Volume 2, issue 1

Sciences @ Kent

September 2008

In this Issue:

China Supplement—October

October's Newsletter will contain a China Supplement. All Departments are invited to participate. Please contact Joanna Walpole: J.L.Walpole@Kent.ac.uk

"Shiver me timbers!" Page 5

View from the Dean's Office

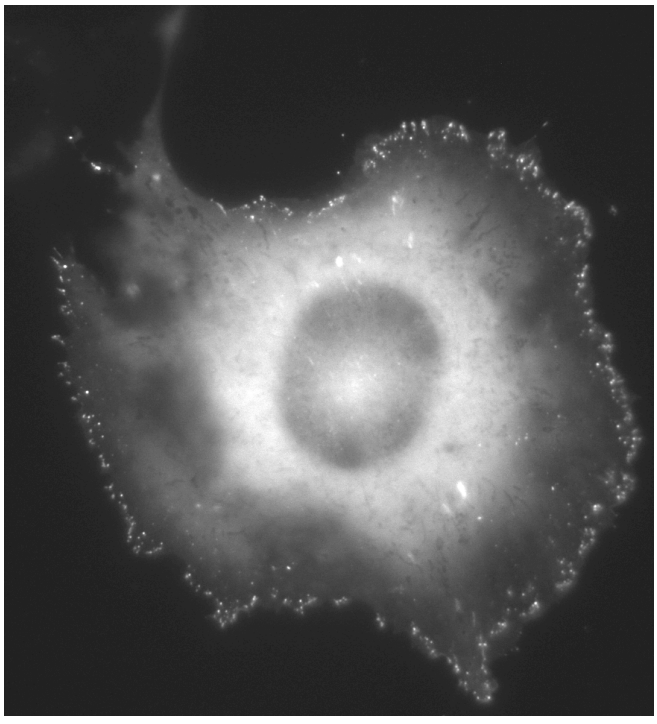
The September issue already—whatever happened to summer?

Work within the Faculty goes on as ever around the holiday period, notable events included here are the annual Space School (p.2) and the activities around scientific skills development (p.2 and p.8).

Research projects also feature strongly with an article on Mike Geeves' recent major grant award to investigate Molecular Motors, and an update on Alan Chadwick's work with the Mary Rose Trust. Finally, we highlight a summer school in China as a prelude to next month's newsletter when we will focus on our links with China.

All the best
Peter

A Living Animal Cell



This month's image is from the laboratory of Professor Bill Gullick in the Department of Biosciences. The image is of a living animal cell showing where it attaches itself to the substratum. The light flecks around the edge are called focal adhesions.

China-UK Summer School on Energy Generation from Biomass

In partnership with Zhejiang University, P.R. China, the Department of Electronics is organising a China-UK Summer School on energy generation from biomass in Hangzhou, P R China from 8 September to 20 September 2008. Financially supported by the Research Councils UK, the Summer School provides a forum for early career researchers from the UK and China to attend a series of keynote lectures to be given by leading experts in the field from both countries. The Summer School also provides a forum for the attendees to discuss common issues concerning biomass research and associated combustion science and engineering.

Professor Yong Yan and Dr. Gang Lu from the Department of Electronics will be giving lectures at the Summer School in the area of combustion sensors and instrumentation. Other contributors from the UK include well-known academics from Leeds and Nottingham and senior engineers from the power generation industry.

In addition to the keynote lectures, the participants will be given tours of research facilities at Zhejiang University and biomass power plants in P R China. Younger researchers will also be given opportunities to present their research projects and report recent progress on biomass combustion. A range of social activities is also arranged to enhance informal interactions between the participants.

Full details of the Summer School programme are available on http://www.rcukchinasummerschool.org/.

Miscanthus—a common source of biomass fuel

Academic Writing Retreat makes the Grade

In early August, the STMS Research Skills Training ran its first successful writing retreat. Fifteen PhD students and Postdocs spent three days in a secluded country retreat where they shared a concentrated two-day period of academic writing. Supervised by experienced academic writer Dr Rowena Murray, from the University of Strathclyde, the group enjoyed life away from the distractions of the internet to complete their individual writing goals.

The retreat offered time to concentrate on actually producing written output and the group atmosphere enabled a camaraderie that helped everyone to knuckle down to the task at hand. In a mere two days, entire papers, thesis chapters and essays were produced, often from scratch by group members.

The feedback from the group was very positive with everyone having found it a worthwhile experience. Some members are so keen to repeat the experience that plans are afoot to start various Postgrad / Postdoc-coordinated writing groups on campus.

More information about writing groups on campus will be available soon on the Research Skills Training Website. http://www.kent.ac.uk/stms/skills/index.html

STMS PhD and Postdoc students who attended the academic writing retreat in the country organised by STMS Research Skills Training

Space School Success

This year's Space School which took place over the weekend of the 9th and 10th August proved to be an enormously successful event, attracting in excess of 50 young people between the ages of 12 and 18 years.

Kent staff from the Centre for Astrophysics and Planetary Sciences and the School of Physical Sciences provided a range of activities which were all designed to give young people an opportunity to explore and investigate some real elements of Space Science. Talks and demonstrations included Stellar Navigation and the Principles of Rocketry both of which were followed up with some hands-on activities.

Each young person was taught how to make a sextant, which uses basic trigonometry to calculate the height of a celestial object, and used them for observation in the University telescope domes on Saturday evening.

Rockets were a big feature of the weekend and Saturday afternoon was spent designing rockets. On Sunday morning, 10 teams built their own rockets and after a demonstration in core physics, all 10 rockets were launched in the open field behind Eliot College. Although it was rather windy, neither the teams nor the huge gathering of parents were undeterred and all 10 rockets were fired successfully, reaching the 200 metre capability of the rocket motors.

The weekend was rounded-off with a prize giving ceremony. Professor Michael Smith, Director of the Centre for Astrophysics and Planetary Sciences said "The children I talked to were all excited and content with an especially intense experience. Kent Space School 2008 was magnificent!" .

Kent Professor is awarded £1.7 Million for Research into Molecular Motors

Professor Mike Geeves, Head of the Department of Biosciences has been awarded £1,728,990 by the Wellcome Trust for research into the correlation between the cellular functions of the myosin family of molecular motors and their biochemical and structural properties. Following the announcement of the award, Mike explained what the research is all about in a special newsletter interview.

Professor Mike Geeves

What is the biology behind the research?

The ability to move and respond to environmental signals is one of the key features of living organisms. Movement in the animal and plant kingdoms is mediated by a small group of proteins knows as motor proteins, the most familiar of which is myosin which is responsible for muscle contraction (skeletal and cardiac).

Could you explain the role of Myosin?

There are more than 20 different types of myosin involved in a range of cellular movements from the very fast wing beat of insects to the slow crawling of individual amoeboid cells such as white blood cells. Other myosins move organelles around inside cells and yet others don't produce movement at all but generate forces inside cells and detect movements such as the response of the very fine stereocillia in our ear to sound waves. While we have a clear idea of how the myosin in muscle does its job, we do not know how the same basic motor protein is adapted for such a wide range of behaviours. This is what we plan to find out using novel methods that allow us to follow the fundamental molecular events that myosin goes through on a time scale of < 1/1000th of a second.

What is the reason for the research for this project?

Myosins have the ability to alter their behaviour in response to a variety of input signals, e.g. state of occupancy of the nucleotide and the phosphate binding sites, the presence of actin, regulatory signals (calcium binding, phosphorylation) and, crucially for myosin, the presence of mechanical load. Cellular activity results from the integration of all the relevant information. The broad family of myosin motors uses these signals to generate different mechanical behaviours from fast-motility to load-bearing, from processivity to strain-sensors. We want to understand how the basic myosin motor can be manipulated to produce such a range of properties.

Why is this research important?

Myosins play major roles in the cell and understanding the different roles of myosin is central to modern cell biology. They are involved in a wide range of transport processes from muscle contraction to cell division, from phagacytosis to vesicle transport, from the invasion of blood cells by parasites to detecting sound waves in the inner ear. Most cells express more that a dozen myosin isoforms, but the specific function of each myosin and its regulation within the cell is, in most cases, poorly defined. The observation that a specific myosin (from one of the 25 subgroups) is present at a specific location in a cell and at a specific time reveals relatively little about its function. If we can define the type of mechanical activity a myosin is capable of it will help define the cellular function of the myosin.

Are myosins associated with diseased cells as well as healthy ones?

Myosins are implicated in many diseases from cardiac and skeletal myopathies to certain types of deafness and blindness. Specific myosins are a potential drug target, for example, the unique myosin XIV group found in the malaria parasite. A clear understanding of myosin function is therefore of significance to human health.

What could be the impact of this research in other areas of bio-related technologies?

Myosins are molecular motors. If we can understand the design principles involved in the different types of motor activity then it may be possible to design novel forms of myosin motors which may be of value in the emerging field of nanotechnology.

What is the primary aim of the research?

Myosins comprise one of the three major families of molecular motors that together are responsible for almost all movement within and by eukaryotic cells. The most familiar of the myosins is myosin II, which is the major motor protein of muscle. However, the broader family of myosin motors in involved in a wide range of movement and transport processes (vesicle transport, phagocytosis, cell division). Yet other myosins are now believed not to be involved in transport at all but to generate and sense mechanical forces in the cell. We are now at the point where the study of the dazzling variety of behaviours and functions of different myosins is beginning to allow the underlying principles to emerge of how a prototypical myosin can be adapted for a myriad of different functions. This research has the primary aim of defining and refining these principles which in the long term should lead to an understanding of how molecular motors can be designed for specific functions – be that biological or bio-technological.

What are the broader aims of the research?

The broad aims of the research are to define two things:

1. How the biochemistry of the myosin motor domain allows the cellular functions of a myosin to be fulfilled.

We aim to be able to define how the myosin cross-bridge is adapted for different mechanochemical functions. To date, my biochemical-kinetic study of a range of different myosins across the family has led me to hypothesise that there are 4-types of myosin motor activity; Fast –movers, load-bearers, strain-sensors and processive-motors. We will now test if these four types of mechanical behaviours are sufficient to define all myosin motors. If so, it will be

...Continued on page 4

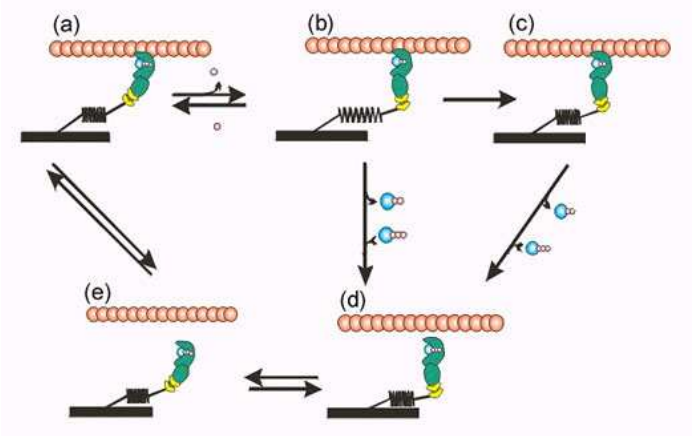
Kent Professor is awarded £1.7 Million for Research into Molecular Motors

...continued from page 3

possible to define the type of mechanical activity of any novel myosin from a few simple biochemical measurements. The four types of motor activity cannot currently be predicted from a simple sequence analysis of the whole motor, i.e. the assignment of myosins to >20 family groups does not correlate simply with the type of motor activity. We will determine if the four types of motor activity can be correlated with specific structural motifs within the motor domain.

2. The regulation of the myosin motor domains.

Myosin motors are regulated by a series of distinct mechanisms; via track binding proteins, via heavy chain phosphorylation, via light chain modification or via the cargo domain. Most of these mechanisms have not been well defined at the biochemical level. Yet it is essential to understand these regulatory mechanisms if we want to understand the cellular role of a motor's mechanical activity. Similar to the motor activity, the type of regulation a myosin is subject to varies with a myosin family – partly because the regulation mechanism can vary between lower and higher eukaryotes. We will define the regulatory behaviour of a subset of myosin motors and test if the type of regulation can be predicted from the sequence.



Cross Bridge Cycle—Colour code for the Figure: Actin monomers - orange; Myosin head - green; Light chains - yellow; Myosin S2 & thick filament - black; ATP/ADP - blue/pink; Pi - pink/yellow.

Does the research have an overall objective?

We will continue to develop our suite of innovative fast reaction methods. The success of our study to date has been built on the development of a range of novel fast reaction methods that allow the kinetics and thermodynamics of the myosin cross-bridge to be studied using sub-milligram and sub-microgram quantities of proteins. The further development of these methods together with their wider exploitation remains a central aim of our approach.

The research project is due to start in January 2009 and will last for five years. It will be carried out in Professor Mike Geeves's laboratory in the Department of Biosciences. He will be working with Sandford Bernstein, Professor of Biology at San Diego State University, who will travel to the UK whilst working with Mike. In recent years, Professor Bernstein has conducted research into the analysis of enzymes using lasers and the abnormalities of genes in cardiac disease.

Successful Collaboration between Radio Communications Engineers in UK and New Zealand

Professor Ted Parker, Dr John Batchelor and colleagues in the Antennas group in the Department of Electronics are working on an Engineering and Physical Sciences Research Council (EPSRC) funded project which looks at the specific problems that arise when designing Frequency Selective Surfaces (FSS) for use at the frequencies typically employed for mobile communications and WLANS, and in particular to their application to buildings. FSS are filters for electromagnetic (EM) waves. They are transparent at some wavelengths, but opaque at others. By embedding them in the walls of buildings at suitable locations, the propagation of waves within those buildings – from room to room for example - can be controlled. We have devised the concept of the *electromagnetic* architecture, as opposed to the structural architecture of buildings, to describe their interaction with EM waves. This work is being carried out in collaboration with Manchester University and the Department of Electrical and Computer Engineering at the University of Auckland.

As part of this collaboration, Ted and John have spent several weeks working in Auckland during the past three years. In June of this year, Professor Allan Williamson, Head of Department in Auckland, paid a return visit, joining the Antennas group here for 10 days, followed in July by his colleagues, Dr Michael Neve and postgraduate students, Eva Lai and Andrew Austin, who gave a seminar on their buildings propagation modelling.

The EM properties of FSS, and antennas, are measured in anechoic chambers – large rooms with walls covered in expensive material that absorbs waves that might land on them, to prevent any reflections from confusing the measurements. There are two chambers in the Antennas lab in the Electronics Department and a large chamber in Professor Williamson's department in Auckland. The photograph shows the official opening ceremony in New Zealand after its recent refurbishment when Ted Parker was asked to do the honours and cut the ribbon.

Prof Allan Williamson (left), John Batchelor, Dr Michael Neve & Ted Parker (centre), Andrew Austin & Eva Lai (right)

Kent Scientists involved in *Mary Rose* Research

The hull in the ship hall. View from the stern. *Image courtesy of the Mary Rose Trust.*

Professor Alan Chadwick of the Functional Materials Group in the School of Physical Sciences is one of a group of scientists involved in research into the stability of the timbers in the *Mary Rose*, King Henry VIII's favourite warship and one of the first true warships of what was to become the Royal Navy. The *Mary Rose* was sunk in Portsmouth harbour in 1545 during an engagement with the French fleet.

The *Mary Rose* is currently the centre of one of the world's largest artefact conservation projects which has been in progress for 20 years, during which there has been great public interest in the preservation process. The ship is currently undergoing conservation treatment in Portsmouth. Little is known about chemical and biological processes operating in marine archaeological timbers from the time of their burial to their subsequent conservation. An understanding of these processes is required to ensure that the conservation of the *Mary Rose* will be successful.

The first time it was realised that damaging chemical processes were taking place in the timbers of an old ship that had been raised from the sea, was less than ten years ago. In 2002 conservators at the *Vasa*, a 17th century Swedish warship in a Stockholm museum, became aware of a serious problem associated with the reduced sulphur that had been present in the timbers when they were raised. Chemical analyses, with synchrotron radiation techniques as a primary probe, revealed the reduced sulphur compounds were slowly oxidizing to sulphuric acid, and thereby threatening to degrade the mechanical stability of the hull timbers. In addition, iron-based fixings/fittings associated with several of the wooden artefacts, was exacerbating this problem. These produce Fe ions which can form sulphides and can act as catalysts for the sulphur oxidation process. As sulphur accumulation is common in underwater wooden shipwrecks, this is now recognised worldwide as a serious problem and is often referred to as the sulphur problem. Recent studies of the *Mary Rose* have revealed similar worrying problems to those found in the *Vasa*.

Conservator investigating main deck timbers at the stern of the ship. *Image courtesy of the Mary Rose Trust*.

The *Mary Rose* is being prepared for display in a new museum in 2011-2012 and before the move to the permanent site the aim is to resolve the sulphur problem. The target of the research programme at Kent, is to develop conservation procedures which can either remove the iron compounds or pacify their adverse effects. The work will involve developing new chemical and physical techniques and investigating their effectiveness. A key part of the characterisation procedures will be the use of state-of-the-art X-ray methods available at the new Diamond Light Source. The Kent group has been one of the pioneers in using these methods and has played a key role in exploiting the application of the exceptionally intense and focused X-ray beams.

The aim of this project is to understand the underlying science of the sulphur problem in the context of the *Mary Rose* (i.e. in the context of timbers which are still 'wet' and undergoing continual spraying-based treatment) and hence develop, and validate, long term preservation measures that will remove or pacify the sulphur compounds in archaeological timbers.

Part of the research team: Fred Mosselmans top-left (Diamond); Andy Smith (Daresbury) top-right; Alan Chadwick bottom-right (Kent); Aaron Berko (PhD student, Kent) bottom-left with a wooden plate recovered from the *Mary Rose*. *Image courtesy of Diamond Light Source.*

Meet the Scientist

This month, we meet Dr Stefano Biagini who is a Lecturer in Organic Chemistry in the School of Physical Sciences. After graduating with a degree at Exeter University, he stayed there to continue his PhD studies. He has held post-doctoral positions at the University of North Wales in Bangor and Imperial College London. After a year lecturing at King's College London, he joined Kent in 1999.

Dr Stefano Biagini, Lecturer in Organic Chemistry, The School of Physical Sciences.

"*How did you first get into science*?"
Science has always been my passion. As a child I read books, watched documentaries, and used to plague adults with questions about cells, atoms, plants, animals, stars.... I felt then (and still do now) that many of the answers to the world around me were related to Chemistry, so I pursued this subject at degree level and just kept going with PhD and postdoctoral work, before gaining an academic position. I'm still looking for answers and enjoying the journey.

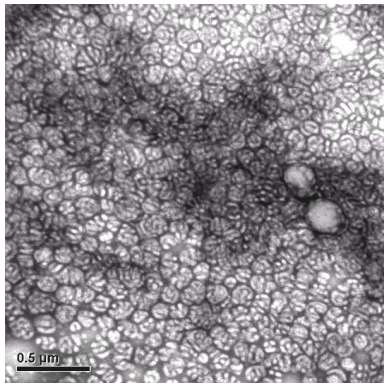
"*What is the focus of your current research*?"
Peptides are at the heart of what I do. In living organisms, peptides perform a myriad of functions, and amongst these, they are both the body's messengers to cells and the receptors. By making subtle changes to peptides it is possible to utilize them for therapeutic or medicinal purposes. In a current collaboration, for example, we add radioactive isotopes to peptides, to target cancer cells for radio-imaging. Artificially mimicking the behaviour of peptides is my ultimate aspiration and an approach that I have taken is to incorporate small peptides into monomers. Monomers are the individual links that go on to make the much bigger molecular chains called polymers. These peptide-polymers have shown very interesting and quite unique structural properties, which is a step closer to developing these materials as a distinct class of therapeutic compounds.

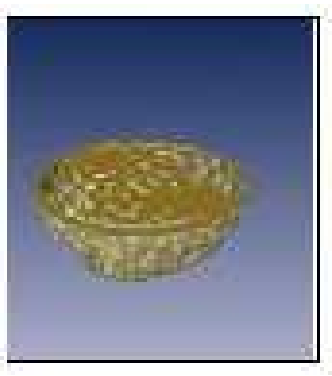
"C*an you tell us about your current research group, what the group is working on and the purpose of the research*?"
Alison Parry, who will soon be defending her thesis, is responsible for the synthesis of the peptide-polymers in the group. Thanks to help from Simon Holder, fellow chemist in my department and Nico Sommerdijk (Eindhoven) we have used cryo-TEM to show the intricate structure and arrangement of our peptide-polymers, which have been recognised as very important by Angew Chemie, the world's leading general chemistry journal. Thanks also to help from Mark Smales in the Department of Biosciences, we have shown that some of our polymers have antibacterial properties. On a different topic, Helen Sladen who is nearing the end of her PhD, has prepared modified peptides specifically with the intention of quickly and efficiently adding Fluorine-18, a radioactive isotope of central importance in Positron Emission Tomography. The project is with Prof Phil Blower in King's College, London, and I have been very lucky to work with him and his team for the last few years. In September, my group will be joined by a PhD student who will be working with Phil and myself on the use of peptides in cancer scanning. The final PhD of the group is Marion van Waterbemdt who has been working on DNA attached to nanoparticles.

"*How has research in your area changed over the past few years*?"
In many cases the bar has been raised and when new systems are presented it is expected that there will also be clearer understanding of the underlying principles. So simply saying that you have prepared a new peptide derivative is not enough: you have to show that it works, and why. But with greater knowledge, comes greater possibilities-these are exciting times for scientists who are willing to step out of their comfort zone and talk to other disciplines.

"*What do you consider is the most significant accomplishment in research in your area in the last few years*?"
The detection of cancers using more sensitive and accurate scanning tools is quite impressive. There have been some very important contributions in both synthetic techniques and instrumental analysis, but rather than single-out noteworthy achievements what I find more valuable is the way that different disciplines have come together and contributed to each other.

"*What kind of challenges do you see lie ahead in your specialism in the future*?"
In many ways the same challenges remain. We are still a long way off replicating Nature's skill in synthesising complex molecules with specific bioactivities. Equally 'magic bullet' therapeutics, that target the disease with no unwanted side-effects, remain a holy grail. Again bringing together different skills and areas of expertise will be the key to success.





Amphiphilic norbornene-based double comb diblock polymers with peptide and oligo (ethylene oxide) side chains aggregate in water to form unprecedented complex morphologies depending on the amino acid sequence of the peptide.

Recent Published Papers

Department of Electronics

Zhang H J, He Q, **Yan Y**, "A new nondestructive technique for measuring pressure in vessels by surface waves" (2008) Applied Acoustics, **69**, 891–900.

Y.Q. Zhou, T.S. Ng, **J. Wang**, K. Higuchi, M. Sawahashi, "OFCDM: A Promising Broadband Wireless Access Technique" (2008), IEEE Communications Magazine, **47**, 38-49.

M.C. Fairhurst, T. Linnell, S. Glenat, **R.M. Guest**, L. Heutte, T. Paquet, "Developing a Generic Approach to On-Line Automated Analysis of Writing and Drawing Tests in Clinical Patient Profiling" (2008), Behavior Research Methods, **40** (I), 290-303.

A. Hannan Bin Azhar, **F. Deravi**, "Particle Swarm Intelligence to Optimize the Learning of N-tuples" (2008) Journal of Intelligent Systems, **17**, Supplement, 334-1860.

C. Edwards, T. Floquet, **S.K. Spurgeon**, "Circumventing the Relative Degree Condition in Sliding Mode Design" (2008), Modern Sliding Mode Control Theory (Ed.), Lecture Notes in Control and Information Sciences, Editors G. Bartolini, L. Fridman, A. Pisano, E. Usai, Springer - Invited Chapter, 1-23.

The School of Physical Sciences

Zhang, F., Dressen, D.G., Skoda, M.W.A., Jacobs, R.M.J., Zorn, S., Martin, **R.A., Martin**, C.M., Clark, G.F., Schreiber, F., "Gold nanoparticles decorated with oligo(ethylene glycol) thiols: kinetics of colloid aggregation driven by depletion forces" (2008) European Biophysics Journal, **37**, 551-561.

Bowden, S.A., Court, R.W., Milner, D., Baldwin, E.C., Lindgren, P., Crawford, I.A., Parnell, J., **Burchell, M.J.**, "The thermal alteration by pyrolysis of the organic component of small projectiles of mudrock during capture at hypervelocity" (2008) Journal of Analytical and Applied Pyrolysis, **82**, 312-314.

Qiu, D., Guerry, P., Ahmed, I., **Pickup, D.M.**, Carta, D., Knowles, J.C., Smith, M.E., **Newport, R.J.**, "A high-energy X-ray diffraction 31P and 11B solid-state NMR study of the structure of aged sodium borophosphate glasses" (2008) Materials Chemistry and Physics, **111**, 455-462.

Tsembelis, K., **Burchell, M.J.**, Cole, M.J., Margaritis, N., "Residual temperature measurements of light flash under hypervelocity impact" (2008) International Journal of Impact Engineering, **35**, 1368-1373.

Trifanov, I., Hughes, M., **Podoleanu, A. Gh.**, Rosen R.B., "Quasi-simultaneous optical coherence tomography and confocal imaging" (2008) Journal of Biomedical Optics, **13**, 044015 1-7.

Sherif, S.S., Rosa, C.C., Flueraru, C., Chang, S., Mao, Y., **Podoleanu, A. Gh.**, (2008) "Statistics of the depth-scan photocurrent in time-domain optical coherence tomography", Journal of Optical Society of America, **25**, 16-20.

Woods, D., **Podoleanu, A. Gh.**, (2008) "Controlling the shape of Talbot bands' visibility", Optics Express, **16**, 9654-9670.

Podoleanu, A. Gh., Rosen, R.B., "Combinations of techniques in imaging the retina with high resolution" (2008) Progress in Retinal and Eye Research, **27**, 464-499.

Recent Papers Presented at Conferences

Department of Electronics

M.A. Hannan Biz Azhar, **F. Deravi**, K. Dimond, "Criticality Dispersion in Swarms to Optimize N-Tuples" (2008), Proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2008, Atlanta, Georgia, USA. Published on CD.

Recent Grants Awarded

Department of Biosciences

Professor Darren Griffin has been awarded £12,000 for a project entitled 'Towards 24 colour FISH for preimplementation diagnosis' by Kreatech Biotechnology.

Computing Laboratory

Clive Birch has been awarded £4,266 for a Mechanical Workshop by Ancon Technologies Ltd.

Dr Andy King has been awarded £112,237 for a project entitled 'REP-THE: Reverse engineering productivity tools for ethical hackers' by the Royal Society,

Dr Sally Fincher has been awarded £227,788 for research entitled 'To see ourselves as others see us: sharing and representing classroom practice' by the Higher Education Academy.

Department of Electronics

Professor Jiangzhou Wang has been awarded £6,000 for a Distinguished Visiting Fellowship Award for Professor Zhenhui Tan, Beijing Jiaotong University by the Royal Academy of Engineering.

Winston Waller has been awarded £18,500 for a project entitled PoCKet Project with Micro Flight by Mircro Flight Systems Ltd.

Postgraduates and Post Doctoral Students Take Opportunity To Hone Their Entrepreneurial Skills

STMS Research Skills Training hosted a 2-day training course entitled: Entrepreneurship - Myth versus Reality. The course took place over the 9th and 10th July and was conducted by Professor Andrew Godley from Reading University.

The course, funded by the Engineering and Physical Sciences Research Council (EPSRC), appealed to a high number of postgraduate and post doctoral students and was aptly summed up by some of the participants: "The entrepreneurship workshop was a refreshing step away from our usual scientific work. The workshop gave us the opportunity to develop a practical understanding of how to bring our scientific expertise to the market place. We covered many useful topics such as idea generation, intellectual capital, basic funding and marketing techniques."

"As part of the workshop we were able to create three product ideas to present to the rest of the group. Whilst this was an enjoyable exercise, it also had more serious undertones whist we developed our ideas and presented a pitch for funding on the second day of the workshop."

Similar training and workshops are planned for the next academic year and details will be available on the website : http://www.kent.ac.uk/stms/skills/index.html

Bright Rim Clouds

These are clouds of molecular gas whose outside edges are irradiated by the light of nearby young stars. This radiation results in the outer layers of the cloud becoming ionised, and the external pressure can lead to stars being induced to form inside the rims, as the overpressure drives a shock into the gas. The image shows one of the objects in our narrow band imaging survey of bright rim clouds, carried out at the Nordic Optical Telescope at La Palma.

Bright Rim Cloud as seen through the Optical Telescope at La Palma

Apart from the ionised rim, clear evidence of striated rays is seen as gas streams off the ionised boundary.

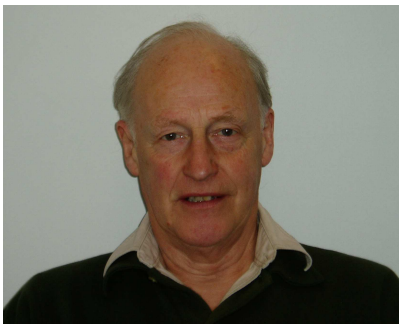
For more details contact Prof Michael Smith or consult:
http://astro.kent.ac.uk/mds/turbulence.html

Professor Michael Smith, Professor of Astronomy.
School of Physical Sciences
http://astro.kent.ac.uk/mds/mdsmith.htm

Café Scientifique
Ye Olde Beverlie,
St Stephen's Green, Canterbury

Tuesday 9th September 2008
Professor John Dore:
Water: The Magic of Molecular Science

Water is a familiar material but it is not widely appreciated that its properties are quite distinct from other liquids. Everyone above the age of about eight knows that the chemical formula is H2O and that snowflakes usually have a hexagonal symmetry. They also know that water is essential for life and that some space research is actively engaged in the search for water on other planets as a possible indicator of extra-terrestrial life. Water also has a direct influence on our weather and through geology has played a central role in shaping our planet. Consequently, one would expect that scientists would know all that there is to know about this important chemical. Surprisingly, this is not the case and, despite much experimental investigation, there are still many aspects that are not fully understood at a molecular level. The talk will explain some of the unusual properties of water and answer questions such as 'why does ice float on water', 'why is water wet?' and 'why do oil and water not mix?'. A key concept in describing how water molecules interact with each other is the 'hydrogen-bond' and this will be explained. Finally, the role of water in a bio-sciences context will be discussed before a brief consideration of some fascinating but controversial new ideas that could explain the unusual nature of liquid water.



Professor John Dore, Emeritus Professor of Condensed Matter Physics, School of Physical Sciences

Café Scientifique in 2008

Oct 14, 2008
Dr. Arnaud Wisman: How do we regulate the awareness of our own mortality
http://www.cs.kent.ac.uk/people/staff/dfc/site/CS/

Nov 11, 2008
Dr. Martyn Amos (Manchester Metropolitan University): Genesis Machines

Dec 9, 2008
Professor Martin Warren, Department of Biosciences: TBA

University of Kent
www.kent.ac.uk

Edited by Joanna Walpole
University of Kent
Marlowe Building
Canterbury
Kent
CT2 7NR

For further information contact:
J.L.Walpole@kent.ac.uk
01227 82 7833
For back issues follow the link:-