CERN COURIER

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Physics aids new medical techniques

A small PET

Until recently, PET analysis was limited to humans and large animals because of the spatial resolution of commercial cameras. Now new PET developments extend non-invasive PET imaging to smaller specimens.

Manufactured by Alan Jeavons' firm, Oxford Positron Systems, HIDAC is one of the first commercial PET cameras developed for this purpose. It uses a quadratic configuration of 16 planar detector modules, with four modules stacked on each side. The distance between opposite modules is 170 mm and the modules are 280 mm deep, providing a cylindrical field of view with corresponding diameter and length.

Each detector consists of a multiwire proportional chamber combined with laminated plates of interleaved lead and insulating sheets drilled with a dense matrix of small holes. An electric field focuses electrons onto the centres of the holes, 0.4 mm in diameter and 0.5 mm in pitch, yielding intrinsic submillimetre resolution. To ensure uniform data acquisition, the detector bank continuously rotates 180 ° backwards and forwards every 6 s.

A HIDAC camera - the second such model to be built - was delivered to the Swiss PSI laboratory in December, following a prototype and an initial commercial model, which was used at London's Hammersmith Hospital. Acceptance tests at Hammersmith demonstrated a resolution of 1.2 mm - twice as good as that obtainable with PET cameras using crystal detectors.

In the past, such fruitful spin-offs have taken root despite CERN's natural focus on particle physics priorities. However, an increasing awareness of the need for, and benefits of, the transfer of such technology now means that CERN's current portfolio (which includes new crystals for PET detectors) should find much more fertile ground.