Volume 2, issue 7

University of Kent

Sciences @ Kent

May/June 2009

In this Issue:

Kent's Got Talent page 6

Kent Research in Dubai page 8

View from the Dean's Office

This month's issue highlights award-winning activities by students and staff from the Faculty. It also features several articles from the Astrophysics group—demonstrating our impact across the universe as well as in Kent! On a more local level, our latest news is that our Faculty Board has endorsed a decision to rename the Faculty from 1st August 2009. We hope that the University Senate will agree to a new name of "Faculty of Sciences" so that the newsletter will truly reflect "Sciences@Kent".
More news next issue.
Best wishes.
Peter
P.S. Good luck to all the STMS undergraduate students in their current examinations!

From Placement to Full-Time with BAE Systems

In the last issue of the Newsletter, we reported on Tim Chapman's winning entry in this year's Association for Sandwich Education and Training (ASET) essay competition. Tim, a Final Year 'Computer Systems Engineering with a Year in Industry' Student, was presented with the £700 cheque by Amanda Monteiro of ASET at the Department's Engineering Industrial Panel meeting on 13th May. The Panel, which meets annually with members of the Department of Electronics to discuss Enterprise, Research, Teaching and student placements, is made up of representatives from local industries, including British Aerospace (BAE) Systems where Tim spent his Placement Year. In addition to winning the essay competition, Tim has won himself a permanent position with BAE Systems. Turn to page 5 for more details about Tim.

left to right: Keith Washington (BAE Systems), Tim Chapman, Amanda Monteiro (ASET), Nick Martin (BAE Systems), Sarah Spurgeon (Head of Electronics)

Student company rated one of the 20 best e-startups in Europe

e-startup entrepreneurs:
[left to right] Pulitha Liyanagama, Sebastien Marion and Philipp Mohr.

A start-up company formed by postgraduate computing students from the University of Kent has been selected by Seedcamp as one of the 20 best e-startups in Europe. The students were invited to demonstrate their communications product to an audience of experienced developers, investors and entrepreneurs at the Seedcamp 2009 event in London on 20th April 2009.

The product, called Comufy, is an innovative web-based platform for controlling multiple communication channels. The project was started more than a year ago by Pulitha Liyanagama and Sebastien Marion with Philipp Mohr joining a few months later.

Sebastien said:

" Today, people are losing control of their communications because of the increasing number of accounts they have to manage such as Social networks (including Facebook, MySpace, Bebo, Orkut, LinkedIn etc.), Instant Messengers (including MSN, Skype, Yahoo, ICQ, etc.), email messaging and phone communications (including mobile, office and home phones). This problem is very likely to keep growing.

As the originator of the communication, whether voice or text-based, we face a similar problem - how can we reach our correspondent in the most efficient manner? "

This is where the platform Comufy comes in. It allows the receiver to control how they want to receive their communications, depending on who the sender is, the location the receiver is in, and the time of the day. The team plans to launch the alpha version of Comufy in May 2009.

Seedcamp is an organisation which helps early-stage start-ups which utilise web-based technologies to take the next step by putting them in touch with experts who can help them realise their potential. The team has been looking for funding and Seedcamp has proved an excellent opportunity.

" The event was fantastic. There were several sessions of one hour each with a panel of mentors including investors, HR consultants, PR consultants, marketing experts etc. Each session was just like BBC's Dragon's Den, but longer. We learned a lot and got some very good feedback. More importantly we networked a lot and made some very valuable contacts. We met investors from major venture capital firms that want to be kept in the loop, we are being put in contact with the Google Voice team, we are invited to give a presentation to T-Mobile, we are in touch with a person from IBM who wants us to meet the Lotus Notes team. "

Sebastien is currently working towards his PhD which focuses on applying data mining techniques to improve memory management performance for the programming language Java. Pulitha's PhD focuses on non-functional aspect-based transformations in model driven engineering. Philipp was awarded a PhD in 2008. His thesis focused on detecting and learning user behaviour on mobile devices.

Electronics Students Website 'Official Honoree' at 13th Webby Awards

Joe Campion and Gavin Clark's third-year website project "The Kitchen Wall" continues to attract awards. The November 2008 issue of the Newsletter reported on the Quality Seal Award from Europrix for the two Multimedia third year students. Joe and Gavin's website has also recently been selected as an Official Honoree for the Student category in The 13th Annual Webby Awards.

The Kitchen Wall Website can be found at:
http://www.thekitchenwall.com/Pages/Home/

As a result of the exceptional quality of submissions this year, the Academy has recognized outstanding entries as Official Honorees alongside their Nominees and Winners. The Official Honoree distinction is awarded to the top 15% of all work entered that exhibits remarkable achievement. With nearly 10,000 entries received from all 50 states and over 60 countries, this is an outstanding accomplishment.

OBE Amongst Awards for Kent alumnus

Robin Pitman, O.B.E.

Robin Pitman, a pioneer Kent graduate in the Physics Class of 1968, has recently been presented with prestigious awards for his work on both sides of the Atlantic.

After Robin left Kent in 1968, he began a career in defence science, first with the UK Atomic Energy Authority and then in a research position with the Ministry of Defence at Aldermaston. During the height of the Cold War, Robin was transferred to the missile range in the Outer Hebrides. Later in his career, he took up positions in the Defence Intelligence Staff and spent some time in the Ministry of Defence Headquarters in London, on the oversight of the UK nuclear warhead research and capability maintenance programme, before taking up the position of Head of Nuclear and Strategic Defence for the British Defence Staff in Washington in 2003. Five years later and shortly before his retirement, Robin was the first foreign national to be awarded the National Nuclear Security Administration Gold Medal for Distinguished Service in recognition of his significant contribution to the interests of the United Kingdom and the United States. The award was presented by the Honorable Tom D'Agostino, Administrator of the US National Nuclear Security Administration, at a gala dinner for senior members of the UK and US nuclear weapons communities. Robin returned from Washington in October 2008 on retirement from government service and was called to Buckingham Palace after being honoured with an OBE in this year's New Year Honours list

Throughout his career, Robin has kept in close touch with Kent and has been an active supporter of alumni events. As one of Kent's '1st 500', he threw himself into undergraduate life, becoming one of the two founders of 'inCant', the first student newspaper, and was its first business manager. He also started the whimsical 'wear a gown around the town' movement, became a pioneer member of Rutherford College when it opened and is now an honorary member of the Rutherford Senior Common Room.

A languid retirement is not for Robin who has recently accepted a position as Associate Director of the newly created Institute for Security Science and Technology at Imperial College. He aims to continue with his active interest in Kent and is involved in the discussions already under way on the planning of events that will be held to mark the 50th anniversary of the foundation of the University.

Doctor's Research into Human Vision wins 2009 Cognitive Science Prize

Dr Rosie Cowell in the Computing Laboratory has recently returned from a 7-month visit, funded by the BBSRC (Biotechnology and Biological Sciences Research Council), to the laboratory of Professor Gary Cottrell in the Department of Computer Science and Engineering at the University of California, San Diego. Rosie, an RCUK Academic Fellow, was investigating human vision, specifically, how the brain processes and represents faces – a special class of visual stimulus – in visual cortex. She used "neural network" computational models to come up with a new method for understanding data from a brain imaging technique that is popular with neuroscientists: functional Magnetic Resonance Imaging (fMRI). In collaboration with Professor Cottrell, she has embarked on a new phase of research, which she envisages will form the backbone of her research program for the remainder of her RCUK Fellowship, and beyond. The visit enabled Rosie to enhance her post-doctoral training, to initiate a lasting international collaboration with Prof Cottrell, and to meet and learn from researchers in many different laboratories in San Diego. She also travelled to several conferences and meetings across the USA, learning about state-of-the-art techniques in experimental neuroscience and computational modelling, and forging links between US researchers and the University of Kent.

Rosie was recently awarded £3000 by the Royal Society to continue her work with Professor Cottrell and she took the opportunity to fly over in May. All Rosie's hard work and commitment has paid off and has just proved to the research councils that their confidence in her research has been well-deserved: Rosie has just been awarded the 2009 Cognitive Science Conference Perception/Action Modeling Prize for her work with Professor Gary Cottrell at UCSD. This prize is awarded by the Cognitive Science Awards Committee, and is sponsored by the Cognitive Science Center (Amsterdam). It also comes with an honorarium of $1000, which no doubt, will be well spent!

Dr Rosie Cowell, Computing Laboratory

Kent Astronomers Map Out the Milky Way Dust

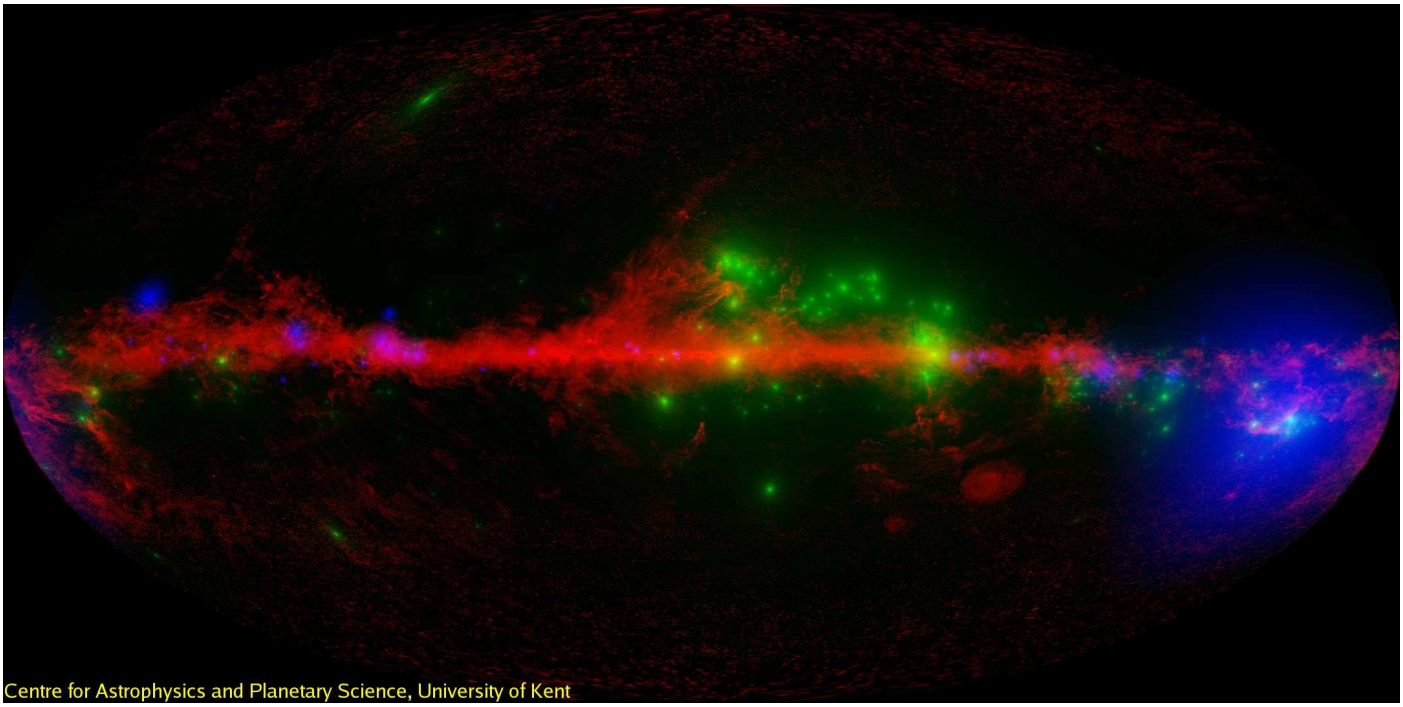
Kent astronomers have generated new all-sky maps of our Galaxy which display the clouds of gas and dust in astonishing detail.

It is known that these giant molecular clouds are the incubators for new stars. Hence, knowing their distribution and structure helps us to understand more details of the star formation process. The analysis of the maps will enable us to find answers to some of the major problems of star formation such as: 'What causes the universal distribution of stellar masses?' and 'Why are there different modes (clustered and isolated) of star formation and under which conditions do they occur?'.

The maps are calculated using the fact that dust dims and reddens the light of stars behind them - effects usually referred to as extinction. Dust can be used as a tracer of molecular hydrogen, as the ratio of gas to dust in the molecular clouds is constant. Thus, the extinction maps represent the line-of-sight or column density of material.

Since the maps are based on near infrared observations, they can trace a wide range of extinction values. Values from 0.2 to 20 magnitudes of optical extinction can be detected with a spatial resolution between one and six arcminutes.

Dr Dirk Froebrich of the Centre for Astrophysics and Planetary Science is leading the project to analyse in detail the projected distribution of material to understand the turbulent structure of these clouds and to investigate if it is dependent on the spatial scales at which they are observed.



Centre for Astrophysics and Planetary Science, University of Kent

This is a composite of three all-sky images calculated in Centre for Astrophysics and Planetary Science (CAPS). The red channel shows our new extinction map from J. Rowles & D. Froebrich (2009, MNRAS, in press). The other two channels represent the ultraviolet radiation field from massive young stars in our Galaxy (they have been determined by P.Cornwall during his final year PH700 project work). These massive stars only live for a few million years, and are hence signposts of recent star formation activity, while the dust distribution marks current and future regions of star formation. The green channel shows the far ultraviolet radiation field caused by B-type stars, and the blue channel the extreme ultraviolet radiation field

£74k Funding To Support National Research Network

Dr Eerke Boiten in the Computing Laboratory has received funding in the sum of £73,820 from the EPSRC to support a new Research Network named 'CryptoForma'. Its purpose is to support a growing research community in the application of formal methods to the modelling and analysis of modern cryptographic protocols. The work carried out within the Network will increase security and confidence in such protocols and their applications (e.g. in e-commerce and voting), to the benefit of protocol designers, businesses, governments and application users.

'CryptoForma' aims to bring together research groups working in the UK with the initial membership including academics from the Universities of Kent, Birmingham, Bristol and Royal Holloway (University of London). Industrial partners include Hewlett-Packard and Microsoft Research.

For information on the network's activities and details of planned events, please contact Dr Boiten
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01227 827615

British Computer Society impressed by Greenfoot

Michael Kölling, Professor of Computer Science, presented Greenfoot to members of the local Kent branch of the British Computer Society (BCS) at their monthly meeting which was held at the Computing Laboratory on the 14 May. Greenfoot is an integrated learning environment for the teaching of object-oriented programming, which is aimed specifically at secondary school level.

The BCS is the leading professional body for those working in IT and has over 68,000 members world wide. Jonathan Killin, the chairman of the Kent branch of the BCS, welcomed Michael to the meeting.

Greenfoot was developed jointly by the University of Kent at Canterbury (UK) and Deakin University, Melbourne (Australia), and is funded by Sun Microsystems. Released in 2006, it gained popularity very quickly. In 2008, it was downloaded 220,000 times from the universities servers. It is free to use and the source code is open for everyone to download, read and modify.

Michael said:" Greenfoot is our attempt to make a contribution to improving the teaching of computing at secondary school level. Teaching computing to that age group is incredibly hard, and good tools and strategies can provide important help. I am delighted to have had the opportunity to present this work to the BCS, who has the same goals and can provide important support that can make a real difference. "

Michael's involvement with the teaching of programming is far reaching. In 2006, the Computing Laboratory was awarded the 'Sun Center of Excellence in Object-Oriented Education' in recognition of Michael's excellent work in advancing the teaching of programming. He was part of the team which developed BlueJ, an environment for teaching the programming language, Java, to first year students at university. He is joint author of the book, 'Objects First with Java: A Practical Introduction using BlueJ', now in its fourth edition and published in seven languages, and is joint editor of 'Reflections on the Teaching of Programming'. His latest book, 'Introduction to Programming with Greenfoot' will be published in August 2009. He is also active in the ICT & Computing Teachers Network Kent, providing information and workshops to school teachers across the county who have an interest in ICT.

Jonathan Killin, Kent BCS Chairman, welcoming Professor Michael Kölling, creator of Greenfoot

Electronics Student Awarded for Outstanding Academic Achievement

Continued from page 1...

In addition to his recent successes, including landing himself a full-time job when he finishes his degree, Tim Chapman of the Department of Electronics has been awarded the Hima-Sella Award for Outstanding Academic Achievement by the Institute of Measurement and Control. His third year project "Software Evaluation of Helicopter Radar Sensors for Landing in Dust Clouds", which came about as a result of Tim's placement with BAE Systems, was selected by the Department from a short list of five. He was nominated by Professor Yan, a Fellow of the Institute and the local contact for student members.

The citation written by his project supervisor, Dr. John Batchelor, was read out at the award ceremony which took place at the 42nd Annual Dinner of the Institute on 23rd April at the Royal Lancaster Hotel in London. The award was sponsored by Hima-Sella, an independent market specialist, designing and supplying integrated safety, control and automation systems, based in Stockport, Cheshire.

Left to right: John Higgins, the Chairman of the London Section of the InstMC, Tim Chapman, Andy Tonge, Hima-Sella

Electronics Postgraduate wins Z-PEN at ICT-2008

Jeanne James, a postgraduate student working with Dr. Nathan Gomes in the Broadband and Wireless Communications Research Group in the Department of Electronics, was recently selected as one of the best fifteen student reporters at the EU's Information and Communications Technology (ICT) event which had been held in Lyon in November 2008. Jeanne was the student representative of the EU Network of Excellence "ISIS" which is centred on Radio over Fibre systems for the support of current and emerging wireless networks. Jeanne and the other winners each won a Z-PEN, which can not only be used as a regular USB drive but can also be used to convert handwritten notes into digital text.

Multimedia Students present Their Work to Acclaimed Director/Producer

(from left to right) Lisa Smith, Helen Curston and lecturer Jane Milton with some Multimedia students)

Second year students at the Department of Electronics' Multimedia Technology and Design course have had their film projects critiqued by acclaimed television director and producer Lisa Smith.

Twenty teams screened their work to their tutors and Lisa Smith at the beginning of the summer term. The film projects were the culmination of seven months 'digital filmmaking' work, which taught them the practical skills and theory of non-fiction film.

Lisa Smith has worked in television for over 10 years. Her credits include: the hit series The Undercover Princes (BBC1 & BBC3, 2009), which followed three foreign princes on their quest to find love in the UK; Make Me Honest (BBC2, 2003), a ground-breaking series which explored recidivism by pairing a young offender with a mentor committed to helping them 'go straight'; and Jackpot (BBC2, 2000) a bold observational documentary series exploring the multifaceted world of gambling in Britain, by following ordinary people whose lives are touched by it. Her other credits focus on social issues, such as re-offending and prison life as shown in Banged Up Stand Up (BBC3, 2004), and teenage pregnancy and attitudes towards parenthood as explored in The Baby Borrowers.

Alongside Lisa was television journalist Helen Curston, whose credits have ranged from news and current affairs to wildlife programmes on the BBC. She is a regular visitor to the course and saw the students last year when they were learning how to edit.

Jane Milton, Lecturer in Film and Video Production at the Department of Electronics said: 'We were delighted that Lisa Smith and Helen Curston could take time out of their busy production schedules to join us. The students have benefited greatly from their insight. Our aim is to produce graduates that are equipped to work in different competitive digital industries, like television".

Alex Jacobs, a second year Multimedia student, said: 'It was great to have Lisa and Helen with us. I was quite nervous since this was our first attempt at documentary, but they gave us some constructive feedback. There was a great atmosphere which made the day very special".

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Previous television producers and directors to visit the department include David Moore (Merlin, BBC1) and Jonathan Smith,

Department of Electronics Celebrates a Successful Course with Students from Kosovo

The University of Kent was host to a group of 39 students from PTK (Post Telekom Kosova) for a 3-week course during the Easter Vacation, organised and provided by the Department of Electronics.

The continuing professional development course, specialising in networks and mobile/wireless communications, was devised and delivered by Dr Nathan Gomes, Prof J. Wang and Adam Jastrzebski, members of the Broadband and Wireless Communications research group within the department.

It was the first time that such an event has been held at the new Virginia Woolf College on the Canterbury Campus. With the support of Kent Innovation and Enterprise and Kent Hospitality, the Electronics department delivered a well-organised course, with feedback from delegates being extremely positive. Student Hysen Gashi said he would strongly recommend it, commenting "this was the most professional training I have ever had".

Dr Nathan Gomes agrees that the course was well received by the students. "From my conversations with them, I could tell they were really impressed with the campus and facilities, and although we worked them hard, they enjoyed the courses," says Dr Gomes. "Most of them took the opportunity to visit London over the weekends, so all in all, they have gone back with very positive experiences. We hope they return for more

courses in the future!". As well as course delivery, the delegates received an introduction to the University, and to the Faculty of Science, Technology and Medical Studies by Prof Peter Jeffries, with Prof Sarah Spurgeon providing the introduction to the Department of Electronics. The students also enjoyed tours of research laboratories in their free time.

As PTK commences with a number of major projects in Kosovo, such as installing fibre optic links to all schools, it is hoped that there will be further co-operation with the Broadband and Wireless communications group at Kent, for CPD and technical project assistance.

Glorious Orion: UKIRT Helps Reveal Chaotic and Overcrowded Stellar Nursery

Astronomers using the United Kingdom Infrared Telescope (UKIRT) in Hawaii, the IRAM Millimeter-wave Telescope in Spain, and the Spitzer Space Telescope in orbit above the Earth, have completed the most wide-ranging census ever produced of dynamical star formation in and around the well-known Great Nebula of Orion. They have found this stellar nursery to be a lively and somewhat overcrowded place, with young stars emitting gas jets in all directions, creating quite a chaotic picture.

This spectacular image combines observations from the United Kingdom Infrared Telescope and the Spitzer Space Telescope. It shows just a small portion of the region surveyed. In this figure, parts of the Orion Molecular cloud are illuminated by nearby stars and therefore glow an eerie green colour. The jets punch through the cloud and can be seen as a multitude of tiny pink-purple arcs, knots and filaments. The young stars that drive the jets are usually found along each jet and are coloured golden orange. Credit: UKIRT/JAC, Spitzer Telescope.

There is much more going on in Orion than previously thought.

The research team comprises more than a dozen astronomers from the US, the UK, including Kent's own Dr Dirk Froebrich, and a number of other European countries. The project thus has a truly international flavour, representing a collaboration of minds from across the globe. A number of them are in Hertfordshire in the UK this week to share their discoveries with colleagues at this year's annual National Astronomy Meeting of the UK (NAM 2009).

When we look at the constellation of Orion at night, we see only the brightest stars with the naked eye, like Betelgeuse and Rigel at the shoulder and knee of the constellation, or perhaps the Orion Nebula as a vaguely fuzzy patch around the sword.

What out eyes do not see is an enormous cloud of molecules and dust particles that hide a vast region where young stars are currently being born. On the sky, the region – known to astronomers as the Orion Molecular Cloud -- is more than 20 times the angular size of the full moon, spanning from far above the hunter's head to far below his feet. It is one of the most intense regions of star formation in the local Milky Way and has been the subject of many small-scale studies over the years. However, the current work is the first to present such a complete study of the young stars, the cloud of gas and dust from which they are being born, and the spectacular supersonic jets of hydrogen molecules being launched from the poles of each star.

Most of the "action" is hidden from view in visible light, because the molecular cloud is very thick and opaque. Only the Orion nebula, which is really just a blister on the surface of the cloud, gives an indication of what is really happening within. To see through the cloud, we need to observe at wavelengths beyond the reach of the human eye. The longer (or "redder") the wavelength, the better! Thus, the team have used UKIRT on Mauna Kea, the

(above) The Wide Field Camera (long black tube) on the United Kingdom Infrared Telescope on Mauna Kea, Hawaii. Credit: UKIRT/JAC.

Spitzer Space Telescope, which works at even longer "mid-infrared" wavelengths, and the IRAM radio telescope, which operates beyond the infrared at short radio wavelengths.

The United Kingdom Infrared Telescope on Mauna Kea, Hawaii. Credit: UKIRT/ JAC.

The key to the success of this project was the combination of data from all three facilities. Inspired by the richness of his images from UKIRT, Chris Davis contacted colleagues in Europe and on the U.S. Mainland. Tom Megeath, an astronomer from the University of Toledo, provided a catalogue of the positions of the very youngest stars – sources revealed only recently by the Spitzer Space Telescope. Thomas Stanke, a researcher based at the European Southern Observatory in Garching, Germany, then provided extensive IRAM maps of the molecular gas and dust across the Orion cloud. Dirk Froebrich, at Kent, later used archival images from the Calar Alto Observatory in Spain (data acquired by Stanke some 10 years ago) to measure the speeds and directions of a large number of jets by comparing them with their positions in the new images. Armed with these data, Davis was able to match the jets up to the young stars that drive them, as well as to density peaks within the cloud – the natal cores from which each star is being created.

(below) The IRAM 30-meter Telescope on Pico Veleta near Granada, Spain. Credit: IRAM 30-meter Telescope.

Research Focus in the Faculty

In conjunction with the 200th anniversary of Darwin, we are featuring some of our scientists and their particular areas of research. This month, we hear how research took two scientists from Biosciences to Dubai in the United Arab Emirates where they spent time at the Central Veterinary Research Laboratory to look at the important role of falcons in avian genomics.

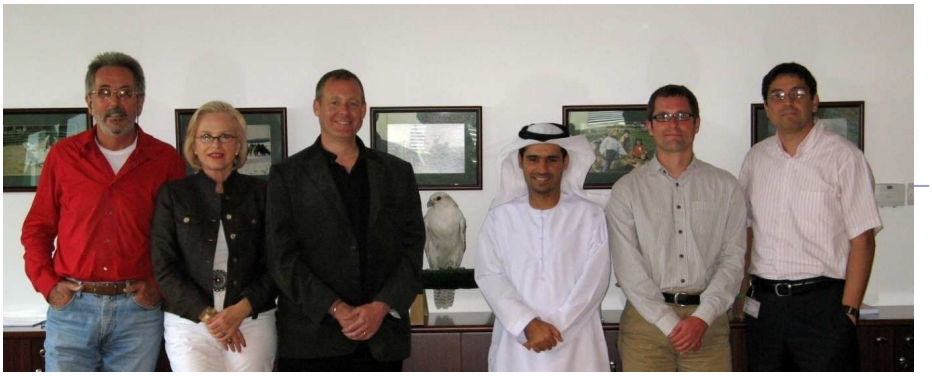
Avian Genomics—a Trucial Innovation in Dubai

Martin Völker and Darren Griffin with a Gyrfalcon (*Falco rusticolus*) x Saker falcon (*Falco cherrug*) hybrid

Professor Darren Griffin and Dr Martin Völker from the Department of Biosciences paid a one-week visit to the Central Veterinary Research Laboratory (CVRL) in Dubai in March. The CVRL is the leading centre for research on commercially important animal species in the United Arab Emirates. Among others, these species include horses (for racing and show purposes), camels (for the production of milk and also for races) and falcons (for falconry, which is a major tradition in Dubai). The CVRL is in a unique position to obtain biological samples from rare falcon species, and this is where the connection with the University of Kent comes in: Darren Griffin's lab has been a leading player in avian genomics for many years and currently extends this work to a wider selection of bird species. In this regard, falcons are especially interesting as their genomes exhibit several unique features that make them ideal targets for comparative studies of the principles underlying genome evolution in birds and other vertebrates. As a result of an earlier visit, Darren Griffin currently supervises a PhD student Abdullah Al Mutery based at CVRL but registered here in Kent who works on falcon genetics, with the primary aim of developing molecular means for identifying individual birds (that may be extremely valuable). Further objectives of his thesis include reconstructing the phylogeny of selected falcon species and the investigation of copy number variation in falcons. The phenomenon of copy number variation – the occurrence of DNA sequences in variable copy number in different individuals of the same species – has only recently moved into the focus of genetics. Although in its infancy, the analysis of copy number variation indicates that this type of genetic variation is implicated in numerous diseases and may underlie key evolutionary innovations. However, the available data are largely restricted to mammals (especially humans and other primates); Darren Griffin's lab is currently in the process of extending the analysis to birds, in an attempt to test whether the characteristics of copy number variation revealed in studies of primates hold true for other organismic groups as well.

The specific objectives of Professor Griffin's and Dr Völker's recent visit were to help Abdullah with the establishment of relevant lab techniques, provide him with some closer supervision than is possible from a distance, and above all to explore opportunities for further collaborations between the University of Kent and the CVRL. During their visit, Professor Griffin and Dr Völker gave two invited lectures each, on topics ranging from genetic diagnostics in IVF embryos to genome evolution in birds and fishes. All talks were very well received, sparked lively discussions and pinpointed areas for future joint projects. Dr Völker, whose visit was partially funded by a grant from the STMS Strategic Research Development Fund, was invited to contribute to a paper on genomics in camels. Professor Griffin also gave a presentation at a local fertility clinic. As a result, this may ultimately lead to the joint supervision of graduate students in the future and in the establishment of preimplantation genetic diagnosis in Dubai (one of Prof Griffin's specialities).

All in all, the visit was very successful, and both Professor Griffin and Dr Völker have been invited to return to the CVRL next year. Hopefully, some additional projects (possibly involving additional academics from the University of Kent) will be initiated in the near future to produce a sustainable and productive collaboration – watch this space!



From left to right: Dr Ulrich Wernery (Scientific Director of the CVRL), Renate Wernery, Professor Darren Griffin, Abdullah al Mutery, Dr Martin Völker, Dr Kamal Khazanehdari (Head of Molecular Biology and Genetics at CVRL)

Next Month, we feature Alistair Mathie who is a Professor in Pharmacology and Dr Xiaoju Shi, Daphne Jackson Fellow, from the Medway School of Pharmacy who give us a glimpse of their research into ion channels as novel therapeutic targets for drug development.

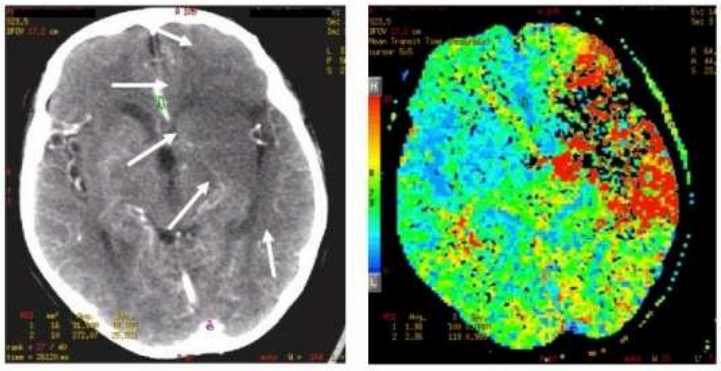
Health Article– New Hope for Brain Attack Victims

Professor Patrick Pullicino is Consultant Neurologist, East Kent Hospitals University NHS Foundation Trust. His research interests are cerebrovascular disease, particularly the effects of heart disease and heart failure on the brain, and small cerebral artery disease. As a clinician, he specialises in neurocardiology and cerebrovascular disease. In this short article, Professor Pullicino talks about the disabling effect of stroke.

A brain attack is an area of damage to the brain due to a reduction in blood flow causing a permanent loss of function. A brain attack is like no other illness because: a) The brain is crucial for thought, movement, and communication and our jobs depend on it. B) Unlike other organs the brain cannot repair itself. C) The brain is extremely vulnerable to reductions of blood flow lasting even a few minutes.

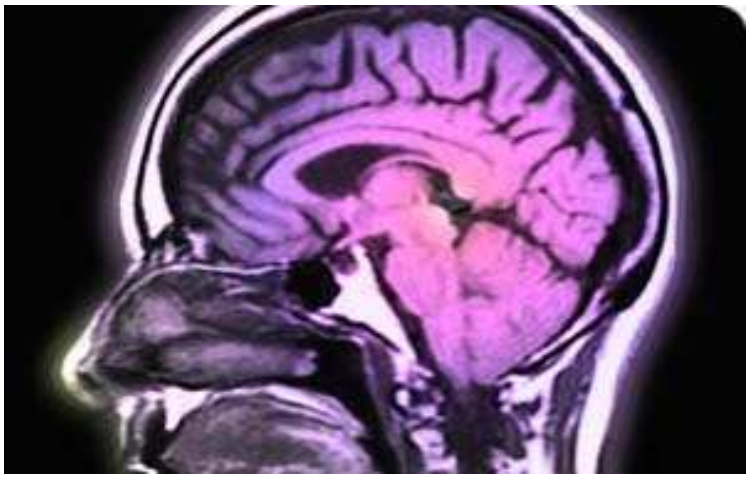
Arteries supplying the brain can be blocked by: a) a clot from the heart, caused by heart disease, going up to the brain and blocking an artery, b) build-up of fatty plaque in neck or brain arteries due to high blood cholesterol, c) narrowing of small arteries in the brain from high blood pressure. Since there are four main arteries leading to the brain and they all usually are connected, blood can often find a way around a blockage, and blood flow to the brain maintained. The brain needs a minimum blood flow of 50 ml/g/min and below this function stops. Permanent brain damage occurs quickly if blood flow stops, but if flow is between zero and 50ml/g/min, research has found that there is a window of up to several hours, during which restoration of flow will allow recovery of function.

Modern brain attack teams, (as was initiated in East Kent in 2008) attempt to restore blood flow to the brain urgently, and depend on the rapid identification and treatment of a brain attack with a powerful clot dissolving agent, tPA. For successful recovery, you have to be aware that you could be having a brain attack and call an ambulance quickly. Everyone should know the FAST test: sudden onset of Face, Arm weakness, Speech difficulty, Time to call 999. If you are able to get to hospital within 3 hours from onset, tPA is given intravenously, if you are eligible. There are many exclusions for the drug as it may cause a bleed in the brain in certain situations. tPA can result in complete recovery of brain function and is a major advance in the treatment of brain attack. Some centres are now also attacking the arterial blockage directly, by inserting catheters into the arteries to reach the clot and remove it.



Left the grey-scale picture, the stroke area is dark grey compared to healthy brain tissue (arrows). Right the colour-coded image of blood flow in the brain, areas of reduced flow are red.

Image courtesy of The European Society of Neuroradiology - Diagnostic and Interventional (ESNR)
http://www.esnr.org/diagnostics.php



Brain scan showing damage following stroke.
Image courtesy of BBC:
http://www.bbc.co.uk/health/images/300/brain_scan.jpg

People are realizing that brain attacks can suddenly cause you to become permanently disabled, unable to speak or can even be fatal. Important causes of brain attack are high blood pressure, heart disease and smoking and stopping smoking, treating high blood pressure and taking blood thinners (warfarin) for an irregular heart (atrial fibrillation) are important ways to prevent stroke. High blood pressure can cause a brain attack due to a bleed into the brain, and these are particularly serious and not open to tPA treatment.

The message about the seriousness of a brain attack, the availability of a powerful treatment and the importance of a very quick diagnosis are rapidly spreading, but still less than 5% of patients with brain attack get tPA. It is important that the FAST message is spread and that research continues into further ways to limit the effects of a disease that ranks third in causes of death in the UK and is the biggest cause of disability.

Professor Patrick Pullicino obtained his MD with distinction, from the University of Malta in 1973. He then trained in the UK and specialised in neurology at the National Hospital, Queen Square and then at the University of Rochester, New York, and obtained the Diploma of the American Board of Psychiatry and Neurology. He subspecialised in Cerebrovascular Disease at the Salpetriere Hospital in Paris and was Consultant Physician and Neurologist in Malta prior to becoming Director of the Stroke Program and tenured Professor of Neurology at the State University of New York in Buffalo. He became Chairman of the Department of Neurology and Neurosciences at the New Jersey Medical School, New Jersey in 2001 and returned to the UK in 2005. His main area of expertise is in the effects of heart disease, particularly heart failure, on the brain. He is principal neurologist of a large multicentre NIH clinical trial of anticoagulation in heart failure which he instigated and successfully submitted to the NIH for funding. The study is currently recruiting in America and Europe.

Scientist of the Month

This month we meet Dr Jingqi Miao who is a lecturer in the School of Physical Sciences. Jingqi was awarded with a BSc in Physics and an MSc in Theoretical Physics by Jiangxi Normal University in P.R.China. She then came to the UK to study for a PhD in Theoretical Physics at the University of Hull. Jingqi was then offered a place as a postdoc in the Engineering Department at Queen Mary College, University of London from November 1998 to October 2000 after which she continued at Queen Mary as a postdoc in Physics until March 2001. In April 2001, Jingqi joined the Kent where she has worked in the School of Physical Sciences as a lecturer.

Dr Jingqui Miao, Lecturer in Astrophysics, School of Physical Sciences.

What inspired you to take up your subject area?

The application of high technology to astronomy in recent decades has greatly extended our vision beyond the Earth so that we can 'see' what could only be imagined previously. However nothing is more satisfying than appreciating the drama of the universe through an understanding of its underlying physical principles. I feel very lucky to be an astrophysicist because we are able to reveal the exotic processes hidden from view and to simulate the events that occur too slowly or rapidly as to defy direct observation.

What is the focus of your current research?

A lot of important topics in astrophysics are closely related to the physics of ionized gases and the interpretation of the observed spectra from them. The focus of my current research is to investigate the effect of the ionising radiation of massive stars on their environment by theoretical simulation. Combining the theoretical modelling with relevant observations, the investigation on the dynamics of molecular clouds near massive stars can let us probe the evolution of the elements and the star formation history of the far reaches of our own galaxy and of distant galaxies. Therefore we can address an answer to a longstanding question in astronomy: how much does star formation rely on the collapse being "triggered" by the imposition of external radiation, as opposed to the self-gravitational collapse of quiescent cold clouds?

Can you tell us about your current research group, what the group is working on and the purpose of the research?

Our astrophysical group at Kent is working on a project to investigate the effect of intensive ionising radiation on the evolution of the molecular clouds near massive stars so that we can extensively explore the physics of ionisation triggered star or star cluster formation; and adequately address the observations and provide insight into the frequency and efficiency of ionisation radiation triggered star/cluster formation.

How has research in your area changed over the past few years?

The process of star formation through the compression of a molecular cloud via a photo-ionisation-induced shock is known as Radiatively-Driven Implosion (RDI). Bright-rimmed clouds (BRCs) are isolated molecular clouds located on the edges of evolved HII regions. Their relative isolation and simple geometry make BRCs an ideal laboratory to explore the RDI mode of triggered star formation. Current observational investigations on triggered star formation at the peripheries of massive stars have raised a lot of unsolved questions on the efficiency and frequency by which ionisation radiation triggers the next generation of star/ cluster formation in their parental clouds. It is not even known if young stars are simply exposed by the evaporation or if the trigger was essential for formation to occur at all.

What do you consider is the most significant accomplishment in your area in the last few years?

Over the recent decade, the dramatic increase in the sensitivity and resolution of multi-wavelength facilities has brought us a gigantic reservoir of characteristics of ionised nebulae, one famous example is Eagle Nebula shown in Figure 1. Theoretical modelling based on fast computers is building up the physical mechanisms for the formed structures of these ionised regions. The research by theoretical modelling is revealing the origins and future evolutions of them. Shown as in Figure 2 is the formation process of one of the three pillars in Eagle Nebula triggered by the ionising radiation from the centre star in the nebula.

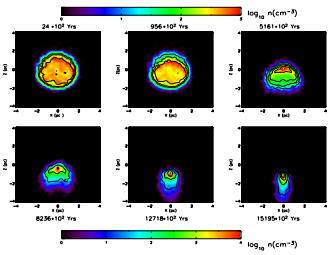


Fig 2. The simulation snapshot of the formation process of one of the pillars in Eagle Nebula

Ionisation triggered star formation is occurring at the head of the pillar. However, the progress of theoretical modelling on radiation triggered star or star cluster formation seriously lags behind the very active observational research due to the lack of an observation-modelling interface in all of the existing models. Therefore our understanding of ionisation triggered star formation in nebulae is seriously impeded.

What kind of challenges do you see lie ahead in your specialism in the future?

A genuine theoretical model of ionising radiation triggered star or star cluster formation is urgently required in order to promote a better communication between theoretical and observational research in the field so we can achieve a deeper understanding to the feedback of massive stars on their surroundings. The accomplished model will bridge the gap between the current theoretical and observational research and open up a wide field of applications involving feedback processes of young star cluster formation on their parental clouds.

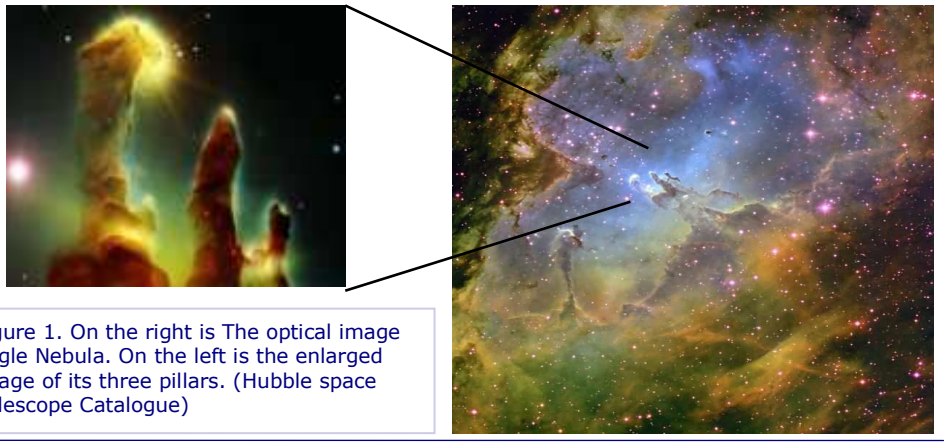


Figure 1. On the right is The optical image Eagle Nebula. On the left is the enlarged image of its three pillars. (Hubble space Telescope Catalogue)

Recent Published Papers

The School of Physical Sciences

Webber JBW, Bland P, Strange JH, Anderson R, Tohidi B. (2009) "Why you Can't Use Water to Make Cryoporometric Measurements of the Pore Size Distributions in Meteorites - or in High Iron Content Clays, Rocks or Concrete". Diffusion Fundamentals, 10, 3.1-3.3.

Valappil SP, Ready D, Abou Neel EA, Pickup DM, O'Dell LA, Chranowski W, Pratten J, Newport RJ, Smith ME, Wilson M, Knowles JC. (2009) "Controlled delivery of antimicrobial gallium ions from phosphate-based glasses". Acta Biomaterials, 5, 1198-1210.

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Medway School of Pharmacy

Javadzadeh Y, Shariati H, Movahhed-Danesh E, Nokhodchi A. (2009) "Effect of some commercial grades of cellulose microcrystalline on flowablity, compressibility and dissolution profile of piroxicam liquisolid compacts". Drug Dev. Ind. Pharm., 35, 243-251.

Hamishekar H, Emami J, Najafabadi AR, Gilani K, Minaiyan M, Mahdavai H, Nokhodchi A. (2009) "Particle size design of PLGA microspheres for pulmonary drug delivery: Mathematical modeling and statistical optimization using response surface methodology". J. Microencapsulation, 26, 1-8.

Barzegar-Jalali M, Adibkia K, Valizadeh H, Siahi Shadbad MR,Nokhodchi A, Omidi Y, Mohammadi G, Hallaj-Nezhadi S, Hasan M. (2008) "Kinetic analysis of drug release from nanoparticles", J. Pharm. Pharmaceut. Sci. 11,167-77

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Jouyban A, Azarmir O, Mirzaei Sh, Hassanzadeh D, Ghafourian T, Acree Jr. WE, Nokhodchi A. (2008) "Solubility Prediction of Paracetamol in Water-Ethanol-Propylene Glycol Mixtures at 25 and 30 C Using Practical Approaches". Chem. Pharm. Bull. 56, 602—606.

Varshosaz J, Talari R, Nokhodchi A. (2008) "Dissolution enhancement of gliclazide using in situ micrcronization by solvent change method". Powder Technology, 187, 222-230.

Department of Electronics

Xia B, Wang J, Sawahashi M. (2009) "Performance Analysis of MMSE Detectors for High Speed VSF-OFCDM". IEEE Transactions on Communications, 56, 2013-2019.

Wang Y, Bai L, Fairhurst M. (2009) "Robust Road Modeling and Tracking using Condensation", IEEE Trans. on Intelligent Transportation Systems, 9, 570-579.

Parker EA, Batchelor JC, Robertson J-B, Sanz-Izquierdo B, Ekpo I. (2009) "Frequency Selective Surfaces for Long Wavelength Use in Buildings". Seminar on Electromagnetic Propagation in Structures and Buildings, IET, London - Invited paper.

Valenciaga F, Puleston PF, Spurgeon SK. (2009) "A Geometric Approach for the Design of MIMO Sliding Controllers. Application to a Wind-Driven Doubly Fed Induction Generator". International Journal of Robust and Nonlinear Control, Special Issue: Wind Turbines: New Challenges and Advanced Control Solutions, 19, 22-39.

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Schouten B, Tistarelli M, Garcia-Mateo C, Deravi F, Meints M. (2008) "Nineteen Urgent Research Topics in Biometrics and Identity Management" Chapter in Biometrics and Identity Management, Lecture Notes in Computer Science, 5372/2008, 228-235.

Recent Published Papers

Computing Laboratory

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Basgalupp MP, Barros RC, de Carvalho ACPLF, Freitas AA, Ruiz DD. In Shin SY, Ossowski S, Martins P, Menezes R, Virol M, Hong J, D, Palakal MJ, Fritzke U, Crosby M, Haddad HM(eds). "Legal-tree: a lexicographic multi-objective genetic algorithm for decision tree induction". Proceedings of the 2009 ACM Symposium on Applied Computing, 1085-1090. ACM Press.

Boiten EA, Derrick J, Schellhorn G. (2009) "Relational concurrent refinement II: Internal operations and outputs". Formal Aspects of Computing, 21, 65-102.

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Bowman H, Craston P, Chennu S, Wyble B. (2009) "The delayed consolidation hypothesis of all-or-none conscious perception during the attentional blink, applying the ST² framework". In Proceedings of the 31st Annual Conference of the Cognitive Science Society, 1-6. Cognitive Science Society.

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Chitil O. (2009) "Functional programming." In Wah BW, (ed), Encyclopedia of Computer Science and Engineering, 2, 1334-1344. John Wiley & Sons, Hoboken, NJ.

Craston P, Wyble B, Chennu S, Bowman H. (2009) "The attentional blink reveals serial working memory encoding: Evidence from virtual & human event-related potentials." Journal of Cognitive Neuroscience, 21,550-566.

Mitavskiy B, Chu S, Zabet NR. (2009) "Models of transcription factor binding: Sensitivity of activation functions to model assumptions." Journal of Theoretical Biology, 257,419-429.

Holden N, Freitas AA. (2009) "Hierarchical classification of protein function with ensembles of rules and particle swarm optimisation." Soft Computing, 13, 259-272.

E.R. Hruschka ER,, Campello RJGB, Freitas AA, de Carvalho ACPLF (2009). "A survey of evolutionary algorithms for clustering." IEEE Transactions on Systems, Man and Cybernetics, Part C: Applications and Reviews, 39, 133-155.

Huiqing L, Thompson S. (2009) "Clone Detection and Removal for Erlang/OTP within a Refactoring Environment." In Di Penta M and Knodel J, (eds), Third International Workshop on Detection of Software Clones, 1, Kaiserslautern, Germany, March 2009.

Stapleton G, Taylor J, Thompson S, Howse J. (2009)"The expressiveness of spider diagrams augmented with constants." Journal of Visual Languages and Computing, 20, 30-49.

Davies MN, Secker A, Freitas AA, Timmis J, Clark E, Flower DR. 2008)"Alignment-independent techniques for protein classification" in Current Proteomics, 5, 217-223.

Huiqing L, Thompson S. (2009) "Clone Detection and Removal for Erlang/OTP within a Refactoring Environment". In ACM SIGPLAN Workshop on Partial Evaluation and Program Manipulation (PEPM'09), Savannah, Georgia, USA, January 2009.

Recent Grants Awarded

Medway School of Pharmacy

Dr Bernhard Gibbs has been awarded £2,700 for research entitled 'Preliminary studies on novel regulatory mechanisms governing human basophil function, by King's College London.

Computing Laboratory

David Soud (Kent IT clinic) has been awarded £800 for a Key Care Support Contract by Key Care Management Ltd.

Department of Electronics

Dr Nathan Gomes has been awarded £234,000 for Telecommunication Training Services by Post Telekom Kosovo. (see page 6 of this newsletter).

Professor Yong Yan has been awarded £88,739 for research entitled 'Intelligent flame detection incorporating burner condition monitoring and on-line fuel tracking' by the British Coal Utilisation Research Association.

Professor Sarah Spurgeon has been awarded £21,302 for a Visiting Professorship form Professor Vadim Utkin by the Leverhulme Trust.

Department of Biosciences

Dr Peter Nicholls has been awarded £21,266 for research entitled 'Improving the biomanufacturing of commercially valuable proteins in yeast expression systems' by Mologic Ltd.

Dr Pauline Phelan has been awarded £5,919 for research entitled 'Drosophila as a model to investigate the role of gap junctions in hearing' by Deafness Research UK.

Dr Dan Mulvihill has been awarded £1,600 for research entitled 'Investigation into conservation of motor activity between myosin V proteins from fission yeast, budding yeasts, and fruit flies' by the Chemical Society.

Dr Marcus Allen has been awarded £1,440 for research entitled 'Investigating the C-terminal microtubule-binding domain of Ssp4' by the Nuffield Foundation.

Seminars

Date	Day	Time	Subject	Lecturer and Title	Location
1	Mon	2.30pm	Pure and Applied Maths	Nalini Joshi, Sydney, Australia, 'Analytic Results for (Ultra-Discrete) Cellular Automata'.	Maths LT
1	Mon	4pm	Computing	Professor Simon Thompson, 'An Overview of the ProTest Project'.	Computing lab S110B
1	Mon	4pm	Biosciences	Dr. Olivier Namy, Equipe Genetique Moleculaire de la Traduction, Institut de Genetique et Microbiologie, Universite Paris-Sud, France, 'Translational recoding in Saccharomyces cerevisiae'.	BLT1
8	Mon	2.30pm	Pure and Applied Maths	Fordyce Davidson, Dundee, 'Travelling Waves in Bistable Systems'.	Maths LT
8	Mon	4pm	Computing	Steve Counsell, Brunell, 'Refractoring, Present and Future'.	Computing lab S110B
8	Mon	4pm	Biosciences	Dr. Iris Salecker, Division of Molecular Neurobiology, National Institute for Medical Research, London, 'Regulation of layer-specific axon targeting in the visual system of Drosophila'.	BLT1
12	Fri	3pm	Pure and Applied Maths	Reinout Quispel, La Trobe University, Victoria, Australia, title TBA	Maths LT
13	Fri	2pm	Computing	David Barnes, title TBA	Computing lab S110B
15	Mon	4pm	Computing	Tom Schrijvers, Leuwen, Belgium, 'Monadic Constraint Programming'.	Computing lab S110B
15	Mon	4pm	Biosciences	Dr. Mark A. Williams, School of Crystallography, Birkbeck, University of London, 'Interactions and Allostery in the Hsp90 Chaperone System'.	BLT1

Star Jets in Orion

A close-up view of a spectacular jet (seen in red) popping out of a busy region of star formation in Orion. All of the red wisps, knots and filaments are in fact associated with jets from young stars, which in this figure are coloured orange. These data were acquired with the Wide Field Camera (WFCAM) at the United Kingdom Infrared Telescope. Credit: UKIRT/JAC.

Astronomers using the United Kingdom Infrared Telescope (UKIRT) in Hawaii, the IRAM Millimeter-wave Telescope in Spain, and the Spitzer Space Telescope in orbit above the Earth, have completed the most wide-ranging census ever produced of dynamical star formation in and around the well-known Great Nebula of Orion. They have found this stellar nursery to be a lively and somewhat overcrowded place, with young stars emitting gas jets in all directions, creating quite a chaotic picture. There is much more going on in Orion than previously thought.

The research team comprises more than a dozen astronomers from the US, the UK and a number of other European countries. The project thus has a truly international flavour, representing a collaboration of minds from across the globe. A number of them are in Hertfordshire in the UK this week to share their discoveries with colleagues at this year's annual National Astronomy Meeting of the UK (NAM 2009).

For more information on this story, turn to page 7

Professor Michael Smith, Professor of Astronomy.
School of Physical Sciences

Café Scientifique
Ye Olde Beverlie, St Stephen's Green, Canterbury
Tuesday 9 June 2009

Professor Murray Smith, Professor of Film Studies:
The Film Instinct

In 1994, Stephen Pinker published *The Language Instinct* in which he argued that language is an evolved, biological adaptation. Early in 2009, Denis Dutton published *The Art Instinct* in which he argued, still more contentiously, that art is a universal practice with an evolved, adaptive value. In the intervening 15 years, evolutionary psychology - a crucial influence on both works - has come to the fore of intellectual inquiry. In this discussion we'll consider what pertinence evolutionary psychology, and the arguments of those like Pinker and Dutton, have for our understanding of a modern medium like film, founded as it is on advanced technological developments. Is it folly to think in terms of something like a 'film instinct,' or might there be some method to the apparent madness of the idea? And more generally, are the methods and knowledge drawn from the sciences relevant to our understanding of cultural phenomena like film?

September 8, 2009
Dr Cyril Isenberg, Department of Electronics: Understanding Numbers and the Geometry of Roadways (or, How to Impress Friends and Colleagues)

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