Future of cancer diagnosis brighter

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The research is a major project between four leading UK Universities, including Cardiff University and three NHS hospital trusts, and will be carried out at the Science and Technology Facilities Council's ALICE accelerator facility. The goal is to develop new techniques to accurately diagnose the three cancer types much earlier than any current conventional tests. It will also aim to develop a new generation of portable and highly accurate cancer diagnostics instruments.

Funded by the Engineering and Physical Sciences Research Council (EPSRC), the project is led by the University of Liverpool, alongside Cardiff, Lancaster and Manchester. They are working closely with the Royal Liverpool and Broadgreen University Hospitals NHS Trust, the Christie NHS Foundation Trust, and the Lancashire Teaching Hospitals NHS Foundation Trust.

Oesophageal cancer has the fastest rise in incidence in the western world, affecting more than half a million people annually world-wide. Prostate cancer affects 10% of males in developed countries, with 30,000 new cases annually in the UK alone. Both cancers can be treated successfully if diagnosed early enough. This view is supported by the results of cervical cancer screening which saves more than 11,000 lives per year, but is an extremely expensive programme to run.

STFC's ALICE accelerator will play a key role in this project that has two main objectives; to add a new dimension to our understanding of these cancers by comparing results from a range of infrared and terahertz techniques, and then to use these findings to go on to develop a

new generation of portable and affordable cancer diagnostics instruments.

The team at Cardiff University, led by Dr Carole Tucker, School of Physics & Astronomy are applying their world-leading expertise in astronomical THz technology to the field of biochemical imaging and improved delineation of cancer.

Professor Peter Ade, a lead scientist on both of the European Space Agency's recent Herschel and Planck missions, School of Physics & Astronomy said, 'It is pleasing to be able to apply the ultra-sensitive techniques developed for astronomy to such an important field in medicine".

The University of Liverpool's Professor Peter Weightman, who is leading the research, said: 'This research could not be carried out efficiently and cost effectively by a number of smaller research groups. This impressive critical mass of scientists and clinicians has the combined experience and expertise to transform our understanding into the diagnosis and successful treatment of these three cancers. In the longer term, if this study reveals features common to all three cancers our results could be significant in the development of treatments for an even wider range of cancers and other diseases."

A light source of unprecedented brilliance, and located at STFC's Daresbury Laboratory at Sci-Tech Daresbury in Cheshire, ALICE is an R&D prototype for the next generation of accelerator based light sources and is the most powerful source of terahertz light in Europe. The third of its kind in the world, ALICE's technology will play a major role for significant advancements in fields from healthcare, materials science and sustainable energy.

Professor John Womersley, Chief Executive at STFC said: "This is a

perfect example of academia and leading clinicians working closely together with a view to changing the lives of potentially hundreds of thousands of people in the UK alone."

Using the extremely powerful source of light at ALICE, Professor Weightman and his team will conduct experiments on tissue specimens from all three diseases using a combination of three different infra-red based techniques to reveal the chemical structure of these diseases with unprecedented accuracy. The instrumentation to do this will be developed in collaboration with teams from the Universities of Cardiff, Lancaster and Manchester. The team will then go on to design and build two complementary terahertz instruments and assess their performance against more developed infrared techniques in cancer diagnosis.

Provided by Cardiff University