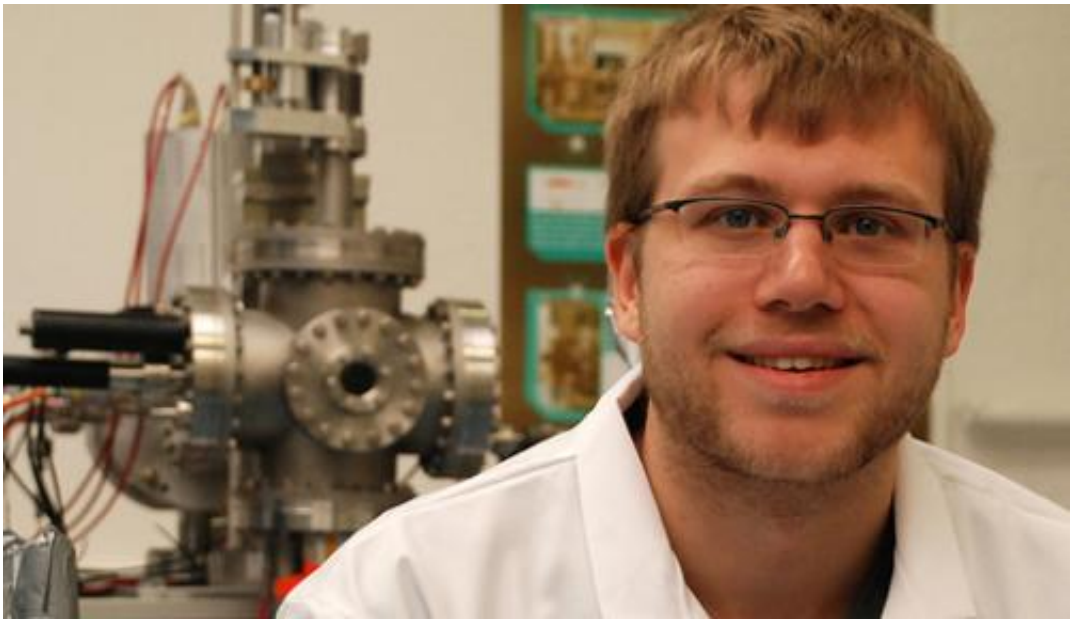
Physicist's research aids battle against drug smuggling

May 2 2014



Physicist Simon Albright is investigating the technology named Pulsed Fast Neutron Analysis.

Global security and the fight against crimes such as drug smuggling and weapons trafficking would be massively aided by an improved method of scanning cargoes for concealed items. A technology for this, based on the use of neutron beams, exists but is beset by problems. But a University of Huddersfield researcher is now playing his part in solving some of them.

Physicist Simon Albright is currently completing his PhD in the University's International Institute for Accelerator Applications (IIAA). The technology he is investigating is named Pulsed Fast Neutron Analysis and it has enormous potential.

Most X-rays, currently used for probing cargoes, produce two-dimensional images in which concealed items can be hard to detect. But after computer analysis, an image produced by neutron beam scanning can be exceptionally clear and easy to interpret.

"All the clutter, all the clothes and shoes, are taken out of the image and the operator sees only the possible threats, such as drugs or bombs," says Simon.

It is vital that neutron beam scanning become a practical possibility, he adds.

"At the moment we just don't have good enough image recognition. With current technology, if someone brings in a container that mostly consists of potatoes, for example, you would not be able to tell that in the middle they have hidden a huge block of cocaine."

However, although the theory of Pulsed Fast Neutron Analysis is well established, the challenge is to produce compact, safe scanners. Devices known as sealed tube neutron generators do exist, in the form of metal tubes that require the use of an isotope of hydrogen named tritium. But its radioactivity means that strict controls are necessary.

"You can't have these sitting around at a port, running through a few hundred of them a year. They would have to be stored in a very secure warehouse, which is simply not practical," says Simon.

Cost-effective neutron scanners

Simon's PhD project – supervised by Professor Rebecca Seviour of the IIAA – investigates the use of safer neutron sources that generate minimal radioactivity. Oxygen, lithium and beryllium are among the safer alternatives to tritium. Simon is also examining lower and more variable energies of beam, so that compact, cost-effective neutron scanners would become a more practical possibility.

Simon studied for his Masters in physics at the University of Lancaster before relocating to Huddersfield for funded PhD study. In addition to research, he is also passionate about explaining and creating enthusiasm for science to the widest possible audience. This led him to take part in the nuclear zone of the science outreach programme named I'm a Scientist Get Me Out Of Here.

This gives school pupils the opportunity to talk to scientists and get answers to their questions about science or the work of scientists. Simon was one of five physicists who took part in live chats and responded to scores of online questions from curious youngsters. For example, he had to field a large number of queries about black holes and other subjects that took him out of his immediate area of expertise.

In an online vote that followed the event, Simon came in at third place, behind two scientists who had considerable previous experience of this kind of outreach. But he enjoyed the exercise and wants to do more of the same.

"I love enthusing people about physics, addressing my work to people and getting them to understand it."

Provided by University of Huddersfield