticated data analytics

| New UCD business analytics degree feeds into industries crying out for talented graduates

*Prof. Michael O'Neill featured in the Irish Times*

Michael O'Neill features in the Irish Times on 20 October 2014 promoting the new BSc Business Analytics starting at UCD in September 2015. <http://www.irishtimes.com/sponsored/winning-through-sophisticated-data-analytics-1.1967678>

Prof Michael O'Neill featured in the UCD Faces of Research series of short films. <http://www.ucd.ie/research/people/videowall/> <https://www.youtube.com/watch?v=bDi701RgbsQ>







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