EDITOR'S REPORT

As members will see from this newsletter, the EPG continues to be very active with meetings on a wide variety of important topics. May I remind members that we have our own web page at http://www.iop.org/IOP/Groups/EP/ which is regularly updated by Lucy Parkin.

Forthcoming Meetings

The next major meeting is the one-day conference on Waste Management at Physics Congress on Tuesday 25 March 2003, details of which are given later in this newsletter.

There are also meetings on RF Interactions with Humans on 27 & 28 February at the Institute, and the 4th International Conference on Urban Air Quality in Prague at the end of March.

Change of Editor

I am handing over as Editor to Dr Karen Aplin who has kindly agreed to take on the job. Please address material for the newsletter to her from now on.

Derek Rose

FORTHCOMING MEETINGS

WASTE MANAGEMENT

Tuesday 25 March 2003
Heriot-Watt University, Edinburgh

This conference has been organised by Dr D.A. Rose of the Environmental Physics Group and Dr C.J. Goy of the Combustion Group, and is supported by the Energy Management Group.

The conference will survey the physics of waste management but, as the management of waste is an interdisciplinary subject, will also consider how physics can mitigate some of the biological and chemical problems that arise from waste. The regulatory framework for waste management will also be addressed.

There are eight invited presentations, all 40-minute slots.

1. Lessons from landfill leachates: fate of carbon in waste disposal by landfill
   **Professor D.W. Manning**
   School of Civil Engineering and Geosciences, University of Newcastle

2. Mitigating gaseous emissions from livestock manures
   **Dr T.H. Misselbrook**
   Institute of Grassland and Environmental Research, North Wyke, Devon

3. Offshore and onshore disposal of wastes from oil and gas drilling
   **Dr S. Hayes**
   BMT Cordah Ltd., Aberdeen Science & Technology Park

4. The use of waste materials in the passive remediation of mine water pollution
   **Dr L.C. Batty**
   School of Civil Engineering and Geosciences, University of Newcastle

5. Environmental aspects of sewage sludge combustion
   **Professor P. Lockwood**
   Department of Mechanical Engineering, Imperial College, London

6. Mass burn incinerator combustion physics
   **Professor J. Swihitenbank**
   Department of Chemical and Process Engineering, University of Sheffield

7. Higher value products from the pyrolysis of scrap tyres
   **Professor P.T. Williams**
   Department of Fuel and Energy, University of Leeds

8. Power generation from waste – an industrial perspective
   **Mr P. Canning**
   Powergen Technology Centre, Ratcliffe on Soar, Nottingham
Full details of this conference are in the Congress Registration Book, sent recently to all members of IOP.

The EPG will provide bursaries to a total value of £200 to members of the group who wish to attend. Apply to Derek Rose.

RF INTERACTIONS WITH HUMANS:
MECHANISMS, EXPOSURE AND MEDICAL APPLICATIONS

27-28 February 2003
Institute of Physics, London

Organised by the Medical Physics, Environmental Physics and Dielcotics Groups of the IOP.

The deadline for the receipt of abstracts has passed.

For further programme and registration information contact Belinda Hopley at the Institute of Physics or consult the conferences web pages at http://physics.iop.org/IOP/Conf/ENV/

THE 4TH INTERNATIONAL CONFERENCE ON URBAN AIR QUALITY

25-28 March 2003
Carolina University, Prague, Czech Republic

For general information, please contact Jasmina Bolfek-Radovani, Institute of Physics, at jasmina.bolfek-radovani@iop.org.

For information about the Scientific Programme, please contact Ranjeet Sodhi, University of Hertfordshire, at r.s.sodhi@herts.ac.uk.

As usual, the EPG will offer three or four bursaries to a total sum of £500. To apply, please contact either Jasmina or Ranjeet.

REPORTS OF MEETINGS

THE SOLAR TERRESTRIAL ENVIRONMENT

Prof M Lockwood,
Rutherford Appleton Laboratory/ Southampton University, 11 December 2002

Solar heating of the Earth's weather and climate was not immediately apparent on a murky December day in London. However Professor Mike Lockwood vividly conveyed the wide-ranging influence of the Sun's magnetic field in an interested audience at the IOP. He outlined solar terrestrial physics as a rapidly-evolving subject which has recently changed in focus, extending from the physics of solar influences on the near-Earth space environment to mechanisms by which the Sun could indirectly affect Earth's atmosphere and climate.

William Herschel began this area of research in 1801 after noticing a correlation between the number of sunspots and the price of wheat. This novel observation began a common (and sometimes unproductive) practice of reporting correlations between solar and terrestrial parameters. One striking recently-observed correlation is the relationship between ice-rafted debris (essentially glacial sediment which provides a palaeoclimate record by indicating glacial calving) and the two isotopes $^{14}$C and $^{10}$Be. These two isotopes are both formed by cosmic rays, which are modulated by the solar magnetic field, dragged out by the "solar wind" of energetic particles constantly emitted from the Sun. At the minimum of the Sun's eleven-year cycle the solar wind and magnetic field are weaker, so more cosmic rays penetrate deep into the Earth's atmosphere, forming more $^{14}$C and $^{10}$Be. The deposition and transport characteristics of these cosmogenic isotopes in the Earth's atmosphere are so different that the strong positive relationship between both the isotopes, and palaeoclimate records of the ice-rafted debris, is most unlikely to have been caused by atmospheric processes affecting the isotopes. This is therefore evidence of a strong and enduring correlation between past climate and independent long-term cosmic ray proxies. Solar-terrestrial physics has suffered from its proliferation of correlations, which cannot, on their own, provide causal proof for anything. However this work does suggest that cosmic rays may somehow be coupled with climate variations, either a) by modulating climate directly, for example via the global atmospheric electrical circuit which originates from cosmic ray ionisation or b) that cosmic rays are a good proxy for another factor, such as solar irradiance changes.

The cosmic ray flux reaching the earth can be determined by monitoring the geomagnetic activity of the Sun. A magnetic index derived from magnetic field measurements at antipodal points on Earth, the "aa index" has long been used as an indicator of the Sun's magnetic activity. During enhanced solar activity, coronal mass ejections of up to $10^{13}$ kg of energetic particles interact strongly with the Earth's magnetosphere. We watched a fascinating animation of a spectacular "substorm" as particles energised by a coronal mass ejection interacted with the upper atmosphere, giving emissions in the UV part of the spectrum. These intensifications of auroral activity are detectable from the surface and are a major contributor to the aa index of
geomagnetic activity. In the space age, satellite measurements have been able to independently verify these theories. Long-term observations of the $\alpha$ index have shown that solar activity has increased over the last century. Linked quantities such as the galactic cosmic ray flux have also varied comparably. The explanation for these observations is an increase in the open flux of the Sun, which escapes into the extra-solar environment without looping back to the solar surface. The total amount of energy emitted from the sun, the total solar irradiance, is related to the level of solar activity via the brightening and darkening of sunspots and other active areas on the solar surface, faculae. Sunspots and faculae are linked to the open solar flux leaving the solar atmosphere because they are caused by the magnetic field threading the solar surface. Consequently, the total solar irradiance is also thought to have increased over the last 100 years.

It is currently unclear whether the Earth's climate is modulated by total solar irradiance variations, cosmic rays, or some other factor related to both. One important question is the role of solar variability in climate change. Variations in the Earth's temperature over the last century are reliably known, with a warming in the second half of the twentieth century. Most of this change can be attributed to the increase in greenhouse gases in the atmosphere, but the natural effects from volcanic activity, pollution and solar effects are not fully quantified. Solar variability remains an important uncertainty, and seems to have had its largest influence in the first half of the twentieth century. Prof. Lockwood explained how a proposed satellite mission, EARTHSHINE, would answer some of these questions. It will monitor the Earth's albedo continuously, calibrated against the Moon's reflectivity, and on board instrumentation will also measure cosmic rays, cloud cover and solar radiation.

Throughout this talk, complex physical concepts were introduced and elucidated with the aid of some well-prepared and stimulating visual material. This was an intriguing lecture, which clearly explained the background to the current controversy about indirect solar effects on climate.

Karen Aplin

THE PHYSICS OF THE BUILT ENVIRONMENT

A half-day seminar was held on Monday 4th November 2002 at the Institute of Physics on the subject of the "Physics of the Built Environment". The purpose of the event was to provide an opportunity for building physicists to meet up and, more generally, to raise awareness of the application of physics in construction. The meeting was well attended by approximately 60 people, one third of whom were members of the Environmental Physics Group.

Six specialists presented on the following topics, which came under the title of the physics of the built environment.

Adrian James from Adrian James Acoustics UK spoke about the "Physics of Sound Transmission in and through Buildings". He detailed the important variables of amplitude, loudness and Sound Pressure Level, frequency and pitch and went on to describe the difficulties in computer modelling and physical modelling of room acoustics, touching on diffusion with respect to surfaces. He commented on the current level of auralisation techniques and referenced back to the Roman amphitheatres to look at previous knowledge of acoustics.

David Infield from CREST (Centre for Renewable Energy Systems Technology), Department of Electronic and Electrical Engineering, Loughborough University. Presented localised energy sources such as building integrated photovoltaics (BIPV), building integrated wind power, micro-and mini-CHP (Combined Heat and Power) and energy storage. He described some key difficulties with BIPV.

Mike Holmes from Arup Research and Development discussed the modelling of the internal climatic conditions within buildings. With a particular focus on the Eden Project, Mike explained the challenges of designing a ventilation system for the Humid Tropics and Warm Temperature "biomes" where strict limits in the acceptable fluctuations of air temperature and humidity were required for plant growth. Mike showed that by applying mathematical models representing the fundamentals of heat and moisture transfer within computer software, it is possible to test a proposed design before the building is constructed.

Jose Gallego (Glass coatings department, Pilkington) described the physics of the passage of solar radiation through glass. Glazing in buildings is a particularly crucial issue because it is popular with architects for aesthetic reasons and popular with building users who value a connection with the outside world. However, the thermal resistance of basic clear float glass is poor and the transmissivity of solar radiation is high. The former property can lead to excessive heat loss in winter and the latter can help generate overheating in summer. The recently revised building regulations have placed greater constraints on the use of glass in buildings by requiring a higher than previous thermal performance of the building envelope. Fortunately a number of glass technologies exist to allow glass to be used and thermal performance to be maintained. These include tints and coatings. Dr Gallego demonstrated that it was possible to obtain a wide range of reflection, absorption and transmission properties by using a combination of coatings and tints.

Suresh Kumar (Fire Research, BRE) described recent advances in the field of fire safety modelling. He highlighted the need for validation of computational fluid dynamics (CFD)
Simulations and the importance of the mathematical representation of the fire within such analysis. Dr. Kumar showed that there were questions about the validity of using a prescribed fire growth curve (the relationship between heat source from the fire and time) in all cases. Instead, he advocated the implementation of a combustion model within the CFD simulation. The advantage of this approach is that it enables the heat flux to vary with the amount of available oxygen, a feature not included explicitly in the alternative approach. This issue can be important in some cases, particularly in a small enclosure where supply of oxygen may be limited. Dr. Kumar also explained the importance of modelling heat transfer by radiation from the fire and hot smoke to other parts of the space, and how this could lead to "flashover".

**Jillian Hunt** (University College, London) discussed the physics of the external environment of urban areas. Professor Hunt showed how fluid dynamics can help illuminate how winds change as they pass through the large groups of buildings that make up urban areas, and how local terrain can also give rise to slope winds at night. Jillian showed how mathematical models can give useful quantitative estimates of urban meteorology and pollutant distribution and dispersion.

**Peter Hedges** (EPSRC) presented some of the challenges facing the built environment and the important role that must be played by engineers and physical scientists in addressing these. Dr. Hedges highlighted the 80% reduction in CO₂ emissions by 2050 that had been recommended by the Royal Commission on Environmental Pollution and the need for sustainable development. He explained that the government spending reviews had been generous towards the sciences but that there was an expectation on the universities to use the funding wisely to produce meaningful, applicable outputs. He emphasised the need for research in the areas of climate change, energy efficiency and low carbon energy sources and transport research (including pollution modelling and clean vehicle technology). He called upon physicists to take a pro-active role in driving forward multi-disciplinary research to answer these challenges.

Alexandra Wilson

---

**THE TRANSPORT OF BIOAEROSOLS**

Report of a meeting held at the Institute of Physics on 19 June 2002

Bioaerosols are airborne particles of biological origin such as pollen grains, fungal spores, bacteria, viruses and plant and animal debris. This meeting, jointly organized by the Environmental Physics Group, the Aerosol Society and the British Aerobiology Federation, concerned aspects of the transport of bioaerosols and their effects on humans, animals and plants. The infective propagules (viruses, bacteria, spores) of many crop, human and animal diseases are spread via the airborne route as are human and animal allergens such as pollen grains and fungal spores. There has been increasing interest in the movement of visible microorganisms through the air especially since the Foot and Mouth outbreak of 2001 and the increasing threat of bio-terrorism. This meeting was therefore a timely introduction to several diverse aspects of bioaerosol transport.

After a brief introduction by Dr. Charles Clement, one of the co-organizers (Aerosol Society), Dr. David Griffith (AERA Technology) gave an overview of the method for assessing bioaerosols. The assessment of bioaerosols is fundamental to our understanding of their behaviour and effects and it is crucial in the development of monitoring strategies for their effective management. Dr. Griffith described potential sources of bioaerosols and some of their properties and effects. He then discussed sampling strategies and the type of sampling equipment available. He finally concluded by highlighting some of the challenges bioaerosol technology will be faced with in the future, such as monitoring genetically modified organisms in the biotechnology industry and agriculture (GM gene flow) and monitoring potential threats from bio-terrorism. The theme of monitoring bioaerosols was picked up again by Dr. Alastair McCartney (Institute of Arable Crops Research, Rothamsted) when he described recent work on the use of molecular methods for the detection airborne inculum of plant pathogenic fungi (fungal spores). The development of molecular technology will make monitoring of airborne micro-organisms easier and open new doors to the development of better crop protection strategies. These technologies will also find applications in human and animal health management and bio-terrorism surveillance. Dr. McCartney also discussed short and long distance dispersal of fungal spores and noted that under appropriate weather conditions fungal spores can be transported long distances. "Fungal spores" was also the theme for the third speaker, Dr. Jonathan West (Institute of Arable Crops Research, Rothamsted), who stepped in at very short notice, along with D. Clement, in place of an invited speaker who had to pull out. Dr. West's talk covered aspects of the dispersal of fungal spores and included the various methods that fungi have evolved to maximise their potential for dispersal by wind. D. Clement concluded the morning session by considering the hazards posed by bioaerosols. His talk highlighted historical disasters related to bioaerosols such as the influenza epidemic of 1918-1920 that was responsible for more deaths than the First World War.

The first two talks in the afternoon session concerned the 2001 Foot and Mouth disease outbreak in the UK. Foot and Mouth disease is a viral infection that can infect domestic livestock (cattle, sheep, goats and pigs) as well as about 70 species of wild animals. Dr. Soren Axlenbend (Institute of Animal Health, Pirbright) described the development of the disease in farm livestock, in relation to sources of the virus and to doses required for infection. The virus is small (genome about 8.5 kilobases) and can survive temperatures less than about 33°C and requires relative humidity to be above about 55%. Exposure experiments have
shown that cattle and sheep are more susceptible to infection via inhalation than pigs, but the pigs produce more virus and are thus much more infective. The initial outbreak of the 2001 epidemic was in pigs; this may have contributed to the rapid spread of the disease. The most likely method of disease spread is via animal to animal contact, but airborne spread can play its part. Airborne spread of the Foot and Mouth virus was taken up by Dr. John Gloster of the Meteorological Office. The models used by the Meteorological Office to predict the potential spread of the virus were described. These were largely based on the models developed after the last severe outbreak in the late 1960's. Several case studies have been investigated from the 2001 epidemic to determine the significance of airborne transport in the development of the epidemic. Current evidence (at the time of writing) suggests that airborne dispersal plays only a small role in the spread of the epidemic and that most spread could be accounted for by the movement of animals.

Dr. Jean Emberlin of the UK Pollen Research Unit (University College Worcester) explained the focus of the meeting to bioserolol effects on human, specifically allergies. Airborne pollen gains constitute a major source of airborne allergens that cause allergic disease (hay fever, asthma) in humans. About 20% of the population will develop allergies to pollen, particularly grass pollen. Because many pollens contain similar classes of allergenic molecules individuals tend to react to a number of types of pollen. The UK Pollen Research Unit produces daily pollen forecasts during the grass pollen season (May - August). This information is intended to help hay fever sufferers more effectively manage their symptoms. Recent work has shown that pollen allergens can be associated with particles much smaller than pollen grains, suggesting that the allergens may be released from the grains and resuspended into the air. This may help to explain the phenomenon of “thunderstorms” asthmatics when large numbers of people have reported asthma attacks associated with onset of thunderstorms. Heavy rain accompanying the storms may have resuspended allergens into the air. Dr. Emberlin also discussed the possible interaction between pollution and airborne biological allergens.

The final talk of the day addressed the rather unusual topic of extraterrestrial organic aerosols. Dr. Mathew Gange of the Natural History Museum told the audience that about 40 000 tonnes of extraterrestrial “dust” falls on the Earth’s atmosphere annually. This has its source in asteroid collision debris and comets. Some of this can reach the Earth’s surface as micrometeorites. Although many of these micrometeorites melt before they reach earth, about half that do not melt are carbon rich. Analysis of carbon rich extraterrestrial “dust” has revealed a wide range of organic molecules, including polynuclear hydrocarbons, amino acids (the building blocks of DNA) and sugars. The idea that life may have been introduced to the Earth via extraterrestrial “bioaerosols” was briefly discussed.

The meeting was attended by about 60 delegates (including 5 “student” registrations) and was generally considered to be both informative and entertaining. The organizers would like to thank the speakers and delegates for making the meeting a success.

Alastair McCartney

---

**RECENT ATMOSPHERIC RESEARCH**

**Cosmic rays, clouds and climate**

Analysis of modern satellite cloud observations has shown that, from 1983 to 1994, the fraction of low clouds in the Earth’s atmosphere varies in a markedly similar way to changes measured in cosmic rays. Some scientists regard these results as evidence of a causal link between cosmic rays and clouds. The strength of the sun, which has varied in the past on many different timescales, modifies the intensity of cosmic rays arriving at Earth. This is an inverse relationship: when the sun is active, as at present, the cosmic ray intensity is reduced. Because of the sun’s effect on cosmic rays, such a link would present a route by which solar changes could have a different effect on climate to that previously thought, perhaps profoundly so.

A recent review paper [Carslaw K.S., Harrison R.G. and Kirkby J. Cosmic rays, clouds and climate Science 298, 5599, 1732-1737 (2002)] moves beyond the similar variations in cosmic rays and clouds observed and examines physical mechanisms proposed to explain the observations. Cosmic rays generate ions in the atmosphere, at all levels down to the surface. Of themselves, molecular ions are too small to permit water droplet formation. However, in the lower atmosphere, the ions form charged clusters of particles, and recent theory now shows that these clusters can continue to grow sufficiently to permit cloud droplets to form. An alternative, or indeed complementary, explanation is based on the electrical effects on clouds resulting from the ions: if charged by ions, aerosol particles are more readily attracted to water drops than are neutral particles. In sufficiently cold clouds, this could cause the drops to freeze.

The paper concludes that, if the physical mechanisms linking cosmic rays and clouds can be established and recent results indicate considerable progress in this subject area - one of the principal uncertainties in climate, cloud formation, could be reduced.

Giles Harrison

---

**Meteorological Observations During The 1999 Eclipse In Cloudy Conditions**

The familiar weather terminology, using anticyclones and depressions to identify atmospheric circulation patterns, only emerged early last century. Some important supporting evidence came from studies of the US solar eclipse of 1900, which generated a moving, cold-core depression, modifying surface winds at several observing sites as the moon's shadow passed. Both scientific and popular eclipse literature hint at mysterious eclipse winds, which have an almost mystical status for those who have experienced dramatic eclipses. Definitively establishing whether such winds exist, particularly in cloudy conditions, requires highly sensitive instrumentation. Dr Karen Aplin of the Rutherford Appleton Laboratory, working
with Dr Giles Harrison at the University of Reading, carried out a field experiment
during the August 1999 solar eclipse in the UK. Their results have recently been
published in (http://www.pubs.royalsoc.ac.uk/proc_marhs//proc_marhs.html).

The work identified eclipse winds and provided new observations of eclipse-induced
atmospheric circulation. Sophisticated meteorological instruments were installed at a
point where the eclipse was total, at the UK Met Office site at Camborne in Cornwall,
and at The University of Reading, in the partial eclipse zone.

As the moon’s shadow passed over both sites, small symmetrical changes in
meteorological variables were observed from transport of cold eclipse air. Using these
observations, the original “eclipse cyclone” postulated in 1901 can be revised. The
controversial “eclipse wind” is probably related to transitions between warmer and
cooler air within local circulations induced by the eclipse.

A second finding provided new evidence for the presence of eclipse-induced “gravity
waves”, which are also a contentious topic amongst eclipse observers. The rapid
cooling in the upper atmosphere caused small atmospheric pressure fluctuations at
ground level, which were observed for some hours after the eclipse passed.

Karen Aplin

OTHER NEWS

PHYSICS POLICY UPDATE

The first issue of Physics policy update was published in May 2002.

Physics policy update is a new newsletter from the Department of Higher Education
& Research Policy of the Institute, which highlights key policy activities that the
Department is actively involved in, including information on consultation responses,
policy meetings and reports. In addition, in the policy news section, there is a round
up of articles relevant to physics policy, abstracted from scientific and educational
journals.

The newsletter will be distributed every month, and is available on the Institute’s
website at http://policy.iop.org/.

I hope you will find this newsletter of interest.

Tajinder Panesar
Policy Officer

VISIONS IN PHYSICS RESEARCH

The Institute has produced a series of Vision Papers in order to demonstrate to
influential opinion-formers and policy-makers with an interest in science, ways in
which contemporary physics and the skills of physicists will affect life in the 21st
century.

A folder containing the first twelve Vision Papers has been produced. They can also
be found on our website at policy.iop.org/v_production/. The Institute produces and
disseminates these papers at regular intervals to keep reinforcing the message that
physics is dynamic, interesting and relevant. Forthcoming papers will look at
telescopes, technological plasmas and free electron lasers. If the subject matter of any
of these topics impacts on your group and you wish to have an input please let me
know. In addition I would be pleased to hear from you if your group would like to
suggest topics and contacts for future papers. You can contact me using the Visions
e-mail given below.

Philip Diamond
e-mail: visions@iop.org
INTER-Agency Committee on
Marine Science and Technology

Slide shows of the UK Hydrographic Office’s and Met Office’s oceanographic activities are available via the OceanNET website (http://www.oceanet.org).

Click onto “About UKMED” and then “UKMED Partners”.

Graham Alcock
e-mail: graham@onetel.net.uk

Ozone and vegetation

A brief report showing estimates of the likely changes in the UK’s ground-level ozone climate and implications for UK vegetation is now available online at:

http://www.edinburgh.ceh.ac.uk/pollution/docs/03trends.uk.veg.htm

or by contacting Mhairi Coyle (mcoyle@ceh.ac.uk).

The main conclusions are that:

- predicted increases in the global background ozone concentration are likely to significantly alter the temporal and spatial distribution of ozone across the UK
- the biggest changes are likely to be in upland areas
- the implications for vegetation cannot be fully quantified as the vegetation most at risk has not been extensively studied
- comprehensive studies of ozone deposition and its effects on vegetation in different ecosystem types are required if the effects of increasing ozone concentrations on UK plants is to be adequately understood.

Mhairi Coyle

Rolex Awards for Enterprise

Julia King, our new Chief Executive has asked me to draw your attention to a Call for Entries to the 11th Rolex Awards for Enterprise.

Enterprising individuals of any age, nationality or background are invited to apply to the programme, that supports innovative projects in the fields of science and medicine, technology and innovation, exploration and discovery, the environment and cultural heritage.

The five winners of the new series will be announced at a ceremony in Paris in September 2004. Each will receive $US 100 000 and international publicity for a project that meets the award programme’s criteria: originality, feasibility and potential impact. All projects must result in the betterment of humankind, and, most importantly, demonstrate the candidate’s spirit of enterprise.

The deadline for applications for the European zone is September 30 2003.

Prospective entrants can complete the official application form available on the Rolex Awards website - www.rolexawards.com - and submit their project on-line, or download the form and post it.

Applicants are urged to submit their entries as early as possible so that they can be given full consideration by the Secretariat. Short-listed projects will then be submitted to the Selection Committee which will meet early in 2004. For the 2002 Rolex awards, the Secretariat received 1300 entries from 113 countries.

For further information email Tom.Conway-Gordon@mslpr.co.uk

Sarah M. Connelly
e-mail: sarah.connelly@iop.org
Career Break Support

Career Break Grants

- The Institute's Career Break Grants help members to stay in touch with the wider physics community.
- Contributions towards attendance and associated costs are available.
- Members can apply by going to http://careers.iop.org/resources
  Or by emailing cbg@iop.org

Career Break Grants for Conferences

- Members can attend all Institute of Physics conferences at a reduced rate.

Reduced Membership Subscription Rates

- Members on a career break are entitled to a reduced membership subscription rate, which is currently just £10.
- Email membership.iop.org, including your membership ID number in the text, to qualify for this rate.

Dr Giles Harrison

Interests in aerosol physics, micrometeorology and atmospheric physics. For several years in the 1990s on the committee of the Static Electrification Group, and contributed to organization of two International Electrostatics Conferences. Invited public talk at the Brighton IOP Congress, on Atmospheric Electrostatics.

1988 MA(Natural Sciences) St Catharine's College, University of Cambridge
1992 PhD(Atmospheric Physics) Imperial College, University of London
1992 to 1994 Research Fellow, Department of Meteorology, The University of Reading
1994 to date Lecturer in Meteorology, The University of Reading (including, during 2001, Visiting Scientist, School of the Environment, University of Leeds; Visiting Scholar, St John's College, Oxford)

Dr A D Heathershaw, CPhys, FInstP

Dr Tony Heathershaw is a physicist and a physical oceanographer. Following a brief spell in the Royal Navy he decided to pursue a career in physics, and later oceanography. His PhD, from the University of Wales, Bangor, was on the physics of turbulent boundary layers and sediment movement in tidal currents. This was followed by 10 years working for the NERC's Institute of Oceanographic Sciences Laboratory in Taunton, Somerset, where he published extensively on sediment transport and geophysical fluid dynamics. Upon the closure of the IOS Laboratory in 1985, he transferred to the MOD's Admiralty Research Establishment at Portland, Dorset, where for 10 years he headed up a group developing coupled ocean-acoustic models and forecast systems for the Royal Navy. In 1997 he moved to the Southampton Oceanography Centre with the Defence Evaluation and Research Agency (DERA), since when he has been leading a team carrying environmental impact assessments and specialising in the effects of underwater noise on marine life. He is an Honorary Fellow in the School of Ocean and Earth Sciences at the University of Southampton and an Associate Editor of the journal Continental Shelf Research. In 2001 DERA was privatised and Dr Heathershaw now works for QinetiQ (pronounced "kinetic") Plc. He is the author of numerous publications in leading journals, technical reports, conference proceedings and books, on topics as diverse as fluid turbulence, internal waves, sandwaves, beach sediments, seabed gravels, radioactive tracers, electromagnetic flow sensors, ocean acoustics, the effects of sound on marine life, ocean currents, wave reflection and offshore bars!
Dr. Rob Kinnersley gained a BSc(Hons) in Biochemistry from the University of Leeds, followed by a two-year MSc in Bio-aeronautics (the use of aircraft and remote sensing in the protection, development and exploitation of natural resources) from the College of Aeronautics, Cranfield Institute of Technology. During the latter he undertook research into agricultural generation, carried out field work on Tsetse fly control in Zimbabwe, and won a bursary to visit agricultural aviation centres in Eastern Europe. He stayed on at Cranfield as a research assistant, carrying out further (NRI-funded) work on Tsetse and Army worm control, the fundamentals of liquid atomisation, and atomiser design, which led to his PhD. After Cranfield he worked as a PDRA, and then Research Fellow, at Imperial College. There his work included measuring and modelling the interactions of aerosol and rain-borne contaminants with plant canopies, modelling personal exposure to particulates, and providing MAFF with guidelines for emergency sampling strategy following nuclear accidents. He arrived at Birmingham in January 1999, as lecturer in air pollution. He is a Chartered Physicist, currently a committee member of the Institute of Physics Environmental Physics Group, a member of the West Midlands Regional Advisory Committee on Incidents involving Radioactivity, sat on the IAEA-BIOMASS Working Group on fruit contamination by radioactivity, and has been a committee member and Newsletter Editor of the Aerosol Society.

Dr. Andrew T Rowley CPhys, MInstP

Dr. Andrew Rowley is a Senior Research Engineer and Project Manager at C-Tech Innovation Ltd, specialising in advanced and innovative thermal and electrochemical technologies for processing waste and effluent streams. Working as a physicist and as an electrical engineer, he has developed: radio frequency, microwave and ohmic heating systems; high voltage pulsed processing systems, and specialised electrochemical cells.

Dr. Rowley graduated with a first class degree in Physics and went on to gain a PhD in solid state physics studying the magnetic properties of materials. He has been an active member of the Institute of Physics for more than 15 years, and has previously served on both the Spectroscopy and Superconductivity Group committees.

Committee of the EPG

<table>
<thead>
<tr>
<th>Chair:</th>
<th>9 Roundwood Park, Harpenden, Herts. AL5 3AB. Tel: 01582 460859 or 01525 863330, fax 01525 863444, e-mail: <a href="mailto:e.g.young@beecwaw.net">e.g.young@beecwaw.net</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Edward Youngs</td>
<td></td>
</tr>
<tr>
<td>Vice-Chair:</td>
<td>Plant Pathogen Interaction Division, Rothamsted Research, Harpenden, Herts. AL5 2JQ. Tel: 01582 763133 x 2246, fax 01582 760981, e-mail: <a href="mailto:alastair.mcCartney@bbrc.ac.uk">alastair.mcCartney@bbrc.ac.uk</a></td>
</tr>
<tr>
<td>Dr. Alastair McCartney</td>
<td></td>
</tr>
<tr>
<td>Hon. Secretary:</td>
<td>Research and Development, Ove Arup &amp; Partners, 13 Pizzey Street, London W1T 4BQ. Tel: 0207 755 3645, fax 0207 755 3669, e-mail: <a href="mailto:alexandra.wilson@arup.com">alexandra.wilson@arup.com</a></td>
</tr>
<tr>
<td>Ms. Alexandra Wilson</td>
<td></td>
</tr>
<tr>
<td>Editor:</td>
<td>Space Science and Technology Department, Rutherford Appleton Laboratory, Chilton, Didcot, Oxford, OX11 0QX. Tel: 01235 445844, fax 01235 445848, e-mail: <a href="mailto:K.L.Aiplin@rl.ac.uk">K.L.Aiplin@rl.ac.uk</a></td>
</tr>
<tr>
<td>Dr. Karen Aplin</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Members:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Ian Colbeck</td>
</tr>
<tr>
<td>Dr. John Garland</td>
</tr>
<tr>
<td>Dr. R.G. Harrison</td>
</tr>
<tr>
<td>Dr. A. Heathershaw</td>
</tr>
<tr>
<td>Dr. Peter Hodgson</td>
</tr>
<tr>
<td>Mr. Peter Hughes</td>
</tr>
<tr>
<td>Dr. R.P. Kinnersley</td>
</tr>
<tr>
<td>Ms. Lucy Parkin</td>
</tr>
<tr>
<td>Dr. Derek Rose</td>
</tr>
<tr>
<td>Dr. A. Rowley</td>
</tr>
</tbody>
</table>