

Stanford



Craig Levin

Professor of Radiology (Molecular Imaging Program at Stanford/Nuclear Medicine) and, by courtesy, of Physics, of Electrical Engineering and of Bioengineering
Radiology - Rad/Molecular Imaging Program at Stanford

 NIH Biosketch available Online

CONTACT INFORMATION

- **Alternate Contact**

Donna Niernberger - Administrative Associate

Email donnan52@stanford.edu

Tel 650-7360449

Bio

BIO

Professor Levin's research interests involve the development of novel instrumentation and software algorithms for in vivo imaging of molecular signatures of disease in humans and small laboratory animals. These new cameras efficiently image radiation emissions in the form of positrons, annihilation photons, gamma rays, and light from molecular probes developed to target molecular signals from deep within tissue of live subjects.

The goals of the instrumentation projects are to advance the sensitivity and spatial, spectral, and/or temporal resolutions. The algorithm goals are to understand the physical system comprising the subject tissues, radiation transport, and imaging system, and to provide the best available image quality and quantitative accuracy.

The work involves computer modeling, position sensitive sensors, readout electronics, data acquisition, image formation, image processing, and data/image analysis algorithms, and incorporating these innovations into practical imaging devices

The ultimate goal is to introduce these new imaging tools into studies of molecular mechanisms and new treatments of disease within living subjects.

ACADEMIC APPOINTMENTS

- Professor, Radiology - Rad/Molecular Imaging Program at Stanford
- Professor (By courtesy), Electrical Engineering
- Professor (By courtesy), Physics
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Stanford Cancer Institute

ADMINISTRATIVE APPOINTMENTS

- Co-Director, Stanford Center for Innovation in In Vivo Imaging, (2004- present)
- Chair of Faculty Search Committee, Department of Radiology, (2006-2007)
- Chair of Faculty Search Committee, Department of Radiology, (2007-2008)
- Chair of Faculty Search Committee, Department of Radiology, (2008-2009)
- Chair of Faculty Search Committee, Department of Radiology, (2009-2010)

HONORS AND AWARDS

- Phi Eta Sigma National Honors, University of California at Los Angeles (1981)
- Physics, Mathematics, and College Honors Programs, University of California at Los Angeles (1981-5)
- Stanford Linear Accelerator Center Undergraduate Fellowship, University of California at Los Angeles (1983)
- Phi Beta Kappa National Honors, University of California at Los Angeles (1984)
- Marilyn F. Lohr Award in Physics, University of California at Los Angeles (1984)
- E. Lee Kinsey Award in Physics, University of California at Los Angeles (1985)
- Sherwood Prize in Mathematics, University of California at Los Angeles (1985)
- B.S. Summa Cum Laude, University of California at Los Angeles (1985)
- Sigma Pi Sigma National Honors in Physics, University of California at Los Angeles (1985)
- Full Tuition and Research Fellowship, Yale University (1985-93)
- Bates Graduate Fellowship, Jonathan Edwards College, Yale University (1987-91)
- National Research Service Award, National Institutes of Health (1993-5)
- Pilot Research Award, Society of Nuclear Medicine (1996)

PROFESSIONAL EDUCATION

- Ph.D., Yale University , Physics (1993)
- M.Phil., Yale University , Physics (1987)
- M.S., Yale University , Physics (1987)
- B.S., UCLA , Physics and Mathematics (1985)

LINKS

- Molecular Imaging Instrumentation Laboratory: <http://miil.stanford.edu>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Molecular Imaging Instrumentation Laboratory

Our research interests involve the development of novel instrumentation and software algorithms for in vivo imaging of cellular and molecular signatures of disease in humans and small laboratory animal subjects. These new cameras efficiently image radiation emissions in the form of positrons, annihilation photons, gamma rays, and light from molecular probes developed to target molecular signals from deep within tissue of live subjects. The goals of the instrumentation projects are to push the sensitivity and spatial, spectral, and/or temporal resolutions as far as physically possible. The algorithm goals are to understand the physical system comprising the subject tissues, radiation transport, and imaging system, and to provide the best available image quality and quantitative accuracy. The work involves computer modeling, position sensitive sensors, readout electronics, data acquisition, image formation, image processing, and data/image analysis algorithms, and incorporating these innovations into practical imaging devices. The ultimate goal is to introduce these new imaging tools into studies of molecular mechanisms and treatments of disease within living subjects.

CLINICAL TRIALS

- Efficacy of Gamma Camera Used Intraoperatively for ID of Sentinel Lymph Nodes w/ Lymphoscintigraphy, Not Recruiting

Teaching

COURSES

2018-19

- Physics and Engineering Principles of Multi-modality Molecular Imaging of Living Subjects: BIOE 222, RAD 222 (Aut)
- Physics and Engineering of Radionuclide-based Medical Imaging: BIOE 221, RAD 221 (Win)

2017-18

- Instrumentation and Applications for Multi-modality Molecular Imaging of Living Subjects: BIOE 222, RAD 222 (Aut)
- Physics and Engineering of Radionuclide-based Medical Imaging: BIOE 221, RAD 221 (Win)

2016-17

- Instrumentation and Applications for Multi-modality Molecular Imaging of Living Subjects: BIOE 222, RAD 222 (Aut)
- Physics and Engineering of Radionuclide-based Medical Imaging: BIOE 221, RAD 221 (Win)
- Probes and Applications for Multi-modality Molecular Imaging of Living Subjects: BIOE 224, RAD 224 (Win)

2015-16

- Advanced Research Topics in Multi-modality Molecular Imaging of Living Subjects: BIOE 229, RAD 222C (Spr)
- Instrumentation and Applications for Multi-modality Molecular Imaging of Living Subjects: BIOE 222, RAD 222 (Aut)
- Physics and Engineering of Radionuclide Imaging: BIOE 221, RAD 221 (Win)
- Probes and Applications for Multi-modality Molecular Imaging of Living Subjects: BIOE 224, RAD 224 (Win)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Mina Esmaelpour, Andrea Gonzalez Montoro, Andrew Groll, Diana Jeong, Min Sun Lee, Zhengzhi Liu, Shirin Pourashraf

Doctoral Dissertation Advisor (AC)

Myungheon(Young) Chin

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)
- Biophysics (Phd Program)

Publications

PUBLICATIONS

- **Intercrystal scatter studies for a 1 mm³ resolution clinical PET system prototype.** *Physics in medicine and biology*
Hsu, D. F., Freese, D. L., Innes, D. R., Levin, C. S.
2019
- **Fast gamma-ray interaction-position estimation using k-d tree search.** *Physics in medicine and biology*
Li, X., Tao, L., Levin, C. S., Furenlid, L. R.
2019
- **Geometry optimization of electrically floating PET inserts for improved RF penetration for a 3T MRI system** *MEDICAL PHYSICS*
Akram, M., Levin, C. S., Obata, T., Hirumi, G., Yamaya, T.
2018; 45 (10): 4627–41
- **Performance evaluation of RF coils integrated with an RF-penetrable PET insert for simultaneous PET/MRI.** *Magnetic resonance in medicine*

- Lee, B. J., Watkins, R. D., Lee, K. S., Chang, C., Levin, C. S.
2018
- **MR Performance in the Presence of a Radio Frequency-Penetrable Positron Emission Tomography (PET) Insert for Simultaneous PET/MRI** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Lee, B. J., Grant, A. M., Chang, C., Watkins, R. D., Glover, G. H., Levin, C. S.
2018; 37 (9): 2060–69
 - **Performance Study of a Radio-Frequency Field-Penetrable PET Insert for Simultaneous PET/MRI** *IEEE TRANSACTIONS ON RADIATION AND PLASMA MEDICAL SCIENCES*
Chang, C., Lee, B. J., Grant, A. M., Groll, A. N., Levin, C. S.
2018; 2 (5): 422–31
 - **Improved single photon time resolution for analog SiPMs with front end readout that reduces influence of electronic noise.** *Physics in medicine and biology*
Cates, J. W., Gundacker, S., Auffray, E., Lecoq, P., Levin, C. S.
2018
 - **Evaluation of a clinical TOF-PET detector design that achieves #100 ps coincidence time resolution.** *Physics in medicine and biology*
Cates, J. W., Levin, C. S.
2018
 - **Gray: a ray tracing-based Monte Carlo simulator for PET** *PHYSICS IN MEDICINE AND BIOLOGY*
Freese, D. L., Olcott, P. D., Buss, S. R., Levin, C. S.
2018; 63 (10): 105019
 - **Design and Performance of a 1 mm(3) Resolution Clinical PET System Comprising 3-D Position Sensitive Scintillation Detectors** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Hsu, D. C., Freese, D. L., Reynolds, P. D., Innes, D. R., Levin, C. S.
2018; 37 (4): 1058–66
 - **Standard OSEM vs. regularized PET image reconstruction: qualitative and quantitative comparison using phantom data and various clinical radiopharmaceuticals** *AMERICAN JOURNAL OF NUCLEAR MEDICINE AND MOLECULAR IMAGING*
Lantos, J., Mitra, E. S., Levin, C. S., Iagaru, A.
2018; 8 (2): 110–18
 - **Ionizing radiation induces femtosecond time scale modulations of a material's optical properties**
Tao, L., Coffee, R., Levin, C. S., Grim, G. P., Furenlid, L. R., Barber, H. B.
SPIE-INT SOC OPTICAL ENGINEERING.2018
 - **Positioning true coincidences that undergo inter-and intra-crystal scatter for a sub-mm resolution cadmium zinc telluride-based PET system** *PHYSICS IN MEDICINE AND BIOLOGY*
Abbaszadeh, S., Chinn, G., Levin, C. S.
2018; 63 (2): 025012
 - **Clinical evaluation of TOF versus non-TOF on PET artifacts in simultaneous PET/MR: a dual centre experience.** *European journal of nuclear medicine and molecular imaging*
Ter Voert, E. E., Veit-Haibach, P., Ahn, S., Wiesinger, F., Khalighi, M. M., Levin, C. S., Iagaru, A. H., Zaharchuk, G., Huellner, M., Delso, G.
2017; 44 (7): 1223-1233
 - **Low eddy current RF shielding enclosure designs for 3T MR applications.** *Magnetic resonance in medicine*
Lee, B. J., Watkins, R. D., Chang, C., Levin, C. S.
2017
 - **Studies of a Next Generation Silicon-Photomultiplier-Based Time-of-Flight PET/CT System.** *Journal of nuclear medicine*
Hsu, D. F., Ilan, E., Peterson, W. T., Uribe, J., Lubberink, M., Levin, C. S.
2017
 - **Robust Timing Calibration for PET Using L1-Norm Minimization.** *IEEE transactions on medical imaging*
Freese, D., Hsu, D., Innes, D., Levin, C.
2017

- **Time-over-threshold for pulse shape discrimination in a time-of-flight phoswich PET detector** *PHYSICS IN MEDICINE AND BIOLOGY*
Chang, C., Cates, J. W., Levin, C. S.
2017; 62 (1): 258-271
- **New-generation small animal positron emission tomography system for molecular imaging.** *Journal of medical imaging (Bellingham, Wash.)*
Abbaszadeh, S., Levin, C. S.
2017; 4 (1): 011008-?
- **An Expectation Maximization Method for Joint Estimation of Emission Activity Distribution and Photon Attenuation Map in PET** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Mihlin, A., Levin, C. S.
2017; 36 (1): 214-224
- **Simultaneous PET/MR imaging with a radio frequency-penetrable PET insert.** *Medical physics*
Grant, A. M., Lee, B. J., Chang, C., Levin, C. S.
2017; 44 (1): 112-120
- **Study of material properties important for an optical property modulation-based radiation detection method for positron emission tomography.** *Journal of medical imaging (Bellingham, Wash.)*
Tao, L., Daghighian, H. M., Levin, C. S.
2017; 4 (1): 011010-?
- **Highly multiplexed signal readout for a time-of-flight positron emission tomography detector based on silicon photomultipliers.** *Journal of medical imaging (Bellingham, Wash.)*
Cates, J. W., Bieniosek, M. F., Levin, C. S.
2017; 4 (1): 011012-?
- **A multiplexed TOF and DOI capable PET detector using a binary position sensitive network.** *Physics in medicine and biology*
Bieniosek, M. F., CATES, J. W., Levin, C. S.
2016; 61 (21): 7639-7651
- **A promising new mechanism of ionizing radiation detection for positron emission tomography: modulation of optical properties.** *Physics in medicine and biology*
Tao, L., Daghighian, H. M., Levin, C. S.
2016; 61 (21): 7600-7622
- **Improvements in PET Image Quality in Time of Flight (TOF) Simultaneous PET/MRI.** *Molecular imaging and biology*
Minamimoto, R., Levin, C., Jamali, M., Holley, D., Barkhodari, A., Zaharchuk, G., Iagaru, A.
2016; 18 (5): 776-781
- **MR Performance Comparison of a PET/MR System Before and After SiPM-Based Time-of-Flight PET Detector Insertion** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Khalighi, M. M., Delso, G., Maramraju, S. H., Deller, T. W., Levin, C. S., Glover, G. H.
2016; 63 (5): 2419-2423
- **Characterization of a sub-assembly of 3D position sensitive cadmium zinc telluride detectors and electronics from a sub-millimeter resolution PET system.** *Physics in medicine and biology*
Abbaszadeh, S., Gu, Y., Reynolds, P. D., Levin, C. S.
2016; 61 (18): 6733-6753
- **An Expectation Maximization Method for Joint Estimation of Emission Activity Distribution and Photon Attenuation Map in PET.** *IEEE transactions on medical imaging*
Mihlin, A., Levin, C.
2016
- **Analog filtering methods improve leading edge timing performance of multiplexed SiPMs.** *Physics in medicine and biology*
Bieniosek, M. F., CATES, J. W., Grant, A. M., Levin, C. S.
2016; 61 (16): N427-40
- **Design Features and Mutual Compatibility Studies of the Time-of-Flight PET Capable GE SIGNA PET/MR System.** *IEEE transactions on medical imaging*
Levin, C. S., Maramraju, S. H., Khalighi, M. M., Deller, T. W., Delso, G., Jansen, F.

2016; 35 (8): 1907-1914

- **NEMA NU 2-2012 performance studies for the SiPM-based ToF-PET component of the GE SIGNA PET/MR system** *MEDICAL PHYSICS*
Grant, A. M., Deller, T. W., Khalighi, M. M., Maramraju, S. H., Delso, G., Levin, C. S.
2016; 43 (5)
- **Achieving fast timing performance with multiplexed SiPMs.** *Physics in medicine and biology*
Bieniosek, M. F., CATES, J. W., Levin, C. S.
2016; 61 (7): 2879-2892
- **Advances in coincidence time resolution for PET.** *Physics in medicine and biology*
Cates, J. W., Levin, C. S.
2016; 61 (6): 2255-2264
- **Breast-Dedicated Radionuclide Imaging Systems.** *Journal of nuclear medicine : official publication, Society of Nuclear Medicine*
Hsu, D. F., Freese, D. L., Levin, C. S.
2016; 57: 40S-5S
- **The potential of TOF PET-MRI for reducing artifacts in PET images.** *EJNMMI physics*
Iagaru, A., Minamimoto, R., Levin, C., Barkhodari, A., Jamali, M., Holley, D., Greg, Z.
2015; 2: A77-?
- **Successful demonstration of simultaneous PET/MR Imaging with a RF-penetrable PET insert.** *EJNMMI physics*
Lee, B., Grant, A., Chang, C., Glover, G., Levin, C.
2015; 2: A17-?
- **Programmable High Voltage Distribution for Photodetectors in a 1 mm Resolution Clinical PET System** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Lau, F. W., Vandenbroucke, A., Yeom, J., Reynolds, P. D., Hsu, D., Innes, D., Levin, C. S.
2015; 62 (5): 1989-1994
- **Technical Note: Characterization of custom 3D printed multimodality imaging phantoms.** *Medical physics*
Bieniosek, M. F., Lee, B. J., Levin, C. S.
2015; 42 (10): 5913-?
- **Performance characterization of compressed sensing positron emission tomography detectors and data acquisition system.** *Physics in medicine and biology*
Chang, C., Grant, A. M., Lee, B. J., Kim, E., Hong, K., Levin, C. S.
2015; 60 (16): 6407-6421
- **Optical delay encoding for fast timing and detector signal multiplexing in PET** *MEDICAL PHYSICS*
Grant, A. M., Levin, C. S.
2015; 42 (8): 4526-4535
- **Analytical calculation of the lower bound on timing resolution for PET scintillation detectors comprising high-aspect-ratio crystal elements** *PHYSICS IN MEDICINE AND BIOLOGY*
Cates, J. W., Vinke, R., Levin, C. S.
2015; 60 (13): 5141-5161
- **Direct conversion semiconductor detectors in positron emission tomography** *MODERN PHYSICS LETTERS A*
Cates, J. W., Gu, Y., Levin, C. S.
2015; 30 (14)
- **Analog electro-optical readout of SiPMs achieves fast timing required for time-of-flight PET/MR** *PHYSICS IN MEDICINE AND BIOLOGY*
Bieniosek, M. F., Levin, C. S.
2015; 60 (9): 3795-3806
- **Prototype positron emission tomography insert with electro-optical signal transmission for simultaneous operation with MRI** *PHYSICS IN MEDICINE AND BIOLOGY*
Olcott, P., Kim, E., Hong, K., Lee, B. J., Grant, A. M., Chang, C., Glover, G., Levin, C. S.
2015; 60 (9): 3459-3478
- **Electrical delay line multiplexing for pulsed mode radiation detectors** *PHYSICS IN MEDICINE AND BIOLOGY*

- Vinke, R., Yeom, J. Y., Levin, C. S.
2015; 60 (7): 2785-2802
- **Simultaneous Whole-Body Time-of-Flight F-18-FDG PET/MRI A Pilot Study Comparing SUVmax With PET/CT and Assessment of MR Image Quality** *CLINICAL NUCLEAR MEDICINE*
Iagaru, A., Mitra, E., Minamimoto, R., Jamali, M., Levin, C., Quon, A., Gold, G., Herfkens, R., Vasawala, S., Gambhir, S. S., Zaharchuk, G.
2015; 14 (1): 1-8
 - **Simultaneous whole-body time-of-flight 18F-FDG PET/MRI: a pilot study comparing SUVmax with PET/CT and assessment of MR image quality.** *Clinical nuclear medicine*
Iagaru, A., Mitra, E., Minamimoto, R., Jamali, M., Levin, C., Quon, A., Gold, G., Herfkens, R., Vasawala, S., Gambhir, S. S., Zaharchuk, G.
2015; 40 (1): 1-8
 - **Thermal regulation of tightly packed solid-state photodetectors in a 1 mm(3) resolution clinical PET system.** *Medical physics*
Freese, D. L., Vandenbroucke, A., Innes, D., Lau, F. W., Hsu, D. F., Reynolds, P. D., Levin, C. S.
2015; 42 (1): 305-?
 - **Side readout of long scintillation crystal elements with digital SiPM for TOF-DOI PET** *MEDICAL PHYSICS*
Yeom, J. Y., Vinke, R., Levin, C. S.
2014; 41 (12)
 - **The lower timing resolution bound for scintillators with non-negligible optical photon transport time in time-of-flight PET** *PHYSICS IN MEDICINE AND BIOLOGY*
Vinke, R., Olcott, P. D., Cates, J. W., Levin, C. S.
2014; 59 (20): 6215-6229
 - **The lower timing resolution bound for scintillators with non-negligible optical photon transport time in time-of-flight PET.** *Physics in medicine and biology*
Vinke, R., Olcott, P. D., Cates, J. W., Levin, C. S.
2014; 59 (20): 6215-6229
 - **Thermal regulation for APDs in a 1 mm(3) resolution clinical PET camera: design, simulation and experimental verification** *PHYSICS IN MEDICINE AND BIOLOGY*
Zhai, J., Vandenbroucke, A., Levin, C. S.
2014; 59 (14): 3951-3967
 - **Thermal regulation for APDs in a 1?mm(3) resolution clinical PET camera: design, simulation and experimental verification.** *Physics in medicine and biology*
Zhai, J., Vandenbroucke, A., Levin, C. S.
2014; 59 (14): 3951-3967
 - **A new dual threshold time-over-threshold circuit for fast timing in PET** *PHYSICS IN MEDICINE AND BIOLOGY*
Grant, A. M., Levin, C. S.
2014; 59 (13): 3421-3430
 - **Analog electro-optical readout of SiPMs for compact, low power ToF PET/MRI.** *EJNMMI physics*
Bieniosek, M. F., Levin, C. S.
2014; 1: A12-?
 - **Performance of a high sensitivity time-of-flight PET ring operating simultaneously within a 3T MR system.** *EJNMMI physics*
Levin, C. S., Jansen, F., Deller, T., Maramraju, S. H., Grant, A., Iagaru, A.
2014; 1: A72-?
 - **RF-Penetrable PET insert for simultaneous PET/MR imaging.** *EJNMMI physics*
Lee, B. J., Grant, A. M., Chang, C., Levin, C. S.
2014; 1: A5-?
 - **A method to achieve spatial linearity and uniform resolution at the edges of monolithic scintillation crystal detectors** *PHYSICS IN MEDICINE AND BIOLOGY*
Vinke, R., Levin, C. S.
2014; 59 (12): 2975-2995

- **Study of electrode pattern design for a CZT-based PET detector** *PHYSICS IN MEDICINE AND BIOLOGY*
Gu, Y., Levin, C. S.
2014; 59 (11): 2599-2621
- **Clinical evaluation of a novel intraoperative handheld gamma camera for sentinel lymph node biopsy.** *Physica medica*
Olcott, P., Pratz, G., Johnson, D., Mitra, E., Niederkohr, R., Levin, C. S.
2014; 30 (3): 340-345
- **Development of an Ultrahigh Resolution Block Detector Based on 0.4 mm Pixel Ce:GAGG Scintillators and a Silicon Photomultiplier Array** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Yamamoto, S., Yeom, J. Y., Kamada, K., Endo, T., Levin, C. S.
2013; 60 (6): 4582-4587
- **Readout strategy of an electro-optical coupled PET detector for time-of-flight PET/MRI** *PHYSICS IN MEDICINE AND BIOLOGY*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
2013; 58 (20): 7227-7238
- **Readout strategy of an electro-optical coupled PET detector for time-of-flight PET/MRI.** *Physics in medicine and biology*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
2013; 58 (20): 7227-7238
- **Readout Electronics and Data Acquisition of a Positron Emission Tomography Time-of-Flight Detector Module With Waveform Digitizer** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Yeom, J. Y., Vinke, R., Spanoudaki, V. C., Hong, K. J., Levin, C. S.
2013; 60 (5): 3735-3741
- **Trends of Data Path Topologies for Data Acquisition Systems in Positron Emission Tomography** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Kim, E., Hong, K. J., Yeom, J. Y., Olcott, P. D., Levin, C. S.
2013; 60 (5): 3746-3757
- **Cross-Strip Multiplexed Electro-Optical Coupled Scintillation Detector for Integrated PET/MRI** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Olcott, P. D., Glover, G., Levin, C. S.
2013; 60 (5): 3198-3204
- **Compact pulse width modulation circuitry for silicon photomultiplier readout.** *Physics in medicine and biology*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
2013; 58 (15): 5049-5059
- **Compact pulse width modulation circuitry for silicon photomultiplier readout** *PHYSICS IN MEDICINE AND BIOLOGY*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
2013; 58 (15)
- **Single-photon sampling architecture for solid-state imaging sensors** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Van Den Berg, E., Candes, E., Chinn, G., Levin, C., Olcott, P. D., Sing-Long, C.
2013; 110 (30): E2752-E2761
- **Fast Timing Silicon Photomultipliers for Scintillation Detectors** *IEEE PHOTONICS TECHNOLOGY LETTERS*
Yeom, J. Y., Vinke, R., Pavlov, N., Bellis, S., Wall, L., O'Neill, K., Jackson, C., Levin, C. S.
2013; 25 (14): 1309-1312
- **Sparse Signal Recovery Methods for Multiplexing PET Detector Readout** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Chinn, G., Olcott, P. D., Levin, C. S.
2013; 32 (5): 932-942
- **Distributed MLEM: An Iterative Tomographic Image Reconstruction Algorithm for Distributed Memory Architectures** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Cui, J., Pratz, G., Meng, B., Levin, C. S.
2013; 32 (5): 957-967

- **First Performance Results of Ce:GAGG Scintillation Crystals With Silicon Photomultipliers** *Symposium on Radiation Measurements and Applications (SORMA)*
Yeom, J. Y., Yamamoto, S., Derenzo, S. E., Spanoudaki, V. C., Kamada, K., Endo, T., Levin, C. S.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.2013: 988–92
- **Optimizing timing performance of silicon photomultiplier-based scintillation detectors** *PHYSICS IN MEDICINE AND BIOLOGY*
Yeom, J. Y., Vinke, R., Levin, C. S.
2013; 58 (4): 1207-1220
- **In situ study of the impact of inter- and intra-reader variability on region of interest (ROI) analysis in preclinical molecular imaging.** *American journal of nuclear medicine and molecular imaging*
Habte, F., Budhiraja, S., Keren, S., Doyle, T. C., Levin, C. S., Paik, D. S.
2013; 3 (2): 175-181
- **An MLEM Method for Joint Tissue Activity Distribution and Photon Attenuation Map Reconstruction in PET** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Mihlin, A., Levin, C. S.
IEEE.2013
- **A 16-Channel FPGA-Based Time-to-Digital Converter for Pulse Width Modulation Circuitry for Silicon Photomultiplier Readout** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Hong, K. J., Bieniosek, M. F., Kim, E., Levin, C. S.
IEEE.2013
- **Novel Photon-Counting Energy-Resolving Ultra-Fast X-Ray Detector** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Ertosun, M. G., Levin, C. S.
IEEE.2013
- **Scintillation Crystal Side-Readout with SiPMs for Improved Time Resolution** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Bieniosek, M. F., Yeom, J. Y., Alvarez, L. C., Levin, C. S.
IEEE.2013
- **Optical Encoding and Multiplexing of Detector Signals with Dual Threshold Time-over-Threshold** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Grant, A. M., Levin, C. S.
IEEE.2013
- **Studies of Electromagnetic Interference of PET Detector Insert for Simultaneous PET/MRI** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Lee, B. J., Olcott, P. D., Hong, K. J., Grant, A. M., Chang, C., Levin, C. S.
IEEE.2013
- **Electrical delay line multiplexing for pulsed mode radiation detectors** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Vinke, R., Yeom, J. Y., Levin, C. S.
IEEE.2013
- **First measurements of a 512 PSAPD prototype of a sub-mm resolution clinical PET camera** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Vandenbroucke, A., Reynolds, P. D., Lau, F. W., INNES, D. R., Freese, D. L., Hsu, D. F., Levin, C. S.
IEEE.2013
- **Characterization of PET Data Acquisition System with Compressed Sensing Detectors** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Chang, C., Olcott, P. D., Hong, K. J., Grant, A. M., Lee, B. J., Kim, E., Levin, C. S.
IEEE.2013
- **General spatial distortion correction method for solid-state position sensitive detectors in PET** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*

-
- Cui, S., Vandenbroucke, A., Bieniosek, M., Levin, C. S.
IEEE.2013
- **A Pulse Width Modulation Readout Method for Densely Packed Solid State Photodetectors** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Bieniosek, M. F., Hong, K. J., Levin, C. S.
IEEE.2013
 - **3D Printing for Cost-Effective, Customized, Reusable Multi-Modality Imaging Phantoms** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Bieniosek, M. F., Lee, B. J., Levin, C. S.
IEEE.2013
 - **Analyzing the Stability of 256 APDs Through Leakage Current and Temperature Monitoring in a 1 mm(3) Resolution Clinical PET System** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Freese, D. L., Vandenbroucke, A., Innes, D., Lau, F. W., Hsu, D. F., Reynolds, P. D., Levin, C. S.
IEEE.2013
 - **Comparison of End/Side Scintillator Readout with Digital-SiPM for ToF PET** *60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Yeom, J. Y., Vinke, R., Bieniosek, M. F., Levin, C. S.
IEEE.2013
 - **Signal Conditioning Technique for Position Sensitive Photodetectors to Manipulate Pixelated Crystal Identification Capabilities** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Lau, F. W., Vandenbroucke, A., Reynolds, P., Ho, H., Innes, D., Levin, C. S.
2012; 59 (5): 1815-1822
 - **Influence of temperature and bias voltage on the performance of a high resolution PET detector built with position sensitive avalanche photodiodes** *JOURNAL OF INSTRUMENTATION*
Vandenbroucke, A., McLaughlin, T. J., Levin, C. S.
2012; 7
 - **Study of PET intrinsic spatial resolution and contrast recovery improvement for PET/MRI systems** *PHYSICS IN MEDICINE AND BIOLOGY*
Peng, H., Levin, C. S.
2012; 57 (9)
 - **Promising New Photon Detection Concepts for High-Resolution Clinical and Preclinical PET** *JOURNAL OF NUCLEAR MEDICINE*
Levin, C. S.
2012; 53 (2): 167-170
 - **The Trend of Data Path Structures for Data Acquisition Systems in Positron Emission Tomography** *18th IEEE-NPSS Real Time Conference (RT)*
Kim, E., Hong, K. J., Yeom, J. Y., Olcott, P. D., Levin, C. S.
IEEE.2012
 - **Characterization of Detector Layers from a 1 mm(3) Resolution Clinical PET System** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Reynolds, P. D., Lau, F. W., Vandenbroucke, A., Innes, D., Yoruk, U., Levin, C. S.
IEEE.2012: 3804–3807
 - **Performance of Fast Timing Silicon Photomultipliers for Scintillation Detectors** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Yeom, J., Vinke, R., Pavlov, N., Bellis, S., O'Neill, K., Jackson, C., Levin, C. S.
IEEE.2012: 2845–2847
 - **Characterization of Inter-detector Effects in a 3-D Position-Sensitive Dual-CZT Detector Modules for PET** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Gu, Y., Levin, C. S.
IEEE.2012: 4088–4090
-

- **Optimizing Timing Performance of Silicon Photomultiplier Based Scintillation Detectors** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Yeom, J., Vinke, R., Levin, C. S.
IEEE.2012: 3119–3121
- **Timing Performance Comparison of P-on-N and N-on-P Silicon Photomultipliers** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Vinke, R., Yeom, J. Y., Mazzillo, M., Sanfilippo, D., Piana, A., Levin, C. S.
IEEE.2012: 2128–2130
- **Improved Compressed Sensing Multiplexing for PET Detector Readout** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Chinn, G., Olcott, P. D., Levin, C. S.
IEEE.2012: 2472–2474
- **PET DAQ System for Compressed Sensing Detector Modules** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Kim, E., Hong, K. J., Olcott, P. D., Levin, C. S.
IEEE.2012: 2798–2801
- **FPGA-based Time-to-Digital Converter for Time-of-Flight PET Detector** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Hong, K. J., Kim, E., Yeom, J. Y., Olcott, P. D., Levin, C. S.
IEEE.2012: 2463–2465
- **Design and Implementation of Scalable DAQ Software for a High-Resolution PET Camera** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Yoruk, U., Vandenbroucke, A., Reynolds, P. D., Levin, C. S.
IEEE.2012: 2537–2539
- **A cost-effective modular programmable HV distribution system for photodetectors** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Lau, F. W., Yeom, J. Y., Vandenbroucke, A., Reynolds, P. D., Innes, D., Levin, C. S.
IEEE.2012: 3504–3506
- **A Method to Achieve Spatial Linearity and Uniform Resolution at the Edges of Monolithic Scintillation Crystal Detectors for PET** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Vinke, R., Olcott, P. D., Yearn, J. Y., Levin, C. S.
IEEE.2012: 2270–2273
- **GPU-Enabled PET Motion Compensation Using Sparse and Low-Rank Decomposition** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Cui, J., Yang, J., Graves, E., Levin, C. S.
IEEE.2012: 3367–3370
- **Strategies to Achieve More Compact Pulse Width Modulation Circuitry for Silicon Photomultiplier Readout** *IEEE Nuclear Science Symposium / Medical Imaging Conference Record (NSS/MIC) / 19th Room-Temperature Semiconductor X-ray and Gamma-ray Detector Workshop*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
IEEE.2012: 3812–3814
- **Readout Electronics and Data Acquisition of a Time of Flight Detector for Positron Emission Tomography** *18th IEEE-NPSS Real Time Conference (RT)*
Yeom, J. Y., Vinke, R., Spanoudaki, V., Hong, K. J., Levin, C. S.
IEEE.2012
- **Fully 3D list-mode time-of-flight PET image reconstruction on GPUs using CUDA** *MEDICAL PHYSICS*
Cui, J., Prax, G., Prevrhal, S., Levin, C. S.
2011; 38 (12): 6775-6786
- **Online detector response calculations for high-resolution PET image reconstruction** *PHYSICS IN MEDICINE AND BIOLOGY*
Prax, G., Levin, C.
2011; 56 (13): 4023-4040

- **A Maximum NEC Criterion for Compton Collimation to Accurately Identify True Coincidences in PET** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Chinn, G., Levin, C. S.
2011; 30 (7): 1341-1352
- **Investigation of a clinical PET detector module design that employs large-area avalanche photodetectors** *PHYSICS IN MEDICINE AND BIOLOGY*
Peng, H., Olcott, P. D., Spanoudaki, V., Levin, C. S.
2011; 56 (12): 3603-3627
- **Study of a high-resolution, 3D positioning cadmium zinc telluride detector for PET** *PHYSICS IN MEDICINE AND BIOLOGY*
Gu, Y., Matteson, J. L., Skelton, R. T., Deal, A. C., Stephan, E. A., Duttweiler, F., Gasaway, T. M., Levin, C. S.
2011; 56 (6): 1563-1584
- **Investigating the temporal resolution limits of scintillation detection from pixellated elements: comparison between experiment and simulation** *PHYSICS IN MEDICINE AND BIOLOGY*
Spanoudaki, V. C., Levin, C. S.
2011; 56 (3): 735-756
- **Convex Optimization of Coincidence Time Resolution for a High-Resolution PET System** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
Reynolds, P. D., Olcott, P. D., Pratz, G., Lau, F. W., Levin, C. S.
2011; 30 (2): 391-400
- **Fast List-Mode Reconstruction for Time-of-Flight PET Using Graphics Hardware** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Pratz, G., Surti, S., Levin, C.
2011; 58 (1): 105-109
- **Scintillation induced response in passively-quenched Si-based single photon counting avalanche diode arrays** *OPTICS EXPRESS*
Spanoudaki, V. C., Levin, C. S.
2011; 19 (2): 1665-1679
- **All-optical encoding of PET detector signals** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Grant, A. M., Olcott, P. D., Levin, C. S.
IEEE.2011: 2258–2260
- **Fast and Accurate 3D Compton Cone Projections on GPU Using CUDA** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Cui, J., Chinn, G., Levin, C. S.
IEEE.2011: 2572–2575
- **Silicon Photomultiplier-based Detector Array for TOF PET** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Yeom, J. Y., Spanoudaki, V., Levin, C. S.
IEEE.2011: 2415–2417
- **Energy and Time Characterization of Silicon Photomultiplier Detector Blocks** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Sanjani, S. S., Taghibakhsh, F., Levin, C. S.
IEEE.2011: 3045–3047
- **A New Data Path Design for a PET Data Acquisition System: A Packet Based Approach** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Kim, E., Olcott, P., Levin, C.
IEEE.2011: 3871–3873
- **Functionality Test of a Readout Circuit for a 1mm(3) Resolution Clinical PET System** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Zhai, J., Vandenbroucke, A., Reynolds, P. D., Levin, C. S.
IEEE.2011: 3945–3949
- **Measuring 511 ke V photon interaction locations in three dimensions using 3-D position sensitive scintillation detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*

- Vandenbroucke, A., Lau, F. W., Reynolds, P. O., Levin, C. S.
IEEE.2011: 3635–3638
- **Study of Readout for Groups of Position Sensitive Avalanche Photodiodes Used in a 1 mm(3) Resolution Clinical PET System** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Reynolds, P. D., Lau, F. W., Vandenbroucke, A., Levin, C. S.
IEEE.2011: 3253–3255
 - **Signal Conditioning Technique for Position Sensitive Photo detectors to Manipulate Pixelated Crystal Identification Capabilities** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Lau, F. W., Vandenbroucke, A., Reynolds, P., Ho, H., Innes, D., Levin, C. S.
IEEE.2011: 1647–1653
 - **Measurement-Based Spatially-Varying Point Spread Function for List-Mode PET Reconstruction on GPU** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Cui, J., Pratz, G., Prevrhal, S., Zhang, B., Shao, L., Levin, C. S.
IEEE.2011: 2593–2596
 - **Point Spread Function for PET Detectors Based on the Probability Density Function of the Line Segment** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Gonzalez, E., Cui, J., Pratz, G., Bieniosek, M., Olcott, P. D., Levin, C. S.
IEEE.2011: 4386–4389
 - **Methods for Increasing the Sensitivity of Simultaneous Multi-Isotope Positron Emission Tomography** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Gonzalez, E., Olcott, P. D., Bieniosek, M., Levin, C. S.
IEEE.2011: 3597–3601
 - **Algorithms that exploit multi-interaction photon events in sub-millimeter resolution CZT detectors for PET** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Chinn, G., Levin, C. S.
IEEE.2011: 3669–3671
 - **Time Resolution Performance of an Electro-Optical-Coupled PET Detector for Time-of-Flight PET/MRI** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Bieniosek, M. F., Olcott, P. D., Levin, C. S.
IEEE.2011: 2531–2533
 - **Compressed Sensing for the multiplexing of PET detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)/18th International Workshop on Room-Temperature Semiconductor X-Ray and Gamma-Ray Detectors*
Olcott, P. D., Chinn, G., Levin, C. S.
IEEE.2011: 3224–3226
 - **Analog signal multiplexing for PSAPD-based PET detectors: simulation and experimental validation** *PHYSICS IN MEDICINE AND BIOLOGY*
Lau, F. W., Vandenbroucke, A., Reynolds, P. D., Olcott, P. D., Horowitz, M. A., Levin, C. S.
2010; 55 (23): 7149-7174
 - **Physical effects of mechanical design parameters on photon sensitivity and spatial resolution performance of a breast-dedicated PET system** *MEDICAL PHYSICS*
Spanoudaki, V. C., Lau, F. W., Vandenbroucke, A., Levin, C. S.
2010; 37 (11): 5838-5849
 - **Photo-Detectors for Time of Flight Positron Emission Tomography (ToF-PET)** *SENSORS*
Spanoudaki, V. C., Levin, C. S.
2010; 10 (11): 10484-10505
 - **Performance characterization of a new high resolution PET scintillation detector** *PHYSICS IN MEDICINE AND BIOLOGY*
Vandenbroucke, A., Foudray, A. M., Olcott, P. D., Levin, C. S.
2010; 55 (19): 5895-5911
 - **Effects of multiple-interaction photon events in a high-resolution PET system that uses 3-D positioning detectors** *MEDICAL PHYSICS*

-
- Gu, Y., Pratz, G., Lau, F. W., Levin, C. S.
2010; 37 (10): 5494-5508
- **Recent Developments in PET Instrumentation** *CURRENT PHARMACEUTICAL BIOTECHNOLOGY*
Peng, H., Levin, C. S.
2010; 11 (6): 555-571
 - **Design study of a high-resolution breast-dedicated PET system built from cadmium zinc telluride detectors** *PHYSICS IN MEDICINE AND BIOLOGY*
Peng, H., Levin, C. S.
2010; 55 (9): 2761-2788
 - **Effects of External Shielding on the Performance of a 1 mm(3) Resolution Breast PET Camera** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Vandenbroucke, A., Innes, D., Levin, C. S.
IEEE.2010: 3644-3648
 - **Analytic Pulse Height Correction in Dual-Ended Readout PET Detectors** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Taghibakhsh, F., Levin, C. S., Rowlands, J. A.
IEEE.2010: 2151-2154
 - **Optical Network-based PET DAQ System: One Fiber Optical Connection** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Kim, E., Olcott, P., Levin, C.
IEEE.2010: 2020-2025
 - **Fully 3-D List-mode Positron Emission Tomography Image Reconstruction on GPU using CUDA** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Cui, J., Pratz, G., Prevrhal, S., Shao, L., Levin, C. S.
IEEE.2010: 2635-2637
 - **Readout Design and Validation for a 1 mm(3) Resolution Clinical PET System** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Reynolds, P. D., Lau, F. W., Vandenbroucke, A., Levin, C. S.
IEEE.2010: 3097-3099
 - **Improving SNR with a Maximum Likelihood Compressed Sensing Decoder for Multiplexed PET Detectors** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Chinn, G., Olcott, P. D., Levin, C. S.
IEEE.2010: 3353-3356
 - **Mixture Model for Fast Estimation of Positron Range** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Olcott, P. D., Gonzalez, E., Vandenbroucke, A., Levin, C. S.
IEEE.2010: 3058-3060
 - **Acceleration of PET Monte Carlo simulation using the graphics hardware ray-tracing engine** *IEEE Nuclear Science Symposium (NSS)/Medical Imaging Conference (MIC)/17th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors*
Wang, Z., Olcott, P. D., Levin, C. S.
IEEE.2010: 1848-1855
 - **Novel Electro-Optical Coupling Technique for Magnetic Resonance-Compatible Positron Emission Tomography Detectors** *MOLECULAR IMAGING*
Olcott, P. D., Peng, H., Levin, C. S.
2009; 8 (2): 74-86
 - **Bayesian reconstruction of photon interaction sequences for high-resolution PET detectors.** *Physics in Medicine and Biology. Selected as Feature Article of the Month, American Institute of Physics, August*
Pratz, G., Levin, CS.
2009; Vol. 54 (Issue 17.): pp. 5073-5094,
 - **1 mm(3) Resolution Breast-Dedicated PET System** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
-

Lau, F. W., Fang, C., Reynolds, P. D., Olcott, P. D., Vandenbroucke, A., Spanoudaki, V. C., Olutade, F., Horowitz, M. A., Levin, C. S.
IEEE.2009: 5378–5381

- **Front-End Electronics for a 1 mm(3) Resolution Avalanche Photodiode-Based PET System with Analog Signal Multiplexing** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Lau, F. W., Vandenbroucke, A., Reynolds, P. D., Olcott, P. D., Horowitz, M. A., Levin, C. S.
IEEE.2009: 3146–3149
- **Study of a High Resolution, 3-D Positioning Cross-Strip Cadmium Zinc Telluride Detector for PET** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Gu, Y., Matteson, J. L., Skelton, R. T., Deal, A. C., Stephan, E. A., Duttweiler, F., Gasaway, T. M., Levin, C. S.
IEEE.2009: 2871–2878
- **Effects of Multiple Photon Interactions in a High Resolution PET System that Uses 3-D Positioning Detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Gu, Y., Prax, G., Lau, F. W., Levin, C. S.
IEEE.2009: 3089–3094
- **Effects of Thermal Regulation Structures on the Photon Sensitivity and Spatial Resolution of a 1 mm(3) Resolution Breast-Dedicated PET System** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Spanoudaki, V. C., Vandenbroucke, A., Lau, F. W., Fang, C., Levin, C. S.
IEEE.2009: 5416–5420
- **Performance characterization of a new high resolution PET scintillation detector** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Vandenbroucke, A., Foudray, A. M., Lau, F. W., Olcott, P. D., Reynolds, P. D., Levin, C. S.
IEEE.2009: 2879–2883
- **Can large-area avalanche photodiodes be used for a clinical PET/MRI block detector?** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Peng, H., Olcott, P. D., Spanoudaki, V., Levin, C. S.
IEEE.2009: 3948–3953
- **Convex Optimization of Coincidence Time Resolution for High Resolution PET Systems** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Reynolds, P. D., Olcott, P. D., Prax, G., Lau, F. W., Levin, C. S.
IEEE.2009: 3343–3348
- **Pulse Width Modulation: a Novel Readout Scheme for High Energy Photon Detection** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Olcott, P. D., Levin, C. S.
IEEE.2009: 3804–3809
- **Novel Electro-Optically Coupled MR-Compatible PET Detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Olcott, P. D., Peng, H., Levin, C. S.
IEEE.2009: 3913–3918
- **Charge Collection Studies of a High Resolution CZT-Based Detector for PET** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Matteson, J. L., Gu, Y., Skelton, R. T., Deal, A. C., Stephan, E. A., Duttweiler, F., Huszar, G. L., Gasaway, T. M., Levin, C. S.
IEEE.2009: 5310–5317
- **Optimization of Coincidence Time Resolution for a High Resolution PET System.** *Submitted to IEEE Transactions on Medical Imaging*
P.D. Reynolds, P.D. Olcott, G. Prax, F.W.Y. Lau, C.S. Levin.
2009
- **Design study of a high-resolution breast-dedicated PET system built from cadmium zinc telluride detectors.** *Submitted to Physics in Medicine Biology*
H. Peng, P.D. Olcott, C.S. Levin.
2009
- **New Geometry for a Whole Body PET System.** *Submitted to IEEE Transactions on Nuclear Science,*
F. Habte, G. Prax, P.D. Olcott, C.S. Levin.
2009
- **Monte Carlo assessment of a dense mechanical design for a 1 mm³ resolution breast-dedicated PET system: effects on photon sensitivity, spatial resolution and multi-interaction photon events.** *Submitted to Medical Physics*

- V.C. Spanoudaki,, F.W.Y. Lau, A. Vandenbroucke, C.S. Levin.
2009
- **Study of a High Resolution, 3-D Positioning Cross-Strip Cadmium Zinc Telluride Detector for PET.** *Submitted to Medical Physics*
Y. Gu,, J. L. Matteson, R.T. Skelton, A.C. Deal, E.A. Stephan, F. Duttweiler, T. M. Gasaway, C.S. Levin.
2009
 - **Sampling Error in CT-based Partial Volume Correction of Lesions Imaged by PET.** *Submitted to Journal of Nuclear Medicine*
D. M. Sigg,, C.S. Levin, A. Quon.
2009
 - **High Resolution, Light Multiplexed 3D Positioning Scintillation Detector for High Resolution PET.** *Submitted to IEEE Transactions on Nuclear Science*
F. Habte,, P.D. Olcott, C.S. Levin.
2009
 - **Can large-area avalanche photodiodes be used for a PET detector insert for an MRI system?** *Submitted to Medical Physics*
H. Peng,, P.D. Olcott, V. Spanoudaki, C.S. Levin.
2009
 - **A Method to Reject Random Coincidences and Extract True from Multiple Coincidences in PET using 3-D Detectors** *IEEE Nuclear Science Symposium/ Medical Imaging Conference*
Chinn, G., Levin, C. S.
IEEE.2009: 4515–4520
 - **Temperature and Bias Voltage Studies of a Large Area Position Sensitive Avalanche Photodiode** *IEEE Nuclear Science Symposium Conference 2009*
Vandenbroucke, A., Lee, J., Spanoudaki, V., Lau, F. W., Reynolds, P. D., Levin, C. S.
IEEE.2009: 3664–3669
 - **Faster Maximum-Likelihood Reconstruction via Explicit Conjugation of Search Directions** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Pratx, G., Reader, A. J., Levin, C. S.
IEEE.2009: 4336–4341
 - **Study of Scintillation Crystal Array Parameters for an Advanced PET Scanner Dedicated to Breast Cancer Imaging** *IEEE Nuclear Science Symposium/ Medical Imaging Conference*
Vandenbroucke, A., Levin, C. S.
IEEE.2009: 4180–4185
 - **Performance characterization of a new high resolution PET scintillation detector.** *Submitted to Physics in Medicine and Biology*
A. Vandenbroucke,, A.M.K. Foudray, P.D. Olcott, C.S. Levin.
2009
 - **Fast, Accurate and Shift-Varying Line Projections for Iterative Reconstruction Using the GPU.** *IEEE Transactions in Medical Imaging, March*
G. Pratx,, P.D. Olcott, G. Chinn, C.S. Levin.
2009; Vol. 28, (No. 3.): 435-445
 - **Online calculation of the detector response for high-resolution PET iterative image reconstruction.** *Submitted to IEEE Transactions on Medical Imaging*
G. Pratx,, C.S. Levin.
2009
 - **Multiplexing circuits for PSAPD-Based PET Detectors: Simulation and Experimental Validation.** *Submitted to IEEE Transactions on Nuclear Science*
F.W.Y. Lau,, A. Vandenbroucke, P.D. Reynolds, P.D. Olcott, M.A. Horowitz, C.S. Levin.
2009
 - **Simulation study of PET spatial resolution and contrast recovery improvement for PET/MRI dual modality systems.** *Submitted to Medical Physics*
H. Peng, C.S. Levin, B.A. Chronik.
2009
 - **Maximum NEC Incident Photon Direction Window Using Compton Kinematics for 3-D Positioning PET Detectors.** *Submitted to IEEE Transactions on Medical Imaging*
G. Chinn,, C.S. Levin.
2009

- **Novel Electro-Optical Coupling Technique for Magnetic Resonance-Compatible Positron Emission Tomography Detectors.** *Molecular Imaging, MAR-APR*
P.D. Olcott, H. Peng, C.S. Levin.
2009; Volume 8, (Issue 2,): 74-86,
- **New geometry for a whole body PET system.** *Submitted to IEEE Transactions on Nuclear Science*
F. Habte,, G. Pratz, P. Olcott, C.S Levin.
2009
- **New imaging technologies to enhance the molecular sensitivity of positron emission tomography** *PROCEEDINGS OF THE IEEE*
Levin, C. S.
2008; 96 (3): 439-467
- **Characterization of a Small Animal Time-Domain Fluorescence Tomography Imaging System.,** *IEEE Transactions on Medical Imaging. Jan.*
S. Keren, O. Gheysens, C.S. Levin, S.S. Gambhir.
2008; Volume 27 (Issue 1,): Page(s):58 - 63.
- **New Imaging Technologies to Enhance the Molecular Sensitivity of Positron Emission Tomography.** *Proceedings of the IEEE, March*
C.S. Levin.
2008; Vol.96, (No.3,): pp. 439-67.
- **Simulation and Measurement of Gamma-Ray and Annihilation Photon Imaging Detectors.** *IEEE Transactions on Nuclear Science.*
F. Habte,, P.D. Olcott, A.M.K. Foudray, C.S. Levin, J. Zhang, G. Chinn.
2008: Undergoing review,
- **Performance characterization of a miniature, high sensitivity gamma ray camera** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Olcott, P. D., Habte, F., Foudray, A. M., Levin, C. S.
2007; 54 (5): 1492-1497
- **Effects of system geometry and other physical factors on photon sensitivity of high-resolution positron emission tomography** *PHYSICS IN MEDICINE AND BIOLOGY*
Habte, F., Foudray, A. M., Olcott, P. D., Levin, C. S.
2007; 52 (13): 3753-3772
- **A new positioning algorithm for position-sensitive avalanche photodiodes** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Zhang, J., Olcott, P. D., Levin, C. S.
2007; 54 (3): 433-437
- **Performance characterization of a novel thin position-sensitive avalanche photodiode for 1 mm resolution positron emission tomography** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Zhang, J., Foudray, A. M., Cott, P. D., Farrell, R., Shah, K., Levin, C. S.
2007; 54 (3): 415-421
- **Study of the performance of a novel 1 mm resolution dual-panel PET camera design dedicated to breast cancer imaging using Monte Carlo simulation** *MEDICAL PHYSICS*
Zhang, J., Olcott, P. D., Chinn, G., Foudray, A. M., Levin, C. S.
2007; 34 (2): 689-702
- **Prototype parallel readout system for position sensitive PMT based gamma ray imaging systems** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Habte, F., Olcott, P. D., Levin, C. S., Foudray, A. M.
2007; 54 (1): 60-65
- **Current Trends in Pre-Clinical Positron Emission Tomography System Design.** *PET Clinics,*
C.S. Levin,, H. Zaidi.
2007; Vol. 2 (No. 2): pp 125-160
- **Noise analysis of LSO-PSAPD PET detector front-end multiplexing circuits** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Lau, F. W., Olcott, P. D., Horowitz, M. A., Peng, H., Levin, C. S.
IEEE.2007: 3212-3219
- **Data acquisition system design for a 1 mm(3) resolution PSAPD-based PET system** *IEEE Nuclear Science Symposium/Medical Imaging Conference*

-
- Olcott, P. D., Lau, F. W., Levin, C. S.
IEEE.2007: 3206–3211
- **Design study of a high-resolution breast-dedicated PET system built from cadmium zinc telluride detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Peng, H., Olcott, P. D., Pratz, G., Foudray, A. M., Chinn, G., Levin, C. S.
IEEE.2007: 3700–3704
 - **Evaluation of free-running ADCs for high resolution PET data acquisition** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Peng, H., Olcott, P. D., Foudray, A. M., Levin, C. S.
IEEE.2007: 3328–3331
 - **Accurately positioning events in a high-resolution PET system that uses 3D CZT detectors** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Pratz, G., Levin, C. S.
IEEE.2007: 2660–2664
 - **PET image reconstruction with a Bayesian projector for multi-electronic collimation schemes** *IEEE Nuclear Science Symposium/Medical Imaging Conference*
Chinn, G., Levin, C. S.
IEEE.2007: 2799–2802
 - **Bayesian estimator for angle recovery: Event classification and reconstruction in positron emission tomography** *27th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering*
Foudray, A. M., Levin, C. S.
AMER INST PHYSICS.2007: 362–371
 - **Bayesian Estimator for Angle Recovery: Event Classification and Reconstruction in Positron Emission Tomography**, *Journal of Bayesian Inference and Maximum Entropy Methods in Science and Engineering, American Institutes of Physics*,
A.M.K. Foudray, and C.S. Levin.
2007; Volume 954: pp. 362-371,
 - **Prototype Parallel Readout System for Position Sensitive PMT based Gamma-Ray Imaging Systems.** *IEEE Transactions on Nuclear Science.*
F. Habte., P.D. Olcott, C. S. Levin, A.M. Foudray.
2007; 54-1(1): 60-65
 - **Study of the Performance of a Novel 1 mm Resolution Dual-Panel PET Camera Design Dedicated to Breast Cancer Imaging Using Monte Carlo Simulation.** *Medical Physics*
Zhang J, Olcott PD, Chinn G, Foudray AMK, Levin CS.
2007; 34(2): 689-702
 - **Performance Characterization of a Novel Thin Position-Sensitive Avalanche Photodiode for High Resolution Positron Emission Tomography.** *IEEE Transactions on Nuclear Science. Part 1 June*
J. Zhang,, A.M.K Foudray, P.D. Olcott, C.S. Levin.
2007; Volume 54 (3): Page(s):415 - 421
 - **Effects of System Geometry and Other Physical Factors on Photon Sensitivity of High Resolution Positron Emission Tomography.** *Physics in Medicine and Biology.*
F. Habte., A.M.K. Foudray, P.D. Olcott, C.S. Levin.
2007; 52: 3753-3772.
 - **A New Positioning Algorithm for Position-Sensitive Avalanche Photodiodes.** *IEEE Transactions on Nuclear Science.*
J. Zhang,, P.D. Olcott, C.S. Levin.
2007; Volume 54 (3, Part 1): Page(s):433 ? 437.
 - **Performance Characterization of a Miniature, High Sensitivity Gamma-Ray Camera.** *IEEE Transactions on Nuclear Science. Part 1 OCT*
P.D. Olcott,, F. Habte, C.S. Levin, A.M.K. Foudray.
2007; 54(5): 1492-1497
 - **Positioning annihilation photon interactions in a thin LSO crystal sheet with a position-sensitive avalanche photodiode** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Foudray, A. M., Habte, F., Levin, C. S., Olcott, P. D.
2006; 53 (5): 2549-2556
-

- **Image processing algorithms to facilitate and enhance sentinel node detection using a hand-held gamma ray camera in surgical breast cancer staging** *Workshop on Nuclear Radiology of Breast Cancer*
Cott, P. D., Levin, C. S.
IST EDITORIALI POLGRAFICI INT.2006: 99–101
- **GRAY: High Energy Photon Ray Tracer for PET Applications** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Olcott, P. D., Buss, S. R., Levin, C. S., Pratz, G., Sramek, C. K.
IEEE.2006: 2011–2015
- **Fully 3-D List-Mode OSEM Accelerated by Graphics Processing Units** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Pratz, G., Chinn, G., Habte, F., Olcott, P., Levin, C.
IEEE.2006: 2196–2202
- **Characterization of Two Thin Position-Sensitive Avalanche Photodiodes on a Single Flex Circuit for Use in 3-D Positioning PET Detectors** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Foudray, A. M., Farrell, R., Olcott, P. D., Shah, K. S., Levin, C. S.
IEEE.2006: 2469–2472
- **A high speed fully digital data acquisition system for Positron Emission Tomography** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Olcott, P. D., Fallu-Labruyere, A., Habte, F., Levin, C. S., Warburton, W. K.
IEEE.2006: 1909–1911
- **Incident Photon Direction Calculation Using Bayesian Estimation for High Energy Photon Detector Systems with 3D Positioning Capability** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Foudray, A. M., Chinn, G., Levin, C. S.
IEEE.2006: 2008–2010
- **Impact of High Energy Resolution Detectors on the Performance of a PET System Dedicated to Breast Cancer Imaging.** *Physica Medica. Selected Top 10 Most Cited Papers in Physica Medica (European Journal of Medical Physics).*
C.S. Levin, F. Habte, A.M.K. Foudray, J. Chang, G. Chinn.
2006; Vol. XXI (Suppl. 1): pp. 28-34
- **A Method to Include Single Photon Events in Image Reconstruction for a 1 mm Resolution PET System Built with Advanced 3-D Positioning Detectors** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Chinn, G., Foudray, A. M., Levin, C. S.
IEEE.2006: 1740–1745
- **Accurately Positioning and Incorporating Tissue-Scattered Photons into PET Image Reconstruction** *15th International Workshop on Room-Temperature Semiconductor X- and Gamma-Ray Detectors/ 2006 IEEE Nuclear Science Symposium*
Chinn, G., Foudray, A. M., Levin, C. S.
IEEE.2006: 1746–1751
- **Positioning Annihilation Photon Interactions in a Thin LSO Crystal Sheet with a Position-Sensitive Avalanche Photodiodes.** *IEEE Transactions on Nuclear Science.*
A.M.K. Foudray, F. Habte, C.S. Levin, P.D. Olcott.
2006; 53-5(1), (Part 1 Oct): 2549-2556,
- **Image Processing Algorithms to Facilitate and Enhance Sentinel Node Detection using a Hand-Held Gamma-Ray Camera in Surgical Breast Cancer Staging.** *Physica Medica.*
P.D. Olcott, C.S. Levin.
2006; Vol. XXI (Suppl. 1): pp.99-101
- **Evaluation of a Dual-Head PET Camera Design Dedicated to Breast Cancer Imaging.** *Physica Medica.*
J. Zhang, G. Chinn, A.M.K. Foudray, F. Habte, P.D. Olcott, C.S. Levin.
2006; Vol. XXI (Suppl.1): pp. 94-98
- **Evaluation of a dual-panel PET camera design to breast cancer imaging** *Workshop on Nuclear Radiology of Breast Cancer*
Zhang, J., Chinn, G., Foudray, A. M., Habte, F., Olcott, P., Levin, C. S.

IST EDITORIALI POLGRAFICI INT.2006: 94–98

- **2004 Workshop on the Nuclear Radiology of Breast Cancer - Rome (Italy) October 22-23, 2004 - Preface** *PHYSICA MEDICA*
Levin, C. S., Tornai, M. P., Pani, R., Garibaldi, F., Mankoff, D. A.
2006; 21: 1-1
- **Impact of high energy resolution detectors on the performance of a PET system dedicated to breast cancer imaging** *Workshop on Nuclear Radiology of Breast Cancer*
Levin, C. S., Foudray, A. M., Habte, F.
IST EDITORIALI POLGRAFICI INT.2006: 28–34
- **Count Rate Studies of a Box-Shaped PET Breast Imaging System Comprised of Position Sensitive Avalanche Photodiodes Utilizing Monte Carlo Simulation.** *Physica Medica.*
Angela M. K. Foudray., F. Habte, G. Chinn, J. Zhang, Craig S. Levin.
2006; Vol. XXI (Suppl. 1): pp. 64-67
- **2004 Workshop on the Nuclear Radiology of Breast Cancer - Rome (Italy) October 22-23, 2004 ? Preface,** *Physica Medica,*
Levin, C., Tornai, MP; Pani, R, Garibaldi, F., Mankoff, DM.
2006; Volume: 21 (Suppl. 1): Pages: 1-1
- **Scintillation crystal design features for a miniature gamma ray camera** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Dhanasopon, A. P., Levin, C. S., Foudray, A. M., Olcott, P. D., Habte, F.
2005; 52 (5): 1439-1446
- **Compact readout electronics for position sensitive photomultiplier tubes** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Olcott, P. D., Talcott, J. A., Levin, C. S., Habte, F., Foudray, A. M.
2005; 52 (1): 21-27
- **Scintillation Crystal Design Features for a Miniature Gamma-Ray Camera.** *IEEE Transactions on Nuclear Science,*
A.P. Dhanasopon., C.S. Levin, A. M. K. Foudray, P. D. Olcott, F. Habte.
2005; 52-5(1),: 1439-1446,
- **Monte Carlo simulation study of a dual-plate PET camera dedicated to breast cancer Imaging** *Nuclear Science Symposium/Medical Imaging Conference*
Zhang, J., Olcott, P. D., Foudray, A. M., Chinn, G., Levin, C. S.
IEEE.2005: 1667–1671
- **Finite element model based spatial linearity correction for scintillation detectors that use position sensitive avalanche photodiodes** *Nuclear Science Symposium/Medical Imaging Conference*
Olcott, P. D., Zhang, J., Levin, C. S., Habte, F., Foudray, A. M.
IEEE.2005: 2459–2462
- **Performance characterization of a novel thin position-sensitive avalanche photodiode-based detector for high resolution PET** *Nuclear Science Symposium/ Medical Imaging Conference*
Zhang, J., Foudray, A. M., Olcott, P. D., Levin, C. S.
IEEE.2005: 2478–2482
- **Charge multiplexing readout for position sensitive avalanche photodiodes** *Nuclear Science Symposium/Medical Imaging Conference*
Olcott, P. D., Habte, F., Zhang, J., Levin, C. S.
IEEE.2005: 2935–2937
- **Investigation of scintillation light multiplexing for PET detectors based on position sensitive avalanche photodiodes** *Nuclear Science Symposium/Medical Imaging Conference*
Habte, F., Olcott, P. D., Levin, C. S., Foudray, A. M.
IEEE.2005: 2027–2030
- **Comparing geometries for a PET system with 3-D photon positioning capability** *Nuclear Science Symposium/Medical Imaging Conference*
Chinn, G., Foudray, A. M., Levin, C. S.
IEEE.2005: 1709–1712
- **Component based normalization for PET systems with depth of interaction measurement capability** *Nuclear Science Symposium/Medical Imaging Conference*

-
- Foudray, A. M., Chinn, G., Levin, C. S.
IEEE.2005: 2108–2111
- **Compact Readout Electronics for Position Sensitive Photomultiplier Tubes.** *IEEE Transactions on Nuclear Science*, P.D. Olcott, .A. Talcott, C.S. Levin, F. Habte, A.M.K. Foudray. 2005; 52-1(1): 21-27,
 - **Primer on Molecular Imaging Technology.** *European Journal of Nuclear Medicine and Molecular Imaging*, C.S. Levin. 2005; , 32-2,: S325-45,
 - **Methods to extract more light from minute scintillation crystals used in an ultra-high resolution Positron Emission Tomography detector** *2nd International Conference on Imaging Technologies in Biomedical Sciences* Levin, C. S., Habte, F., Foudray, A. M. ELSEVIER SCIENCE BV.2004: 35–40
 - **Study of low noise multichannel readout electronics for high sensitivity PET systems based on avalanche photodiode arrays** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE* Habte, F., Levin, C. S. 2004; 51 (3): 764-769
 - **Investigation of position sensitive avalanche photodiodes for a new high-resolution PET detector design** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE* Levin, C. S., Foudray, A. M., Olcott, P. D., Habte, F. 2004; 51 (3): 805-810
 - **Methods to Extract More Light from Minute Scintillation Crystals Used in an Ultra-High Resolution Positron Emission Tomography Detector.** *Nuclear Instruments and Methods in Physics Research A*, C.S. Levin,, F. Habte, A.M. Foudray. 2004; 527(1-2):: 35-40.
 - **Positioning annihilation photon interactions in a thin LSO crystal sheet with a position-sensitive avalanche photodiode** *Nuclear Science Symposium/Medical Imaging Conference* Foudray, A. M., Habte, F., Levin, C. S., Olcott, P. D. IEEE.2004: 2985–2989
 - **Characterization of performance of a miniature, high sensitivity gamma ray camera** *Nuclear Science Symposium/Medical Imaging Conference* Olcott, P. D., Habte, F., Levin, C. S., Foudray, A. M. IEEE.2004: 3997–4000
 - **Simulation and measurement of gamma ray and annihilation photon imaging detectors** *Nuclear Science Symposium/Medical Imaging Conference* Habte, F., Olcott, P. D., Foudray, A. M., Levin, C. S., Zhang, J., Chinn, G. IEEE.2004: 4019–4022
 - **Scintillation crystal design features for a miniature gamma ray camera** *IEEE Nuclear Science Symposium/Medical Imaging Conference* Dhanasopon, A. P., Levin, C. S., Foudray, A. M., Olcott, P. D., Talcott, J. A., Habte, F. IEEE.2004: 1967–1971
 - **Investigation of position sensitive avalanche photodiodes for a new high resolution PET detector design** *IEEE Nuclear Science Symposium/Medical Imaging Conference* Levin, C. S., Foudray, A. M., Olcott, P. D., Habte, F. IEEE.2004: 2262–2266
 - **Prototype parallel readout system for position sensitive PMT based gamma ray imaging systems** *IEEE Nuclear Science Symposium/Medical Imaging Conference* Habte, F., Olcott, P. D., Levin, C. S., Foudray, A. M., Talcott, J. A. IEEE.2004: 1891–1894
 - **Compact readout electronics for position sensitive photomultiplier tubes** *IEEE Nuclear Science Symposium/Medical Imaging Conference* Olcott, P. D., Talcott, J. A., Levin, C. S., Habte, F., Foudray, A. M. IEEE.2004: 1962–1966
-

- **Study of Low Noise Multi-Channel Readout Electronics for High Sensitivity PET Systems Based on Avalanche Photodiode Arrays.** *IEEE Transactions on Nuclear Science*,
F. Habte, and C.S. Levin.
2004; 51-3(2);: 764-9,
- **Investigation of Position Sensitive Avalanche Photodiodes for a New High Resolution PET Detector Design.** *IEEE Transactions on Nuclear Science*,
C.S. Levin,, A.M.K. Foudray, P.D. Olcott, F. Habte.
2004; 51-3(2);: 805-810,
- **Detector design issues for compact nuclear emission cameras dedicated to breast imaging** *1st Topical Symposium on Functional Breast Imaging with Advanced Detectors*
Levin, C. S.
ELSEVIER SCIENCE BV.2003: 60–74
- **Detector Design Issues for Compact Nuclear Emission Cameras Dedicated to Functional Breast Imaging.** *Nuclear Instruments and Methods in Physics Research A*,
C.S. Levin.
2003; 497-1,: 60-74,
- **Investigation of low noise, low cost readout electronics for high sensitivity PET systems based on avalanche photodiode arrays** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)*
Habte, F., Levin, C. S.
IEEE.2003: 661–665
- **Initial studies of a new detector design for ultra-high resolution Positron Emission Tomography** *IEEE Nuclear Science Symposium/Medical Imaging Conference (NSS/MIC)*
Levin, C. S., Habte, F.
IEEE.2003: 1751–1755
- **Design of a high-resolution and high-sensitivity scintillation crystal array for PET with nearly complete light collection** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Levin, C. S.
2002; 49 (5): 2236-2243
- **Evaluation of breast tumor detectability with two dedicated, compact scintillation cameras** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
McElroy, D. P., Hoffman, E. J., Macdonald, L., Patt, B. E., Iwanczyk, J. S., Yamaguchi, Y., Levin, C. S.
2002; 49 (3): 794-802
- **Performance analysis of an improved 3-D PET Monte Carlo simulation and scatter correction** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Holdsworth, C. H., Levin, C. S., Janecek, M., Dahlbom, M., Hoffman, E. J.
2002; 49 (1): 83-89
- **Centered Versus Non-Centered Source For Intracoronary Artery Radiation Therapy: A Model Based on the Scripps Trial.** *American Heart Journal*,
Arbab-Zadeh, RJ Russo, V Bhargava, C.S. Levin, SK Jani, J Lucisano, PS Teirstein.
2002; 143-2: 342-8
- **Expanding the versatility of a more accurate accelerated Monte Carlo simulation for 3D PET: Data correction of PET emission scans using I-124** *IEEE Nuclear Science Symposium*
Holdsworth, C. H., Dahlbom, M., Liu, A., Williams, L., Levin, C. S., Janecek, M., Hoffman, E. J.
IEEE.2002: 2105–2109
- **Design of a high resolution and high sensitivity scintillation crystal array with nearly perfect light collection** *IEEE Nuclear Science Symposium*
Levin, C. S.
IEEE.2002: 48–52
- **Design of a High-Resolution and High-Sensitivity Scintillation Crystal Array for PET with Nearly Complete Light Collection.** *IEEE Transactions on Nuclear Science*,
C.S. Levin.
2002; 49-5(1);: 2236-43
- **Evaluation of Breast Tumor Detectability with Two Dedicated, Compact Scintillation Cameras.** *IEEE Transactions on Nuclear Science*,

- D.P. McElroy,, E.J. Hoffman, L. MacDonald, B.E. Patt, J.S. Iwanczyk, Y. Yamaguchi, C.S. Levin.
2002; 49-3(1),: 794-802,
- **Performance Analysis of an Improved 3-D PET Monte Carlo Simulation and Scatter Correction.** *IEEE Transactions on Nuclear Science*, C.H. Holdsworth,, C.S. Levin, M. Janecek, M. Dahlbom, E.J. Hoffman.
2002; 49-1(1),: 83-89,
 - **Investigation of microcolumnar scintillators on an optical fiber coupled compact imaging system** *Medical Imaging Conference (MIC)* Tornai, M. P., Archer, C. N., Weisenberger, A. G., Wojcik, R., Popov, V., MAJEWSKI, S., Keppel, C. E., Levin, C. S., Tipnis, S. V., Nagarkar, V. V. IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.2001: 637–44
 - **Investigation of accelerated Monte Carlo techniques for PET simulation and 3D PET scatter correction** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE* Holdsworth, C. H., Levin, C. S., Farquhar, T. H., Dahlbom, M., Hoffman, E. J.
2001; 48 (1): 74-81
 - **Investigation of Accelerated Monte Carlo Techniques for PET Simulation and 3-D PET Scatter Correction.** *IEEE Transactions on Nuclear Science*, C. Holdsworth, C.S. Levin, M. Dahlbom, T. Farquhar, E.J. Hoffman.
2001; 48-1(1),: 74-81
 - **Investigation of Microcolumnar Scintillators on an Optical Fiber Coupled Compact Imaging System.** *IEEE Transactions on Nuclear Science*, MP Tornai, C Archer, AG Wiesenberger, R. Wojcik, V Popov, CE Keppel, CS Levin, S Majewski, SV Tipnis, VV Nagarkar.
2001; 48-3(2),: 637-44,
 - **Corrigendum: Calculation of Positron Range and its Effect on Positron Emission Tomography System Spatial Resolution.** *Physics in Medicine and Biology* C.S. Levin, and E. J. Hoffman.
2000; 45-2: 559
 - **Calculation of Positron Range and its Effect on Positron Emission Tomography System Spatial Resolution.** *Physics in Medicine and Biology* C.S. Levin, and E.J. Hoffman.
1999; 44,: 781-799,
 - **Investigation of accelerated monte carlo techniques for PET simulation and 3-D PET scatter correction** *1999 IEEE Nuclear Science Symposium and Medical Imaging Conference* Holdsworth, C. H., Levin, C. S., Farquhar, T. H., Dahlbom, M., Hoffman, E. J.
IEEE.1999: 1500–1504
 - **A miniature phoswich detector for gamma-ray localization and beta imaging** *1997 Medical Imaging Conference* Tornai, M. P., Levin, C. S., MacDonald, L. R., Holdsworth, C. H., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1998: 1166–73
 - **A dual detector beta-ray imaging probe with gamma-ray background suppression for use in intra-operative detection of radiolabeled tumors** *7th Pisa Meeting on Advanced Detectors* Hoffman, E. J., Tornai, M. P., Levin, C. S., MacDonald, L. R., Holdsworth, C. H.
ELSEVIER SCIENCE BV.1998: 511–16
 - **A Miniature Phoswich Detector for Gamma-Ray Localization and Beta Imaging.** *IEEE Transactions on Nuclear Science*, M.P. Tornai,, C.S. Levin, L.R. MacDonald, C.H. Holdsworth, E.J. Hoffman.
1998; 45-3(2),: 1166-73,
 - **A miniature phoswich detector for gamma-ray localization and beta imaging** *1997 IEEE Nuclear Science Symposium and Medical Imaging Conference* Tornai, M. P., Levin, C. S., MacDonald, L. R., Holdsworth, C. H., Hoffman, E. J.
IEEE.1998: 1028–1032
 - **A Dual Detector Beta-Ray Imaging Probe with Gamma-Ray Background Suppression for Use in Intra-Operative Detection of Radiolabeled Tumors.** *Nuclear Instruments and Methods in Physics Research A* E.J. Hoffman,, M.P. Tornai, C.S. Levin, L.R. MacDonald, C.H. Holdsworth.
1998; 409: 511-16,
 - **Design and performance of gamma and beta intra-operative imaging probes** *V International Conference on Application of Physics in Medicine and Biology (Trieste Medical Physics 96) / IX Congresso AIFB / EFOMP Medical Physics 96 / EUTECH 96* Hoffman, E. J., Tornai, M. P., Levin, C. S., MacDonald, L. R., Siegel, S.

ELSEVIER SCI LTD.1997: 243–246

- **PSPMT and photodiode designs of a small scintillation camera for imaging malignant breast tumors** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Levin, C. S., Hoffman, E. J., Tornai, M. P., MacDonald, L. R.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1513–20
- **Gamma and beta intra-operative imaging probes** *4th International Conference on Position-Sensitive Detectors*
Hoffman, E. J., Tornai, M. P., Levin, C. S., MacDonald, L. R., Siegel, S.
ELSEVIER SCIENCE BV.1997: 324–29
- **Investigation of crystal geometries for fiber coupled gamma imaging intra-operative probes** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Tornai, M. P., Levin, C. S., MacDonald, L. R., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1254–61
- **Investigation of a new readout scheme for high resolution scintillation crystal arrays using photodiodes** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Levin, C. S., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1208–13
- **Discrete scintillator coupled mercuric iodide photodetector arrays for breast imaging** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Tornai, M. P., Patt, B. E., Iwaczyk, J. S., Levin, C. S., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1127–33
- **Development of an intraoperative gamma camera based on a 256-pixel mercuric iodide detector array** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Patt, B. E., Tornai, M. P., Iwaczyk, J. S., Levin, C. S., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1242–48
- **Annihilation gamma ray background characterization and rejection for a small beta camera used for tumor localization during surgery** *1996 Medical Imaging Conference (MIC) / Nuclear Science Symposium (NSS)*
Levin, C. S., Tornai, M. P., MacDonald, L. R., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1997: 1120–26
- **Compton scatter and X-ray crosstalk and the use of very thin intercrystal septa in high-resolution PET detectors** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Levin, C. S., Tornai, M. P., Cherry, S. R., MacDonald, L. R., Hoffman, E. J.
1997; 44 (2): 218-224
- **Gamma and Beta Intra-Operative Imaging Probes.** *Nuclear Instruments and Methods in Physics Research A*,
E.J. Hoffman, M.P. Tornai, C.S. Levin, L.R. MacDonald, S. Siegel.
1997; 392: 324-29
- **A new photodiode readout scheme for high resolution scintillation crystal arrays** *1996 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., Hoffman, E. J.
IEEE.1997: 1223–1227
- **PSPMT and PIN diode designs of a small scintillation camera for imaging malignant breast tumors** *1996 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., Hoffman, E. J., Tornai, M. P., MacDonald, L. R.
IEEE.1997: 1196–1200
- **Investigation of crystal geometries for fiber coupled gamma imaging intra-operative probes** *1996 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Tornai, M. P., Levin, C. S., MacDonald, L. R., Hoffman, E. J.
IEEE.1997: 1135–1139
- **Discrete scintillator coupled mercuric iodide photodetector arrays for breast imaging** *1996 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Tornai, M. P., Patt, B. E., Iwaczyk, J. S., Levin, C. S., Hoffman, E. J.

IEEE.1997: 1034–1038

- **Annihilation gamma ray background characterization and rejection for a positron camera** *1996 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., Tornai, M. P., MacDonald, L. R., Hoffman, E. J.
IEEE.1997: 1044–1048
- **Investigation of a New Readout Scheme for High Resolution Scintillation Crystal Arrays Using Photodiodes.** *IEEE Transactions on Nuclear Science*
C.S. Levin, and E.J. Hoffman.
1997; 44-3(2),: 1208-13
- **Development of an Intraoperative Gamma Camera Based on a 256-Pixel Mercuric Iodide Detector Array.** *IEEE Transactions on Nuclear Science*,
B.E. Patt., M.P. Tornai, J.S. Iwanczyk, C.S. Levin, E.J. Hoffman.
1997; 44-3(2),: 1242-48,
- **Compton Scatter and X-Ray Crosstalk and the Use of Very Thin Intercrystal Septa in High Resolution PET Detectors.** *IEEE Transactions on Nuclear Science*
C.S. Levin, M.P. Tornai, S.R. Cherry, L.R. MacDonald, E.J. Hoffman.
1997; 44-2: 18-24
- **Investigation of Crystal Geometries for Fiber Coupled Gamma Imaging Intra-Operative Probes.** *IEEE Transactions on Nuclear Science*,
M.P. Tornai, C.S. Levin, L.R. MacDonald, E.J. Hoffman, J. Park.
1997; 44-3(2),: 1254-61
- **Annihilation Gamma-Ray Background Characterization and Rejection for a Small Beta Camera Used for Tumor Localization During Surgery.** *IEEE Transactions on Nuclear Science*
C.S. Levin, M.P. Tornai, L.R. MacDonald, E.J. Hoffman.
1997; 44-4: 1120-26,
- **Discrete Scintillator Coupled Mercuric Iodide Photodetector Arrays for Breast Imaging.** *IEEE Transactions on Nuclear Science*,
M.P. Tornai, B.E. Patt, J.S. Iwanczyk, C.S. Levin, E.J. Hoffman.
1997; 44-3(2),: 1127-33,
- **PSPMT and Photodiode Designs of a Small Scintillation Camera for Imaging Malignant Breast Tumors.** *IEEE Transactions on Nuclear Science*,
C.S. Levin, E.J. Hoffman, M.P. Tornai, L.R. MacDonald.
1997; 44-4(1),: 1513-20,
- **Design and Performance of Gamma and Beta Intra-Operative Imaging Probes.** *Physica Medica*
E.J. Hoffman, M.P. Tornai, C.S. Levin, L.R. MacDonald, S. Siegel.
1997; Vol. XIII (Suppl. 1): S243-247
- **Characterization of fluor concentration and geometry in organic scintillators for in situ beta imaging** *IEEE TRANSACTIONS ON NUCLEAR SCIENCE*
Tornai, M. P., Hoffman, E. J., MacDonald, L. R., Levin, C. S.
1996; 43 (6): 3342-3347
- **Mercuric iodide photodetector arrays for gamma-ray imaging** *9th International Workshop on Room Temperature Semiconductor X-Ray and Gamma-Ray Detectors, Associated Electronics and Applications*
Patt, B. E., Iwanczyk, J. S., Wang, Y. J., Tornai, M. P., Levin, C. S., Hoffman, E. J.
ELSEVIER SCIENCE BV.1996: 295–300
- **Design considerations and initial performance of a 1.2 cm(2) beta imaging intra-operative probe** *1995 Nuclear Science Symposium / Medical Imaging Conference (NSS/MIC 95)*
Tornai, M. P., MacDonald, L. R., Levin, C. S., Siegel, S., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1996: 2326–35
- **Optimizing light collection from thin scintillators used in a beta-ray camera for surgical use** *1995 Nuclear Science Symposium / Medical Imaging Conference (NSS/MIC 95)*
Levin, C. S., MacDonald, L. R., Tornai, M. P., Hoffman, E. J., Park, J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1996: 2053–60
- **Design Considerations and Initial Performance of a 1.2 cm² Beta Imaging Intra-Operative Probe.** *IEEE Transactions on Nuclear Science*,

-
- M.P. Tornai, L.R. MacDonald, C.S. Levin, S. Siegel, E.J. Hoffman.
1996; 43-4(1): 2326-2335
- **Removal of the effect of Compton scattering in 3-D whole body positron emission tomography by Monte Carlo** *1995 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., Tai, Y. C., Hoffman, E. J., Dahlbom, M., Farquhar, T. H.
IEEE.1996: 1050-1054
 - **Design considerations and initial performance of a 1.2cm(2) beta imaging intra-operative probe** *1995 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Tornai, M. P., MacDonald, L. R., Levin, C. S., Siegel, S., Hoffman, E. J.
IEEE.1996: 1791-1795
 - **Compton scatter and x-ray crosstalk and the use of very thin inter-crystal septa in high resolution PET detectors** *1995 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., Tornai, M. P., Cherry, S. R., MacDonald, L. R., Hoffman, E. J.
IEEE.1996: 1036-1040
 - **Characterization of fluor concentration and geometry in organic scintillators for in situ beta imaging** *1995 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Tornai, M. P., Hoffman, E. J., MacDonald, L. R., Levin, C. S.
IEEE.1996: 1632-1636
 - **Optimizing light collection from thin scintillators used in a beta-ray camera for surgical use** *1995 IEEE Nuclear Science Symposium and Medical Imaging Conference*
Levin, C. S., MacDonald, L. R., Tornai, M. P., Hoffman, E. J., Park, J.
IEEE.1996: 1796-1800
 - **Miniature Nuclear Emission Imaging System for Intra-Operative Applications.** *In: Proceedings from UCLA International Conference on Imaging Detectors in High Energy & Astroparticle Physics*
M.P. Tornai, L.R. MacDonald, C.S. Levin, S. Siegel, E.J. Hoffman, J. Park, M. Atac, D.B. Cline.
1996: 133-47
 - **Optimizing Light Collection from Thin Scintillators Used in a Beta-Ray Camera for Surgical Use.** *IEEE Transactions on Nuclear Science,*
C.S. Levin, L.R. MacDonald, M.P. Tornai, E.J. Hoffman, J. Park.
1996; 43-3(2): 2053-60
 - **Mercuric Iodide Photodetector Arrays for Gamma-Ray Imaging.** *Nuclear Instruments and Methods in Physics Research A,*
B.E. Patt, J.S. Iwaczyk, Y.J. Wang, M.P. Tornai, C.S. Levin, E.J. Hoffman.
1996; 380: 295-300
 - **Characterization of Fluor Concentration and Geometry in Organic Scintillators for in situ Beta Imaging.** *IEEE Transactions on Nuclear Science,*
M.P. Tornai, E.J. Hoffman, C.S. Levin, L.R. MacDonald.
1996; 43-6(2): 3342-47
 - **DEVELOPMENT OF A MERCURIC IODIDE DETECTOR ARRAY FOR MEDICAL IMAGING APPLICATIONS** *NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT*
Patt, B. E., Iwaczyk, J. S., Tornai, M. P., Levin, C. S., Hoffman, E. J.
1995; 366 (1): 173-182
 - **INVESTIGATION OF THE PHYSICAL ASPECTS OF BETA-IMAGING PROBES USING SCINTILLATING FIBERS AND VISIBLE-LIGHT PHOTON COUNTERS** *1994 Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*
MacDonald, L. R., Tornai, M. P., Levin, C. S., Park, J., Atac, M., Cline, D. B., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1995: 1351-57
 - **A MONTE-CARLO CORRECTION FOR THE EFFECT OF COMPTON-SCATTERING IN 3-D PET BRAIN IMAGING** *1994 Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*
Levin, C. S., Dahlbom, M., Hoffman, E. J.
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1995: 1181-85
 - **A COMPARISON OF PET DETECTOR MODULES EMPLOYING RECTANGULAR AND ROUND PHOTOMULTIPLIER TUBES** *1994 Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*
-

Cherry, S. R., Tornai, M. P., Levin, C. S., Siegel, S., Hoffman, E. J., Andreaco, M. S., Williams, C. W.

IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.1995: 1064-68

- **A Monte Carlo Correction for the Effect of Compton Scattering in 3-D PET Brain Imaging.** . *IEEE Transactions on Nuclear Science*,
C.S. Levin, M. Dahlbom, E.J. Hoffman.
1995; 42-4(1, 2): 1181-1185
- **Small area, fiber coupled scintillation camera for imaging beta-ray distributions intra-operatively** *Conference on Photoelectronic Detectors, Cameras, and Systems*
MacDonald, L. R., Tornai, M. P., Levin, C. S., Park, J., Atac, M., Cline, D. B., Hoffman, E. J.
SPIE - INT SOC OPTICAL ENGINEERING.1995: 92-101
- **Small Area, Fiber Coupled Scintillation Camera for Imaging Beta-Ray Distributions Intra-Operatively. In: Photoelectronic Detectors, Cameras and Systems, Eds. C.B. Johnson, E.J. Fenyves, Proceedings of SPIE, the International Society for Optical Engineering, SPIE, Bellingham, WA.**
L.R. MacDonald, M.P. Tornai, C.S. Levin, J. Park, M. Atac, D.B. Cline, E.J. Hoffman.
1995; 2551: 92-101
- **Development of a Mercuric Iodide Detector Array for Medical Imaging Applications.** *Nuclear Instruments and Methods in Physics Research A*,
B.E. Patt, J.S. Iwanczyk, M.P. Tornai, C.S. Levin, E.J. Hoffman
1995; 42-4(1, 2): 1181-1185
- **Development of a Mercuric Iodide Detector Array for in-vivo X-Ray Imaging.** *Advances in X-Ray Analysis*,
B.E. Patt, J.S. Iwanczyk, M.P. Tornai, C.S. Levin, E.J. Hoffman.
1995; 38: 615-24
- **A Comparison of PET Detector Modules Employing Rectangular and Round Photomultiplier Tubes.** *IEEE Transactions on Nuclear Science*,
S. R. Cherry, M.P. Tornai, C.S. Levin, S. Siegel, E.J. Hoffman.
1995; 42-4(1, 2): 1064-1068
- **Investigation of the Physical Aspects of Beta Imaging Probes Using Scintillating Fibers and Visible Light Photon Counters.** *IEEE Transactions on Nuclear Science*,
L.R. MacDonald, M.P. Tornai, C.S. Levin, J. Park, M. Atac, D.B. Cline, E.J. Hoffman.
1995; 42-4(1, 2): 1351-1357
- **Investigation of the physical aspects of beta imaging probes using scintillating fibers and visible light photon counters** *1994 Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*
MacDonald, L. R., Tornai, M. P., Levin, C. S., Park, J., Atac, M., Cline, D. B., Hoffman, E. J.
I E E E.1994: 1380-1384
- **A Monte Carlo correction for compton scattering effects in 3D pet brain imaging** *1994 Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*
Levin, C. S., Dahlbom, M., Hoffman, E. J.
I E E E.1994: 1502-1506