World Leading Birmingham Physicist Receives Joule Medal Honour

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An acclaimed physicist from the University of Birmingham's School of Physics and Astronomy has won the Joule Medal and prize of £2000 for the creation of positron emission particle tracking (PEPT) as a practical tool in a wide variety of engineering applications.

Professor David Parker, the recipient of the prize bestowed by the Institute of Physics, has pioneered and now leads the world in the use of positron emitting radionuclides to study engineering processes. The new technique has been taken up by many large industrial companies including BNFL and Glaxo SmithKline.

PEPT is an adaptation of the well known medical imaging technique, positron emission tomography, in which a positron-emitting isotope is injected into tissue. The positron is an example of antimatter and on encountering a normal electron the two annihilate, releasing a pair of gamma-rays which are then detected. Professor Parker recognised that a similar technique could be used to study the flow inside engineering systems. Instead of imaging the dispersion of a radioactive fluid, the path of a single radio-labelled particle is tracked.

The technique has the unique advantage that is can be used to visualise flow patterns in fluids within opaque vessels, providing information previously unobtainable. Applications range from studying the fundamental flow behaviour of powders and viscous fluids to improving the production of materials such as washing powders, pharmaceutical tablets and breakfast cereals.

As well as improving the detector systems, Professor Parker's research group has continued to refine the methodology, developing new techniques for radio labelling multiple small particles less than 100 micrometres, which can then be tracked at high speed. Until recently PEPT measurements could only be performed in Parker's laboratory in Birmingham, but last year the technique was employed for the first time on an industrial site, BP's refinery at Hull, using a newly-developed transportable detector system.

The radioactive tracers used in this work are produced using a cyclotron particle accelerator. The present Birmingham cyclotron was purchased by Professor Parker in 2002 second-hand from a hospital in Minneapolis. As well as producing the radioisotopes for PEPT studies, every evening it produces rubidium-81 which is sold to hospitals across the UK for lung imaging.

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For further information

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