NEXT-GENERATION MOLECULAR IMAGING & PARTICLE THERAPY SEMINAR

MADPET4: a small animal PET insert for a 7T MRI scanner, overview and achievements

Prof. dr. S. Ziegler, University Hospital of Ludwig-Maximilians-Universität, München, Germany.

MADPET4 is the first small animal PET insert with two layers of individually read out crystals in combination with silicon photomultiplier technology. It has a novel detector arrangement, in which all crystals face the center of field-of-view transaxially. The PET performance was evaluated and compared to other preclinical PET scanners, followed by imaging a resolution phantom and two in vivo simultaneous PET/MRI scans in a 7 T MRI scanner. The FDG uptake in a mouse heart and brain were visible in the two in vivo simultaneous PET/MRI scans without applying image corrections. The insert demonstrates a good overall performance and can be used for small animal multi-modal research applications.

Research activities at the Nuclear Application Laboratory in the field of Radiation Detection and Radiation Therapy

Prof. dr. K. Ziemons, FH Aachen University of Applied Sciences, Germany.

The use of nuclear technologies is very widespread in many different industries and in research. Many applications of nuclear technologies are not immediately obvious, others are well known and has a direct link to nuclear technologies; like nuclear power and technologies based on fission and fusion processes; nuclear chemistry to develop and optimize radio-analytical methods for measuring the environmental impact; radiopharmaceuticals in nuclear medicine for diagnose and treatment; and radiation therapy using radioactive sources or accelerators for cancer therapies.
A brief overview of the activities at our laboratories of FH Aachen University of Applied Sciences is given and actual projects in the field Medical Physics.

Imaging in particle therapy

Dr. ir. D. R. Schaart, Medical Physics & Technology, Radiation Science & Technology department, Delft University of Technology.

About half of all cancer patients receive some form of radiotherapy. The majority of patients are irradiated with high-energy X-ray photons. For radiotherapy purposes, the physical properties of protons are much more attractive. However, the characteristic dose profile, with a sharp dose falloff behind the so-called Bragg peak, also makes proton therapy sensitive to deviations from the treatment plan. This phenomena may result in severe overdosing to healthy tissues and/or underdosing in the tumor. In photon radiotherapy, image guidance has developed to a point where highly optimized dose distributions are applied routinely and safely. The Holland Proton Therapy Centre (HollandPTC) has the ambition to realize the full potential of proton therapy, so as to improve clinical outcomes while reducing the side effects of therapy. This talk presents some of HollandPTC's research activities and how they will contribute to the development of the next generation of proton therapy.

Location: **Lecture Hall Boole**
EWI - TU Delft
36-HB-T0-610

Date & Time: **Wed. April 10th**
14.00 to 17.30 hs

The Positron Emission Tomograph ARPET project and related activities in National Atomic Commission of Argentina

Assoc. prof. C. Verrastro, Universidad Tecnológica Nacional, Argentina. Comisión Nacional de Energía Atómica, Argentina

The ARPET is a modular equipment, is easy to install and it works with 12 volts. It has a mechanical design that allows it to rotate 360 degrees helically, which avoids dead zones and improves uniformity and spatial resolution of results.The transmission of information is wireless. Its digital electronics have distributed processing capacity; this makes it possible to apply advanced algorithms without introducing dead times in the system.
The equipment is already installed in the Hospital de Clínicas José de San Martín of Buenos Aires, where calibration and characterization tasks are carried out prior to their approval for use in patients.

Fast scintillators for high energy physics and medical applications

Dr. E. Auffray Hillemanns, Dept EP-CMX, European Organization for Nuclear Research, Switzerland.

The recent years have seen an increasing need of fast timing detectors for various application domains. For example, in PET it is required a major leap forward in the improvement of timing precision below 100ps. Over the last years, in the frame of Crystal clear collaboration with the support of several European projects, various studies have been carried out addressing all aspects of understanding and improving the key parameters of fast timing detectors and to develop new innovative concepts of future radiation detectors. In the domain of scintillation detectors, various ultra fast scintillation processes have been investigated. In this presentation, the current state of art of time resolution and the different approaches pursued to go forward 10ps time resolution will be presented.

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