Institute of Physics – L & S E Branch – Retired Members Section

AT HOME – A MISCELLANY
THURSDAY 7 January 2016

This meeting has been organised by George Freeman

PROGRAMME

Chairman Mike Quinton

10:00	Registration and coffee	
11:00	Welcome and notices	
11:10	*Sir Arnold Wolfendale FInst.P.*	**Navigation, Astronomy and Timekeeping--from John Harrison to the possibility of New Physics.**
12:05	*Dr Eleanor Schofield*	**Conserving the Tudor warship Mary Rose**
13:00	Lunch	
14:30	*Prof Norbert Klein*	**Graphene – towards remote sensing, wireless communication and medical diagnostics with terahertz radiation**
15:20	*Prof Francis Duck*	**Medical ultrasound**
16:10	*Tom Jacobs*	**Stained Glass**
17:00	Tea	

Venue: Read Lecture Theatre (level 5), Sherfield Building, Imperial College, London SW7 2AZ
Registration and coffee on level 5 outside the theatre.

Costs Free but £27 with lunch

This is a London & SE Branch meeting and is open to visitors and the public free of charge. Please register on the London and SE website http://www.iop.org/activity/branches/south_east/lse/

For lunch please register on the REMS/IOP website www.london.iop.org/rems which takes you to the REMS page and click on the calendar link on the left. .

Lunch will be in the Sherfield building in the Queen's Tower Room on the ground floor. It is a hot sit down buffet with wine.

Sir Arnold Wolfendale FInst.P, FRS, Durham

Navigation, Astronomy and Timekeeping--from John Harrison to the possibility of New Physics..

Arnold is a former President of the IOP, and the EPS. He was the 14th Astronomer Royal and he led Durham Physics into Astronomy in its widest sense. Arnold's current research is in Climate Change and Cosmic Ray Astrophysics.

Dr Eleanor Schofield

Conserving the Tudor warship Mary Rose

The ***Mary Rose***, a Tudor ship which sank off the South coast of England in 1545, has been undergoing conservation in Portsmouth Historic Dockyard since its excavation in 1982. Sprayed with polyethylene glycol to replace water in the degraded wood, the ship is now being closely monitored as it dries under environmentally controlled conditions. Alongside possible mechanical instability as the hull dries, introducing air to the ship for the first time also has the potential to promote chemical instability due to the oxidation of endogenous sulphur species in the wood. These sulphur compounds were incorporated whilst buried under the seabed via the interaction of sulphate reducing bacteria with sulphate ions in seawater [1]. Sulphur k-edge x-ray absorption spectroscopy, at a synchrotron source, allows us to determine and quantify what sulphur is now present in the wood. Core samples from the Mary Rose hull before and during drying have been analysed with this technique to assess whether problematic sulphates and sulphuric acid are being formed and to what depth. Alongside this neutralisation techniques are being explored to combat potential acid production. An overview of the conservation of the ship to date, current status and future strategies will be discussed.

CV

Dr. Eleanor Schofield is currently the Conservation Manager at the Mary Rose Trust. After completing her PhD in Materials Science at Imperial College London in 2006, she moved to Stanford Synchrotron Radiation Laboratory as a Post-Doctoral Research Associate, using X-ray Absorption Spectroscopy to investigate the speciation of waste Uranium in ground water. Following this she moved to the University of Kent as a Post-Doctoral Research Associate investigating neutralisation treatments for acidic waterlogged archaeological wood. X-ray Absorption techniques at Stanford Synchrotron Radiation Laboratory and Diamond Light Source were vital to this project. After completing this post, she joined the Mary Rose Trust and her work currently focuses on monitoring the drying of the *Mary Rose* hull and researching novel conservation treatments and characterisation methods.

Norbert Klein, Imperial College London

Graphene – towards remote sensing, wireless communication and medical diagnostics with terahertz radiation

Abstract: Graphene, as the most noticeable representative of ultrathin “2D” materials with thickness equal to the diameter of just one atom, has raised hope and research funding - due its unprecedented properties which are mostly described by superlatives. A tremendous application potential addressing nearly every area of our modern technologies was predicted, including the transition of mankind from the silicon age to the carbon age – enabled by graphene.

Not for the first time in the history of material science, realism emerges after the first euphoric phase and after facing the “real” material science problems, which usually shrink the vast application potential down to niche applications – at least if one looks not longer than ten years down the line towards broader commercial applications.

Although niches tend to become smaller the closer you look, the terahertz frequency range is a niche of great potential, which - till date - remains nearly unexploited in our everyday life. State-of-art graphene prepared by wafer-scalable micro-fabrication processes are on their way to become an enabling technology for broad and low cost applications of terahertz radiation in growing commercial areas like wireless communication, environmental remote sensing and medical diagnostics.

The talk will show the recent progress in graphene manufacturing and device applications – with emphasis on terahertz technology. New ideas for sensors and wireless communication systems and devices will be discussed and the benefits and needs of interdisciplinary university research and education will be emphasized.

Short CV: Prof. Norbert Klein is Professor for Electromagnetic Materials and Sensors in the Department of Materials at Imperial College London. He is founder and Director of Imperial's Centre for Terahertz Science and Engineering and he spun out a company which successfully commercializes microwave sensor systems for airport security. Prof. Klein is author or more than 160 publications in science- and engineering journals and he holds a large number of patents in microwave/ THz sensor and communication technology. His current research comprises label-free electromagnetic biochemical sensors including microfluidics, electromagnetic material characterization and graphene device fabrication and device physics

Prof Francis Duck, Bath

Medical ultrasound

Abstract

Ultrasonic methods for submarine detection were pioneered by Paul Langevin in France and by Robert Boyle in Britain during WW1. During the interwar period the physical, chemical and biological effects of these novel mechanical waves started to be explored. Medical uses of ultrasound emerged followed further developments in SONAR during WW2. Ultrasound imaging is now an embedded part of the clinical diagnostic pathway, with scans of the heart, muscles, abdomen and blood vessels together far exceeding fetal scans in number, the overall total now accounting for about one quarter of all medical imaging in Britain. This talk will review this history, and continue with a personal story of the speaker's involvement with some developments of medical ultrasound from the late 1960s onwards, some successful, some not. In particular, the development of harmonic imaging and of 3D imaging by ultrasound will be discussed. Remaining challenges for further progress will be identified. The widespread acceptance of ultrasound in medicine has arisen in part because it is very safe, and the story of how this was assured will be recounted briefly.

Short CV

Francis Duck is a retired medical physicist and visiting professor at the University of Bath. He spent time in research in medical ultrasound in the UK, Canada and the USA, and then made his career as a medical physicist in the National Health Service. He contributed to the growth of medical ultrasound through developing novel imaging techniques and by helping to define safety boundaries for the diagnostic use of ultrasound, In 2007 he was awarded the MBE for services to health care.

Tom Jacobs, Twickenham

The nature of glass.
Designing and and making stained glass windows.
Finding a theme. The cartoon. Cutting and joining the pieces of glass.
Actual windows, and projected images of windows.

CV

Early years: Born in Berlin, escaped to the UK in 1938 and presently became a British subject.
Pre Industry: Educated at Dorchester and Holloway Grammar schools, then National Service in the Royal Signals in Malay (attached to the Queen's own 4th Hussars - I'm rather proud of that), then took a Physics Degree at London University.
Industry: Mullard Research Labs, then Mullard Ltd; rose to Divisional Director. Then management consultant and Director at Mackingtosh Consultants.
Post Industry: Wanted a change so 'went back to school, got a PGCE, taught for the ILEA, rose to Head of Science, then taught at the RUTC (Richmond Upon Thames College) until retirement.