Physics Talks

1) The Nuclear Physics of Radioactive Polonium-210

In late 2006, we all became acutely aware of the mysterious substance polonium-210 in the notorious fatal poisoning of former Russian spy, Alexander Litvinenko. Prof Paddy Regan will explain what polonium-210 is; how it is made and what it does, in his lecture The Nuclear Physics of Polonium 210 at the University of Surrey,
In addition to its macabre uses, Prof. Regan will talk about this isotope and its fundamental significance. Radioactivity of atoms is due to them being unstable and emitting particles. These particles (alpha, beta and gamma rays) can kill or damage living cells. Prof. Regan will explain why some atoms are stable and others not. He will talk about their nuclear structure.
Prof. Regan will discuss how one might use gamma-ray spectroscopy to prevent smuggling of polonium-210 or other radioactive substances.

2) Cosmic Alchemy: How are We Made.

Prof. Paddy Regan of the University of Surrey will explain how the elements which make up our bodies are created in the cosmic furnaces which we call stars. He will explain that the pseudo-science of alchemy, namely trying to create precious metals from base materials, can now be realized using knowledge of the nuclear reactions and astrophysical processes in stars, to determine how the material from which we are made up was created.

3) (Some) Current Frontiers in Nuclear Physics Research

Prof. Paddy Regan of the University of Surrey will present some contemporary nuclear research frontiers in this talk including the ongoing search for the very heaviest elements and the upper limits for the period table; the synthesis of wildly exotic radioactive nuclei which help explain the creation of the heavy elements in exploding stars; the 'zoo' of nuclear shapes and excitations which are currently re-writing the textbooks theories on our understanding of the nucleus; and a brief discussion of the combined technological advances in both accelerator and radiation detection science which are combining to give rise to a new Golden Age of nuclear physics research one hundred years after the first experimental verification of the atomic nucleus. .

1. "Field Guide to the Isotopes" – Dr Paul Stevenson

At the centre of every atom is a nucleus, made up of protons and neutrons. The number of protons determines the kind of element (hydrogen, helium, lithium etc.) the atom is, and hence all its chemical properties. Each element, though, can come in different isotopes with different numbers of neutrons, and the different isotopes have different uses based on the nuclear rather than the chemical properties. This talk explores some of the isotopes and the uses they are put to in a range of diverse areas such as medical imaging and treatment, nuclear weapons and power, environmental monitoring, geological dating, and astronomy

Quantum mechanics – Prof Jeremy Allam

What is the Universe made of? – Prof Phil Walker
Although the Big Bang model gives a basic understanding of the structure of the Universe, there are many gaps in our knowledge. This talk addresses aspects of ordinary matter, dark matter and dark energy, based on both the dynamics of astronomical objects (on the large scale) and reactions between atomic nuclei (on the small scale).

A Journey into Nanospace – Dr Steve Clowes
Yr 6-8
This talk uses electron microscope images of insects, pollen and more to help students understand how small a nanometre really is.

The Mysteries of Quantum Mechanics – Dr David Faux
An introduction to some of the peculiar predictions of mankind's most successful theory.

Physics and Finance – Dr David Faux
How and why physicist are sought after as "rocket scientists" those highly paid finance jobs in the city.

Photonics: communicating with light – Prof Stephen Sweeney
Did you know that every time you pick up the phone or use the internet, information is being transmitted with light? In this talk we will see how strange quantum effects are being used every time you surf the web.

50 years of the laser – Prof Stephen Sweeney
This year is the 50th anniversary of the laser. Today lasers impact almost every aspect of life from communication and entertainment to research and medicine. This talk will show what a laser is and how they've become such an important part of every day life.

Superman and I – Dr Silvia Pani
As Superman teaches us, X-ray vision could be quite useful to see inside people and objects. But how is X-ray vision practically achieved, and can we really use it like Superman would? This lecture will introduce the physics of X-ray imaging and present the main applications of X-rays in the fields of medical imaging and crime prevention. It will cover both traditional methods and the most recent innovations introduced in medical imaging and security scanning.

Spintronics – Prof Ben Murdin

Nuclear Physics – Prof Wilton Catford