

Bristol Scientific Club: Meetings 2014-2015

(1) Friday, 26 September 2014

Guest Speakers: Colin Sparrow and Coin Burn: "REMAP"

Remap is a national charity working through local groups of skilled volunteers to help people with disabilities achieve independence and a better quality of life. Remap makes or modifies equipment when nothing suitable is available through mainstream sources. Items are tailor-made to be suitable for individual needs and to make a real difference to people's ability to rise to a particular challenge and achieve something not otherwise possible for them. 2014 is their 50th anniversary. Remap volunteers are professional engineers, craftspeople, technicians, healthcare professionals and skilled helpers, who freely give their time and expertise to improve the lives of others – an opportunity for some of our Scientific Club members?

(2) Saturday, 18 October 2014

Mark Dennis: "Vikings in shades : navigating by skylight polarization"

The hypothesis that Vikings navigated at sea using 'sunstones' to detect the direction of skylight polarization has excited controversy for almost 50 years. It is possible to understand the necessary crystal optics, and light scattering in daylight, with only a minimum of linear algebra. In this talk Mark describes the Viking navigation hypothesis, and in doing so reveals the deeper and surprising relationship between polarization in birefringent crystals and in the blue sky. Mark is Professor of Theoretical Physics at the University of Bristol.

(3) Saturday, 29 November 2014

Julian Lea-Jones: "Dowsing : How we used it to detect corridors of curiosity"

Julian writes: Initial discoveries in the late 70' of alignments of local historic sites and topographical features arose by chance from research in into the history of the circular church of the Knights Templar.

It soon became evident that Bristol's Temple Church occupies a significant position in relation to other local historic sites. Following a lunchtime discussion with a Dowser under contract to our company, Sperry Gyroscope and in spite of our extreme scepticism we were shown the existence of a dowse line running through the centre of the Templars' church site. In this evening's talk I will show the unexpected results of that meeting and will also tell of the companies and organisations that have successfully employed dowsers.

(4) Friday, 27 February 2015

Guest Speaker: Anthony Koupparis: "Robotic Surgery"

Anthony Koupparis is a consultant surgeon with extensive experience in robotic surgery, particularly relating to the prostate. His talk will cover the history of robotics – both ancient and modern. Developments exist as far back as ancient Chinese medicine and Leonardo da Vinci. More modern history brings in the US military and NASA. Current uses and future developments will be covered.

(5) Saturday, 25 April 2015

Guest Speaker: Bruce W Drinkwater: "Ultrasonic levitation of human beings and individual cells"

When ultrasonic waves (i.e. high pitch sound waves) hit an object a small amount of momentum is imparted, resulting in a force on the object. This force is called the acoustic radiation force. Using arrays of loudspeakers, ultrasonic waves can be focused and used to concentrate this force at a particular location. The force is sufficiently large that humans can feel it and we are exploring how we can use this to create virtual computer interfaces, sculpted from ultrasound. If a high amplitude ultrasonic standing wave is generated, the acoustic radiation force can be made to exceed gravity and cause objects to levitate. In principle, this could levitate humans, although the experiment would probably be too dangerous to try. Of more practical benefit, contactless production lines have been proposed to manipulate delicate products in a factory of the future. This talk will explore the origins of this little-known phenomenon and discuss its possible uses. One of the most exciting applications is to use it to manipulate clusters of living cells to assist the formation three-dimensional tissue structures.

Professor Bruce Drinkwater is from the Department of Mechanical Engineering at the University of Bristol.

(6) Friday, 22 May 2015

Speaker: John Steeds: "A Convergence of Beauty and Utility"

Crystalline material is widespread in our everyday environments. It may occur naturally as in the case of minerals, metals and alloys, inter-metallic compounds, ceramics (oxides, nitrides, carbides, borides..) semiconductors (silicon, gallium arsenide, gallium nitride..), ice and molecular compounds. It may also be deliberately produced as in the case of biological macromolecules and polymers. Although there is a vast number of such examples only a limited set of crystal symmetries are consistent with space-filling and the determination of crystal symmetry is hence a crucial step in the analysis of crystalline materials. Moreover, once determined, well defined methods exist for arriving at the atomic arrangement within the crystal structure. In fact this is the way that most of our knowledge about atomic arrangements has been derived.

Traditionally, crystallographic analysis depends on X-ray diffraction although there are some inherent difficulties with this approach. This talk will be concerned instead with the use of electron diffraction, using a finely focussed electron beam some tens of atoms in diameter, to study small regions of crystals. Very beautiful and informative patterns result, as will be demonstrated; some of the limitations of X-ray crystallography are overcome by using this approach. A wide range of applications of the technique, known as convergent beam electron diffraction, will be given.