Università Politecnica delle Marche

Inter-departmental Crystal Research & Analysis Center

ICRYS

DIISM **SIMAU** **DICEA**

SCINTILLATOR DETECTORS: from Theory to Applications

(Medicine, Security, High Energy Physics and Engineering)

Serie of seminars and meetings

Prof. Karl Ziemons

FH Aachen - University of Applied Sciences

After receiving Doctoral degree in 1993 from RWTH Aachen in the field of High Energy Physics, Dr. Ziemons Karl joined to Nuclear Medicine group at the Research Center Jülich, Germany, for research on PET/SPECT imaging. He was in charge of developing a high-performance small animal PET project, the ClearPET Neuro, which became commercial equipment in Germany. His research interests span non-invasive imaging techniques, image reconstruction procedures, image processing applications, and signal processing in high-performance computing. Before moving to his present affiliation at the FH Aachen University of Applied Sciences, Campus Jülich, he was Acting Head of the Central Institute of Electronics at the Research Center Jülich (2005-2010). He is currently working in an international ultrafast ToF-PET project, to develop a new scanner generation based on heterostructure scintillation crystals for ultrahigh-timing resolution for PET. Since 2000 he has been a member of the Steering Committee of the Crystal Clear Collaboration and from 2018 also of the openGATE Collaboration. As BMBF-Delegate to CERN KT Forum on Medical Applications, he has been representing the interests of German industry and science at the large European research center CERN since 2018. He is the author of more than 40 publications in international journals.

Lecture:

Molecular Imaging with SPECT and PET

November 16th, 2023 at 9.00

Room 155/1 - Faculty of Engineering

Università Politecnica delle Marche, Ancona

Link for Remote Attending

Molecular imaging is an attractive technology that is widely used in clinical practice and greatly improves the understanding for the assessment of body functions and for the diagnosis and treatment of diseases. It is a multidisciplinary technique that defines in vivo characterization and qualification of biological processes at the molecular and cellular levels. Among all molecular imaging modalities, positron emission tomography (PET) and single photon emission computed tomography (SPECT) occupy a special position that can visualize and measure physiological processes in vivo using high-affinity and highly specific molecular radioactive tracers as imaging probes.

Physical aspects of SPECT and PET instrumentation and imaging are presented in detail. In recent years, new developments in detector technology and electronics have made it possible to complement PET imaging with time-of-flight (TOF) technology, resulting in significant improvements in patient imaging. Commercial hybrid TOF-PET scanners currently provide temporal resolution in coincidence detection of approximately 200 ps - 300 ps. With the goal of achieving temporal resolution in the range of 10 ps for TOF-PET, the implications for improved PET imaging will be presented using simulation results and initial functional samples as examples.The combination of a functional method (PET) with morphological imaging (CT or MRI) in one examination procedure offers further advantages in diagnostics that go far beyond corresponding images on the individual devices.

Organizers and local contacts:
Dr. Luigi Montalto: l.montalto@staff.univpm.it;
Prof. Daniele Rinaldi: d.rinaldi@staff.univpm.it
Prof. Lorenzo Scalise l.scalise@univpm.it

FH AACHEN
UNIVERSITY OF APPLIED SCIENCES