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Science turns T-rays on terrorists

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A conference opening today at the University of Adelaide will hear how science is preparing to deploy powerful new weapons in the war on terrorists, drug smugglers and cancer, using TeraHertz rays - or T-rays.

New devices that see through clothing and packaging as never before and can identify explosives, guns, knives and even chemical and biological weapons with pinpoint precision are being developed in laboratories around the world.

Leading scientists from America, Europe, Asia and Australia will share the latest advances in T-ray technology at the international workshop on TeraHertz for Defence and Security, being held at the University of Adelaide from December 16-17.

T-rays are emissions between infra-red and microwaves. This enables scientists to analyse the composition and density of things the rays contact, as well as to image them.

“Most molecules vibrate in the TeraHertz frequency, so if you can detect them with T-rays, you can get a very good ‘fingerprint’,” says conference organiser Associate Professor Derek Abbott, Director of the Centre for Biomedical Engineering, School of Electrical & Electronic Engineering, University of Adelaide.

“T-rays pass through things like food packaging, clothing, plastic and cardboard enabling us to analyse what’s inside. This means they can be used to detect and identify weapons of metal or plastic, illicit drugs or biological hazards like anthrax, even if they were hermetically sealed,” he says.

“You can find out much more about the substance than you would with optical, infra-red or X-ray imaging, and this helps to identify it precisely.”

Because T-rays are low energy, they are also safe to use around people – unlike X-rays, Dr Abbott explains.

“One of the most important recent discoveries is that T-rays can also be used to detect cancer. Australia is part of the big scientific race to find out why.”

Due to their low penetrating power of the human body, T-rays would probably be used to scan the outer skin or, on endoscopes, to scan the bowel and other organs for early signs of cancer, he says.

Dr Abbott says the potential applications of T-rays are huge, from food safety and quality

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monitoring, to disease detection, airport security, postal scans for drugs, explosives or bio-weapons, military threat detection and medical diagnosis.

“Although some people don’t realise it, you can actually analyse things which are smaller that the wavelength of T-rays itself. You can break the wavelength of light by passing it through a tiny pinhole,” Dr Abbott says.

“This means we will soon be able to use T-rays to study human cells at below the cellular level.”

The workshop on TeraHertz for Defence and Security is sponsored by Australia’s Defence Science and Technology Organisation (DSTO).

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