

May 2014

London • Wednesday 7 • 6.30 p.m. • Dr Heather Williams

Rise of the anti-matter machines – the past, present and future of positron emission tomography

Dr Williams introduces Positron Emission Tomography, from its fundamental principles and initial development to current applications in clinical care and research, before looking at imminent advances and blue-skies dreams of the future.

Milton Keynes • Tuesday 13 • 7.30 p.m. • Dr Marialuisa Aliotta

Nuclear reactions, stars and the creation of elements

Our bodies are mostly made up of six elements: oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. All are necessary to life. A key question for Nuclear Astrophysics is: how, when, and where in the Universe are these elements created? The answer takes us on a journey through the inner workings of stars, and shows our intimate connection with past fierce stellar explosions. This talk will reveal how nuclear physics takes centre stage in the quest to understand our origin and place in the Universe.

London • Wednesday 21 • 6.30 p.m.

Joint meeting with Environmental Physics Group.

To be arranged. Check branch calendar.

Herts • Wednesday 28 • 7.00 p.m. • Dr Mark Telling

Magic bullets and plastic sponges

In the heart of the Oxfordshire country side lies a neutron research laboratory which houses what The Guardian describes as, “one of the most extraordinary machines ever built” - a machine, however, that few ever have the chance to see or even know exists! In this newly devised outreach presentation, Mark invites the audience to peak behind the curtain and learn exactly what neutron research entails, how this tiny particle illuminates our atomic world and how he uses the method for his own bio-physics based research.

June 2014

London • Weds 4 • 6.30 p.m. • Victoria Murphy

Standing up for science

Sense About Science equips people to make sense of science & evidence, & gets scientists talking on issues that matter to society. Every day, we hear claims about what is good for our health, bad for the environment, how to improve education, cut crime, and treat disease. Some are based on reliable evidence & scientific rigour. Many are not. So how can we make companies, politicians, commentators and official bodies accountable for the claims they make? We should ask them for evidence, as consumers, patients, voters and citizens.

Milton Keynes • Tues 10 • 7.30 p.m. • Dr Paul Jones

Nanotechnology and nanomaterials: sun cream and socks

What do sun cream and socks have in common? How could ink help us build better circuits or generate power? What does the future have in store for medical diagnostics & associated drug delivery? Nanotechnology has found its way into many things we take for granted in our day to day lives - and there's more to come... This talk will give you a glimpse into the fascinating world of the very, very small - from the use of nanoparticles in the fight against cancer to exotic materials used to generate power from body heat.

Information:

All our lectures are free to all and last about one hour. There is usually 10 to 15 minutes afterwards for the audience to ask the questions. School parties are most welcome but please register numbers beforehand with the relevant venue organiser (see below).

All venues are wheelchair accessible. Details herein are subject to possible alteration - check branch webpages. Any views expressed in here are not necessarily those of the IOP.

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Lecture venue information and times are as follows:

London

PLEASE NOTE: Due to the IOP's relocation to new premises in Kings Cross over the coming year, the venue for London lectures will be close to Portland Place but may vary throughout 2014. Please check the branch calendar for location details. Refreshments are served from 6.00 p.m. on the day of the lecture. Please register online to attend lectures. If you do not have access to e-mail, telephone or text Alex on 020 8845 2295.

Berkshire

Lectures held at 7.30 p.m. in the William Penny Theatre, AWE, Aldermaston, Reading, RG7 4PR. The theatre entrance can be found on the A340 Basingstoke to Newbury road, just before the Heath End Roundabout at Tadley. E-mail iop.lectures@awe.co.uk for further information.

Herts

Lectures usually held in the Lindop Building or Prince Edward Hall, University of Hertfordshire, College Lane, Hatfield, AL10 9AB. For further information on this season's events, contact Diane Crann (e-mail d.crann@herts.ac.uk, tel 07770 444614).

Kent

Unless stated otherwise lectures held at 7.30 p.m. in Rutherford Lecture Theatre 1, University of Kent, Canterbury, CT2 7NZ. Further information can be obtained from Dr. Cyril Isenberg (e-mail c.isenberg@kent.ac.uk, tel 01227 823768)

Milton Keynes

Lectures held at 7.30 p.m. in the Berrill Lecture Theatre, Open University, Walton Hall, Milton Keynes, MK7 6AA. For further information contact Prof Ray Mackintosh (e-mail raymond.mackintosh@open.ac.uk). You do not need to register for IOP lectures held in Milton Keynes

London & South East Branch

Public Events – Spring 2014

London and South East Lecture Programme

January 2014

Kent • Marloe Building Lecture Theatre • Monday 20 • 7.30 p.m.
• Dr Jayawardhana

The neutrino hunters: the chase for the ghost particle and the secrets of the Universe

Before the Higgs boson there was a maddening search for another particle – the neutrino. First detected in 1956, it hinted at the answers to still more mysteries. Why is antimatter so rare? What might 'dark matter' be made of? Is faster than light travel possible? Renowned astrophysicist and award-winning science writer Dr Jayawardhana delivers a thrilling lecture on the hunt for the neutrino, from the dawn of the quantum age to today's most inventive laboratories. This lecture is based on his new book, *The Neutrino Hunters: The chase for the ghost particle and the secrets of the universe*.



London • Wednesday 22 • 6.30 p.m. • Prof. B Newport
Glass: a look inside

Making glass is one of our oldest technologies. From its deceptively simple beginnings, glass has found a place in art and technology: a material of beauty as well as of utility. This century, glassy materials are now used as scaffolds for regenerating a patient's lost bone and have the potential to provide smart drug delivery systems in vivo. Prof Newport will illustrate the history, technology and artistry of glass, unravelling the science by revealing its atomic-scale properties.

Kent • Tuesday 28 • 7.30 p.m. • Dr Pantelis Georgiou
Bio-inspired semiconductors for healthcare

Semiconductor technology is revolutionising the healthcare sector by providing innovative solutions to combat chronic disease. This talk explains how bio-inspired techniques & semiconductors can be used for building novel systems for early detection and therapy of disease. This talk will look at recent developments on the bio-inspired artificial pancreas for the treatment of diabetes and semiconductor genetics for DNA sequencing.

Herts • Lindop Building • Wednesday 29 • 7.00 p.m. • Dr Jesus Rogel-Salazar
Theory, model and simulation: an involved association

The use of simulations in physics is a very well established practice and it can be a very useful and powerful tool. The development of computer models requires a simplified and stylised version of the target system, taking into account the aspect we are most interested in. In the vast majority of cases, models are backed by theories; what is then the relationship between model and theory?

February 2014

London • Wednesday 5 • 6.30 p.m. • Prof. Peter Barham
Molecular Gastronomy: the science of taste and flavour

What gives food its flavour? What makes some foods taste really good while others can be mediocre or even disgusting? How far can science go in answering these (and other) questions that are so important for domestic cooks and chefs alike? It is often said that flavour is the combination of taste on the tongue and aroma in the nose.



Kent • Tuesday 11 • 7.30 p.m. • Dr Graham Farmelo
Winston Churchill, his nuclear physicists and the bomb
Winston was the only international leader who could claim to be a nuclear visionary. In the 1920s and 30s, he wrote several articles looking forward to the nuclear age. Later, he became the first leader to be presented by his nuclear scientists with a plan of action to build the bomb. Winston

fore-saw the advent of nuclear weapons, worked with his scientists to deliver them, and eventually became obsessed with the threat of thermonuclear warfare.

Milton Keynes • Tuesday 11 • 7.30 p.m. • Dr Tamsin Edwards
Predicting future climate change

The fifth IPCC report on the latest climate science has now been published. What can science say about our planet's future? How confident are we in the results? Dr Edwards will discuss how we make predictions with models of the Earth system.

London • Wednesday 19 • 6.30 p.m. • Prof. Vlatko Vedral
Living in the quantum world

Quantum mechanics is commonly said to be a theory of microscopic things: molecules, atoms and subatomic particles. Most physicists think it applies to everything, regardless of size. The reason its distinctive features tend to be hidden is not a simple matter of scale. Recently, experimentalists have seen quantum effects in macroscopic systems. Dr Vedral will discuss fundamental aspects of quantum physics as well as some potential applications to biology & technology.

Herts • Lindop Building • Wednesday 26 • 7.00 p.m. • Dr Suzie Sheehy
Five things you should never do with a particle accelerator

Particle accelerators are some of the most advanced machines on the planet. They incorporate an impressive range of cutting edge technology to do what seems like a simple job. So what would happen if we tried to use them in unexpected ways? With the help of demonstrations, Dr Sheehy will discuss her top five things you should never do with a particle accelerator... and a few things you definitely should.

March 2014

Due to the IOP moving buildings, from this date until further notice London lectures will be held just down the road at the Royal Institute of British Architects, 66 Portland Place, London, W1B 1AD.

Kent • Tuesday 4 • 7.30 p.m. • Dr Suzie Sheehy
Five things you should never do with a particle accelerator

See February 26 for abstract

London • Wednesday 5 • 6.30 p.m. • Marta Caballero
Medical physics in Ghana

Ewa Karczewska & Marta Caballero travelled to Ghana for a project in collaboration with UCL's partner initiative, to develop training for Ghana's hospitals that have linear accelerator radiotherapy units but lack expertise to use them. Here is their story...

Milton Keynes • Tuesday 11 • 7.30 p.m. • Prof John Bouchard

Extending the life of nuclear power plants – materials engineering research.

Extending the life of existing nuclear power stations is necessary to secure the UK electricity supply over the next 10 years. A structural integrity issue that has challenged existing AGR nuclear power plants will be reviewed with a discussion of how materials engineering research has contributed to extending the life of these plants.

London • Wednesday 19 • 6.30 p.m. • Pantelis Georgiou
Bio-inspired semiconductors for healthcare.

See January 28th for abstract



Herts • Prince Edward Hall • Wednesday 26
• 7.00 p.m. • Dr Simon Singh

The Simpsons and their mathematical secrets

Mathematicians on the writing team behind *The Simpsons* have covered everything from calculus to geometry, from pi to game theory & from infinitesimals to infinity in episodes of the most successful TV show in history. Join Dr Singh as he unearths the show's mathematical treasures. Dr Singh is an award winning science journalist and TV producer, having worked on the BBC's *Tomorrow's World* & co-directing BAFTA award-winning documentary *Fermat's Last Theorem*.

April 2014

Kent • Tuesday 1 • 7.30 p.m. • Prof Dame Jocelyn Bell-Burnell
Transient astronomy bursts, bangs and things that go bump in the night

Improvements in telescopes and computing allow us now to look for and study things in the sky that are transient or short duration. How different will the universe look when viewed in this way?

London • Wednesday 2 • 6.30 p.m. • Prof Frank Close
The infinity puzzle – the fifty year story of the Higgs boson

50 years ago Peter Higgs speculated a new particle – the Higgs boson – could explain many of the mysteries surrounding particle physics. In the intervening years new discoveries supported this. This culminated in the building of the LHC to detect it.



Milton Keynes • Tuesday 8 • 7.30 p.m. • Dr John Bridges

The Curiosity Rover exploration of Mars: What have we learnt about Mars?

Since landing in August 2013 we have identified the clearest evidence yet for a habitable, lacustrine environment on Mars. Using the range of instruments on the rover, including

X-ray diffraction and gas chromatography, we have been able to establish some of the conditions under which water was present. The Mars Science Laboratory mission is rapidly deepening our knowledge of Mars.

Herts • Wednesday 30 • 7.00 p.m.
To be arranged. Check branch calendar