



# Physics at the Interface



**Symposia to mark the opening of  
the IRCEP at Queen's University,  
Belfast.**

Programme and Speaker  
Biographies

## Session A

Emeleus Lecture Theatre

**Chair: Bill Graham**

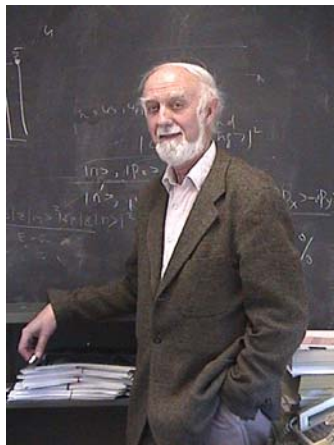
**Wednesday 22nd June 2005**

**2:00 - 2:40**

Prof Alex Dalgarno

Inst. for Theoretical AMO Physics,  
Harvard, MA, USA

“The early universe”



A. Dalgarno was an Assistant Lecturer, Lecturer, Reader and Professor at Queen's University in the period from 1951 to 1967. He received an honorary degree of D.Sc. from Queen's in 1982. In 1967 he was appointed as Professor of Astronomy at Harvard University and a Senior member of the Smithsonian Astrophysical Observatory. He is now the Phillips Professor of Astronomy. He was the founding Director of the Harvard-Smithsonian Institute for Theoretical Atomic, Molecular and Optical Physics. He was the Editor of *Astrophysical Journal Letters* from 1972 to 2001. His researches in Atomic, Molecular and Optical Physics and its applications to Astrophysics and to Atmospheric Science have been recognised by the award of prizes by the International Academy of Quantum Molecular Sciences, the Smithsonian Institution, the American Physical Society, the American Optical Society, the Royal

Astronomical Society, the Royal Society of Chemistry, the American Geophysical Union and the Royal Society. He is a Fellow of the Institute of Physics, the American Geophysical Union, the American Physical Society, the American Academy of Arts and Sciences and the Royal Society. He is an Honorary Member of the Royal Irish Academy and a Member of the United States National Academy of Sciences. In 1998 Asteroid 6941 was named Asteroid Dalgarno.

**2:40 – 3:20**

Prof Melvyn Folkard

Gray Cancer Inst., Mount Vernon  
Hospital, Northwood, UK

“From biomolecule to man;  
understanding radiation damage”



Professor Folkard leads the Radiation Physics Team of the Gray Cancer Institute, with interests in experimental methods for understanding mechanisms of biological radiation damage. He has overseen the development of a range of novel systems for exposing various biological targets to ionising radiations. Most notable, are methods for irradiating cells individually using collimated or focused radiations. One facility uses collimation to produce a micron sized counted, charged particle beam, while another uses micro focused low energy X rays. Other studies involve the interaction of low energy photons with DNA, with a view to quantifying the energy dependence for various pathways of DNA damage.

**3:20 – 3:40 Coffee****3:40 – 4:20**

Dr Ken Stalder

ArthroCare Corporation, Sunnyvale,  
CA, USA

“Plasmas in bio-applications”



Kenneth R. Stalder is a Senior Scientist at ArthroCare Corporation in Sunnyvale, California. Since 1999 he has also conducted independent contract research and consulting through Stalder Technologies and Research in Redwood City, California. He held various research positions in the Molecular Physics Laboratory at SRI International from 1986 to 1999, and continues there on a limited part-time basis. From 1983 to 1986 he was at Applied Materials Inc. He earned an A.B. in physics from the University of California, San Diego in 1974, and a Ph.D. in physics from the University of California, Berkeley in 1982. His graduate research was conducted in the Magnetic Fusion Energy Group at the Lawrence Berkeley Laboratory where his thesis concerned the measurement of ion-ion collision cross sections in plasma targets. He is a member of the APS, IEEE and AIAA, and he is a Distinguished Visiting Fellow at the International Research Centre for Experimental Physics at Queen's University in Belfast, Northern Ireland.

**4:20 – 5:00**

Prof Sergei Bulanov

Russian Academy of Sciences,  
Moscow and JAERI, Japan

“Relativistic Laser Plasmas”



Professor Bulanov graduated from and was a postgraduate student of the Moscow Institute of Physics and Technology on the speciality "Theoretical Physics and Astrophysics". He then worked for several years at the Theoretical Department in the P.N.Lebedev Physical Institute of the Academy of Sciences of the USSR. At that time he was involved in studies of the cosmic ray physics and in the theory of solar flares. He then moved to the Plasma Physics Department of the P.N.Lebedev Physical Institute, which later appeared within the A.M.Prokhorov Institute of General Physics of the Russian Academy of Sciences and for a number of years he was head of a theoretical laboratory there. At the present time he is chief scientist at the Institute of General Physics, full professor at the Moscow Institute of Physics and Technology, in Russia, and leader of the laser acceleration group at the Advanced Photon Research Centre of Japan Atomic Research Institute in Japan. My scientific interests are in laboratory and space plasma theory and in nonlinear and computation physics.

## Session B

Emeleus Lecture Theatre

**Chair: Robert Bowman**

**Thursday 23rd June 2005**

**9:00 – 9:40**

Prof John Ryan

Bionanotechnology IRC, Clarendon,  
Oxford, UK

“Bio-nano-technology”

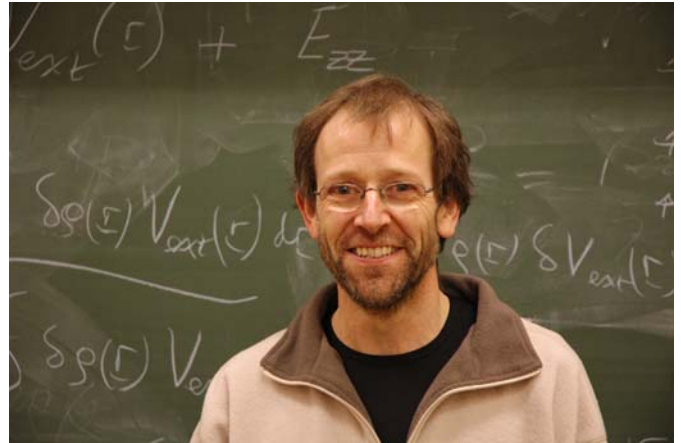
Professor John Ryan is Director of the Bionanotechnology IRC and Professor of Physics at Oxford University. He is a strong advocate of interdisciplinary research and training. The Bionanotechnology IRC is the UK's principal nanotechnology research initiative at the interface between the physical, biological and medical sciences. He is Principal Investigator of the EPSRC-funded Life Science Interface Doctoral Training Centre at Oxford University, and he is Chair of the Institute of Physics Bioscience Forum which fosters links between the physics and biology research communities in the UK.

**9:40 – 10:20**

Prof Mike Finnis

School of Mathematics and Physics,  
QUB

“Sizes and surprises of atoms at  
interfaces”



Mike Finnis works at interfaces where the traditional disciplines of physics, chemistry and engineering meet, and on interfaces where materials meet other materials. Having a taste for theorising, and little aptitude for anything else, he has managed to make a living and even raise a family by doing calculations rather than experiments, and by enticing others to do either. He is Professor in the Atomistic Theory of Materials, and has been at Queen's for ten years.

**10:20 – 10:40 Coffee**

**10:40 – 11:20**

Prof Nigel Mason

Centre of Molecular and Optical  
Science, Open University, UK“Astrobiology; Revealing the Origins  
of Life”

Son of Sir John Mason, FRS a leading physicist and meteorologist Nigel was born into a physics environment! After graduating from Department of Physics and Astronomy at University College London in 1983 his PhD investigated the simultaneous excitation of an atom by energy transfer from an electron and a photon. This research led to his developing a research programme which encompasses molecular spectroscopy, electron interactions and molecular dynamics. Awarded a Royal Society University Research Fellowship in 1990 he established the Molecular Physics Laboratory at University College where he became a lecturer in 1998 and a Reader in 2000. In 2002 he moved to the Open University as Professor of Molecular Physics founding the Centre of Molecular and Optical Physics, he is also co-director of the Interdisciplinary Centre of Astrobiology and Centre of Atomic, Molecular and Materials Engineering. His current research includes the study of molecular formation in space; radiation damage of biomolecules and studies in atmospheric chemistry pertinent to ozone depletion and global warming. He is a Visiting Professor of the University of Innsbruck and a Visiting Fellow to Queens University Belfast.

**11:20 – 12:00**

Prof James Scott

Centre for Ferroics, Cambridge, UK

“Applications of nano-ferroelectrics  
to microelectronics”

James F. Scott has been Professor of Ferroics at Cambridge University since 1999. Prior to that he was Dean of Science and Professor of Physics in Sydney, Australia, and at The University of Colorado, for nearly thirty years. Author of more than 400 journal articles, his last book "Ferroelectric Memories" has been translated into Japanese and Chinese. Originally from the USA (Harvard University), he is a Fellow of the American Physical Society and won a Humboldt Prize in 1997 and a Monkasho Prize in 2001 for his research on ferroelectrics. In 1986 he was a founder of Symetrix Corporation, a high-tech university spin-off, which together with Matsushita/Panasonic Corp. shared the "Product of the Year" award in 1994 from the Japan Electronics Industry for the first device integrating a semiconductor chip with a ferroelectric.

## Session C

Emeleus Lecture Theatre

**Chair: Ian Williams**

**Thursday 23rd June 2005**

**2:00 – 2:40**

Prof Joachim Ullrich

MPI fur Kernphysik, Heidelberg,  
Germany

“Atoms and molecules in intense fields : from visible to X-ray free electron lasers”



Joachim Ullrich studied physics and geophysics at the Johann-Wolfgang-Goethe Universität in Frankfurt. His PhD, about novel methods to detect small recoil-momenta in atomic or molecular fragmentation reactions (Recoil-Ion Momentum Spectroscopy), was awarded the “Best Thesis Prize” in 1988. At the BEVALAC of the LBL, Berkeley and as scientific staff member at the GSI, Darmstadt he explored energetic up to relativistic heavy-ion atom collisions and, later, photon interactions at the ALS, Berkeley or at DESY, Hamburg. For the development of many-particle imaging techniques, so-called “Reaction-Microscopes”, he received the 1.5 Mio. € German Leibniz-Award in 1999. From 1997 to 2000 he hold a Full Professor position at Freiburg University and was appointed Director at the Max-Planck-Institute for Nuclear Physics (MPI-K), Heidelberg in

2001. He is Honorary Professor at the University of Heidelberg since 2001, Managing Director at the MPI-K since 2002, Consultant Professor at the Shanghai Fudan University since 2003 and has published about 250 articles in refereed journals. His main current interest is in atomic and molecular many-particle dynamics in ultra-fast intense lasers, free electron lasers, in collisions with electrons, heavy ions and antiparticles as well as in precision spectroscopy in highly-charged few-electron ions. His division develops many-particle imaging methods, ultra-short laser as well as pump-probe techniques, atom and ion storage devices, like magneto-optical traps (MOT), ion-traps and sources for highly-charged ions (EBIT) as well as novel ultra-cold, 2 Kelvin storage rings for molecular ions, heavy ions and antiprotons.

**2:40 – 3:20**

Prof Oswald Willi

HHU, Dusseldorf, Germany

“Shortest light pulses, extreme energy densities : Modern laser plasma physics”



Prof. Willi was a student at the University of Innsbruck between 1973 and 1977 studying for and obtaining his diploma in physics. He gained a scholarship from the Austrian Government to pursue his studies in the U.K. where he obtained the Master of Science at the University of Oxford 1978 and his D.Ph. degree in 1980. From 1980 to 1982 he was a Research Associate at the Clarendon Laboratory in Oxford. In 1982 he

obtained a postdoctoral fellowship at Los Alamos National Laboratory. In 1984 he returned to the U.K. to start his lectureship at Imperial College, London. He was promoted to Professor in 1993. In 2001 he moved to Germany to lead the Institute of Laser- and Plasmaphysics at the University of Düsseldorf.

### 3:20 – 3:40 Coffee

#### 3:40 – 4:20

Prof Eduardo Montenegro  
Pontificia Universidade Catolica, Rio de Janeiro, Brazil  
“Double ionization, free radicals and molecular stability”



Obtained his Ph.D degree in 1980 in PUC-Rio. He worked as a visiting professor at the Institute of Physics of UNAM (Mexico) from 1981 to 1982. He started his career at the Physics Department of PUC-Rio in 1982 as Assistant Professor; in 1986 he became Associate Professor and Full Professor in 1996. In 1987, he spent a sabbatical year at the Stanford University. He was elected Fellow of the American Physical Society in 1993. He spent another sabbatical year at the Kansas State University, USA, in 1994, and became Chairman of the Physics Department of PUC-Rio for the following two years. He is presently co-Chairman of the XXIV ICPEAC, in Rosario, Argentina, and Chairman of the XIX ISIAC, in Rio de Janeiro, Brazil.

### 4:20 – 5:00

Prof John Costello  
NCPST, Dublin City University,  
Ireland  
“Colliding Laser Produced Plasmas”



John Costello is currently Associate Professor and Head of the School of Physical Sciences at DCU. He is also a founding member of the National Center for Plasma Science and Technology. He is a Fellow of the Institute of Physics (IOP), a committee member of the IOP Atomic and Molecular Interactions Group and is a former EPS-EGAS board member. He is a past treasurer of the IOP in Ireland and served as IOP representative on the Irish government Task Force on the Physical Sciences. He chairs the local organising committee of the next EGAS conference – <http://www.egas37.org>. His research interests lie mainly in atomic physics of and with laser plasmas.

**Session D**

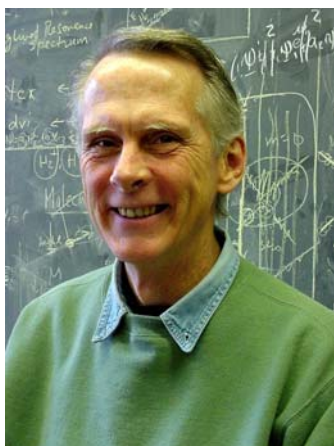
Emeleus Lecture Theatre

**Chair: Bob McCullough****Friday 24th June 2005****9:00 – 9:40**

Prof Tom Morgan

Wesleyan University, CT, USA

"Giant atoms and small molecules"



Tom Morgan has been Foss professor of physics at Wesleyan University, USA since 1973, after a period as a University Research Fellow at Queen's, Belfast. His research field relates to atomic and molecular collisions and spectroscopy with strong focus on the structure and dynamics of highly excited states (Rydberg states) in electric fields. Recently he has been interested in the role of Rydbergs in plasmas and the interface between a plasma and a Rydberg gas.

**9:40 – 10:20**

Prof Peter Lambropoulos

FORTH, Crete, Greece

"Exploring high atomic excitation with intense short-wavelength radiation"



Professor Peter Lambropoulos is presently Professor Emeritus of the Physics Department of the University of Crete and Distinguished Fellow of the Foundation for Research and Technology Hellas (FORTH), in Heraklion, Crete. Among the positions he has held have been, Professor of Physics at the University of Southern California in Los Angeles, Head of the Theory Group at the Max Planck Institute for Quantum Optics, Garching, Germany, Professor of Physics at the University of Crete, and Director of the Institute for Electronic Structure and Lasers of FORTH. He has received a Humboldt Senior Scientist Prize, is a Fellow of the American Physical Society, and has served as Chair of the Greek National Research Council. His research interests are in theoretical atomic physics, laser-atom interactions, quantum and non-linear optics. He is author or co-author of about 250 articles.

**10:20 – 10:40 Coffee**

**10:40 – 11:20**

Prof Nico Stolterfoht

Freie Universitaat Berlin, Germany

“Guided transmission of highly charged ions through nano-capillaries in PET polymers”



In 1970 Nikolaus Stolterfoht finished his dissertation at the Freie Universität Berlin. In 1972 he became leader of the Atomic Physics Group at the Hahn-Meitner Institute Berlin. His research work was devoted to high-energy atomic collisions in gases and solids, studying primarily Auger transitions and emission of secondary electrons. In 1978 he performed his Habilitation as a lecturer at the Freie Universität Berlin. In the following he performed sabbaticals at several research institutions including University of Washington, Kansas State University, University Orsay, Centro Atomico Bariloche, Oak Ridge National Laboratory, University Caen, and University Rosario. At Oak Ridge National Laboratory he started measurements using slow highly charged ions from ECR sources. In 1986 this work was continued in Berlin for a decade devoting specific effort on the interaction of highly charged ions with atoms in the gas phase. In 1989 he became professor at Caen lecturing at the University where stayed for 4 years. When returning to Berlin, he merged into the new field of highly charged ion interaction with surfaces. Since 2001 he focused his attention on nanotechnology studying the novel effect of guided transmission of highly charged ions through tiny capillaries. During his career he

supervised 15 master and 32 PhD thesis in Berlin and Caen. He has 245 publications in refereed journals including 17 Physical Review Letters and 8 book contributions. He obtained numerous invitations at international conferences and he wrote a book about electron emission mechanisms published by Springer.

**11:20 – 12:00**

Prof Kyuman Cho

Sogang University, Seoul, Korea

“Study of self-focusing and giant photo-expansion effects in an  $\text{As}_2\text{S}_3$  amorphous semiconductor film”



Kyuman Cho received the B.S. and M.S degree from Sogang University in 1978 and 1980, respectively, and received the Ph.D. degree from University of Maryland, College Park in 1991. From 1980 to 1984 he was a full-time lecturer in the Department of Physics, Korea Air Force Academy and from 1991 to 1992 he was with the Electrical Engineering Department, University of Maryland, as a research associate. Since 1992 he has been a professor of physics at Sogang University, Seoul, Korea. Professor Cho has a broad spectrum of research interests including super-resolution linear and nonlinear spectroscopy using scanning near-field optical microscope, ultra-precision interferometric sensors, optical fiber communications, short-range free-space optical communications for broadband subscriber services.