

## New Technologies for Time-of-Flight PET: Heterostructured Scintillators

*Wednesday 14 September 2022 16:45 (15 minutes)*

Fiammetta Pagano<sup>1,2</sup>, Nicolaus Kratochwil<sup>1</sup>, Matteo Salomoni<sup>1</sup>, Loris Martinazzoli<sup>1,2</sup>,  
Marco Paganoni<sup>2,1</sup>, Marco Pizzichemi<sup>1,2</sup>, Etienne Auffray<sup>1</sup>

<sup>1</sup> European Organization for Nuclear Research (CERN). Geneva, Switzerland

<sup>2</sup> University of Milano-Bicocca. Piazza dell'Ateneo Nuovo, 1, 20126 Milan, Italy

Time-of-Flight (TOF) Positron Emission Tomography (PET) uses the time difference between the two annihilation photons to improve the Signal-to-Noise-Ration (SNR) compared to standard PET. A 10ps full-width-half-maximum (FWHM) coincidence time resolution (CTR) would mean a huge improvement in the SNR and spatial resolution, with an uncertainty of only 1.5mm. A CTR of 10ps would also increase effective sensitivity, which means earlier diagnosis and reduced patient exposure time to ionizing radiation, making this diagnostic test also possible for pregnant women and children.

The aim of our KT/MA project is to develop TOF-PET modules toward 50ps time resolution based on heterostructure concept. Heterostructured scintillators rely on the combination of two materials with complementary properties (e.g., high stopping power and ultra-fast scintillation kinetics) to take advantage from both. In this talk, we show the validity of these approach and the investigation of the fundamental properties of these structures.

**Presenter:** PAGANO, Fiammetta ((Universita & INFN, Milano-Bicocca (IT) and CERN)