

APR13-2013-020107

Abstract for an Invited Paper
for the APR13 Meeting of
the American Physical Society

Novel Developments in Instrumentation for PET Imaging

JOEL KARP, University of Pennsylvania

Advances in medical imaging, in particular positron emission tomography (PET), have been based on technical developments in physics and instrumentation that have common foundations with detection systems used in other fields of physics. New detector materials are used in PET systems that maximize efficiency, timing characteristics and robustness, and which lead to improved image quality and quantitative accuracy for clinical imaging. Time of flight (TOF) techniques are now routinely used in commercial PET scanners that combine physiological imaging with anatomical imaging provided by x-ray computed tomography. Using new solid-state photo-sensors instead of traditional photo-multiplier tubes makes it possible to combine PET with magnetic resonance imaging which is a significant technical challenge, but one that is creating new opportunities for both research and clinical applications. An overview of recent advances in instrumentation, such as TOF and PET/MR will be presented, along with examples of imaging studies to demonstrate the impact on patient care and basic research of diseases.