
BIOGRAPHICAL SKETCH

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NAME Craig Steven Levin, Ph.D.	POSITION TITLE Associate Professor of Radiology		
eRA COMMONS USER NAME clevin			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of California, Los Angeles, CA	B.S.	1985	Double: Physics and Math.
Yale University, New Haven, CT	M.S.	1987	Physics
Yale University, New Haven, CT	M.Phil.	1987	Physics
Yale University, New Haven, CT	Ph.D.	1993	Physics
University of California, Los Angeles, CA	Fellowship	1996	Biomedical Physics

A. Positions and Honors

Positions

1993-1996	Post-doctoral Scholar, Division of Nuclear Medicine & Biophysics, Departments of Radiological Sciences and Molecular & Medical Pharmacology and, UCLA School of Medicine, CA.
1996-1998	Assistant Research Scientist, Division of Nuclear Medicine & Biophysics, Department of Molecular and Medical Pharmacology, UCLA School of Medicine, Los Angeles, CA.
1998-pres.	Assistant Professor, Department of Radiology, UC San Diego School of Medicine
1998-2004	Faculty Physicist, Nuclear Medicine Service, Veterans Affairs Medical Center
1998-2004	Research Scientist, Veterans Medical Research Foundation, San Diego, CA.
2002-pres.	Member, Whitaker Institute for Biomedical Engineering, UC San Diego.
2004-pres.	Associate Professor, Department of Radiology, Stanford University School of Medicine
2004-pres.	Core member, Molecular Imaging Program at Stanford
2004-pres.	Member, Stanford Cardiovascular Institute, Stanford University School of Medicine
2004-pres.	Member, Stanford Bio-X Program, Stanford University
2005-pres.	Member, Stanford Comprehensive Cancer Center, Stanford University School of Medicine
2005-pres.	Member, Stanford Biophysics Program, Stanford University
2007-pres.	Associate Professor (Affiliate), Department of Bioengineering, Stanford University

Honors

1993-1996	National Research Service Award, National Institutes of Health
1985-93	Tuition Fellowship, Yale University
1986-93	Research Fellowship, Yale University
1987-91	Jonathon Edwards College Bates Graduate Fellowship, Yale University
1985	E. Lee Kinsey Award in Physics, UCLA
1985	Sherwood Prize in Mathematics, UCLA
1985	Summa Cum Laude, UCLA
1985	Sigma Pi Sigma National Honors in Physics
1984	Phi Beta Kappa National Honors
1984	Marilyn F. Lohr Award in Physics, UCLA
1983	Stanford Linear Accelerator Center Summer Fellowship
1981-85	Physics, Mathematics and College Honors Programs, UCLA
1981	Phi Eta Sigma National Honors, UCLA

B. Selected peer-reviewed publications (in chronological order)

1. **C.S. Levin**, M. Dahlbom, E.J. Hoffman. A Monte Carlo Correction for Effect of Compton Scattering in 3D PET Brain Imaging. *IEEE Trans. Nucl. Sci.* 42-4, August 1995: 1181-1185.
2. S. R. Cherry, M.P. Tornai, **C.S. Levin**, S. Siegel, E.J. Hoffman. Comparison of PET Block Detector Modules Employing Rectangular and Round PMTs. *IEEE Trans. Nucl. Sci.* 42-4, 1995: 1064-1068.

3. **C.S. Levin**, L.R. MacDonald, M.P. Tornai, E.J. Hoffman, J. Park. Optimizing Light Collection from Thin Scintillators Used in a Beta-Ray Camera for Surgical Use. *IEEE Trans. Nucl. Sci.* 43-3 (1996).
4. **C.S. Levin**, Y-C Tai, E.J. Hoffman, M. Dahlbom, et al. Removal of the Effect of Compton Scattering in 3-D Whole Body Positron Emission Tomography By Monte Carlo. *1995 IEEE MIC Conf. Rec.* II: 1050-4.
5. **C.S. Levin**, M.P. Tornai, S.R. Cherry, L.R. MacDonald, E.J. Hoffman. Compton Scatter and X-Ray Crosstalk and The Use of Very Thin Inter-Crystal Septa in High Resolution PET Detectors. *IEEE Trans. Nucl. Sci.* 44-2:18-24, April (1997).
6. **C.S. Levin**, M.P. Tornai, L.R. MacDonald and E.J. Hoffman. Annihilation Gamma-Ray Background Characterization and Rejection For A Small Surgical Beta-Ray Camera Imaging Positron Emitters. *IEEE Trans. Nucl. Sci.* 44-3, June (1997) 1120-6.
7. **C.S. Levin**, E.J. Hoffman, M.P. Tornai, L.R. MacDonald. PSPMT and Photodiode Designs of a Small Scintillation Camera for Imaging Malignant Breast Tumors. *1996 IEEE Medical Imaging Conference Record II*: 1196-1200. *IEEE Trans. Nucl. Sci.* 44-4, Aug. (1997) 1513-20.
8. **C.S. Levin** and E.J. Hoffman. An Investigation of Photodiode Readout of Scintillation Crystals Used in Positron Emission Tomography. *IEEE Trans. Nucl. Sci.* 44-3, (1997) 1208-13.
9. M.P. Tornai, **C.S. Levin**, L.R. MacDonald, E.J. Hoffman, J. Park. Investigation of Crystal Geometries for Fiber Coupled Gamma Imaging Intra-operative Probes. *1996 IEEE Medical Imaging Conference Record II*: 1135-9. *IEEE Trans. Nucl. Sci.* 44-3, June (1997) 1254-61.
10. E.J. Hoffman, M.P. Tornai, **C.S. Levin**, L.R. MacDonald, and S. Siegel. "Gamma and Beta Intra-operative Imaging Probes." *Physica Medica* Vol. XIII, Suppl. 1, December 1997.
11. M.P. Tornai, **C.S. Levin**, E.J. Hoffman, L.R. MacDonald, E. Glass, R. Essner, K. Black. A Novel Dual Detector Probe for Gamma-ray Guided Intra-operative Beta Imaging. *J Nucl Med* 38(5), p. 8P (1997).
12. M.P. Tornai, **C.S. Levin**, CH. Holdsworth, L.R. MacDonald, D. Kim, E.J. Hoffman. Investigation of a Miniature Phoswich Detector for Gamma-ray Localization and Beta Imaging. *IEEE Tran Nucl Sci* 45-3 June (1998) 1166-73.
13. **C.S. Levin** and E.J. Hoffman. Calculation of Positron Range and Its Effect on the Fundamental Limit of Positron Emission Tomography System Spatial Resolution. *Physics in Medicine and Biology* 44 (1999) 781-99. Corrigendum: *Phys. Med. Biol.* 45 No 2 (February 2000) p. 559.
14. C.H. Holdsworth, **C.S. Levin**, M. Dahlbom, T. Farquhar and E.J. Hoffman. Investigation of Accelerated Monte Carlo Techniques for PET Simulation and 3-D PET Scatter Correction. *IEEE Tran. Nucl. Sci.* vol.48 Feb. 2001. p.74-81.
15. Holdsworth, C.H.; Dahlbom, M.; Liu, A.; Williams, L.; **Levin, C.S.**; Janecek, M.; Hoffman, E.J.; Expanding the versatility of a more accurate accelerated Monte Carlo simulation for 3D PET: data correction of PET emission scans using ¹²⁴I. Holdsworth, C.H.; Dahlbom, M.; Liu, A.; Williams, L.; Levin, C.S.; Janecek, M.; Hoffman, E.J.; Nuclear Science Symposium Conference Record, 2001 IEEE, Volume 4, 4-10 Nov. 2001 Page(s):2105 – 2109.
16. A Arbab-Zadeh, RJ Russo, V Bhargava, **C.S. Levin**, SK Jani, J Lucisano, PS Teirstein. Centered Versus Non-Centered Source For Intracoronary Radiation Therapy: A Model Based on the Scripps Trial. *American Heart Journal* 2002 Feb;143(2):342-8.
17. **C.S. Levin**. Basic Physics of Radioisotope Imaging. In *Emission Tomography: The Fundamentals of PET and SPECT*. Ed. J. Aarsvold and M. Wernick. Academic Press (2004).
18. **C.S. Levin**. Application-Specific Small Field-of-View Imagers. In *Emission Tomography: The Fundamentals of PET and SPECT*. Ed. J. Aarsvold and M. Wernick Academic Press (2004).
19. L.S. Graham and **C.S. Levin**. Anger Scintillation Camera. Chapter 7, In *Diagnostic Nuclear Medicine*. Ed. M.P. Sandler, R.E. Coleman, F.J. Wackers, J.A. Patton A. Gottschalk, P.B. Hoffer. 4th Ed. Willams & Wilkins (2002).
20. C.H. Holdsworth, **C.S. Levin**, M. Janecek, M. Dahlbom, E.J. Hoffman. Performance Analysis of an Improved 3D PET Monte Carlo Simulation and Scatter Correction. *IEEE Tran Nucl Sci*, V.49 #1, p. 83-89, Feb 2002.
21. **C.S. Levin**. Design of a High Resolution and High Sensitivity Scintillation Crystal Array for PET with Nearly Complete Light Collection. *IEEE Trans Nucl Sci* Vol. 49, No.5, Oct. 2002, 2236-43.
22. Habte, F.; Olcott, P.D.; **Levin, C.S.**; Foudray, A.M.; Talcott, J.A.; Prototype parallel readout system for position sensitive PMT based gamma ray imaging systems. Nuclear Science Symposium Conference

- Rec., 2003 IEEE Volume 3,19-25 Oct. 2003 Page(s):1891 - 1894 Vol.3. IEEE TRANSACTIONS ON NUCLEAR SCIENCE 54 (1): 60-65 Part 1 FEB 2007.
23. **C.S. Levin.** Detector Design Issues for Compact Nuclear Emission Cameras Dedicated to Functional Breast Imaging. *Nuclear Instruments and Methods in Physics Research Section A*, Volume 497, Issue 1, 21 January 2003, Pages 60-74.
 24. Habte F, **Levin CS.** Study of low noise multichannel readout electronics for high sensitivity PET systems based on avalanche photodiode arrays. *IEEE Trans Nucl Sci* 51 (3): 764-769 Part 2 Jun 2004.
 25. **C.S. Levin**, F. Habte, and A.M. Foudray. 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* 527 (2004) 35–40.
 26. **C.S. Levin**, A.M.K. Foudray, P.D. Olcott, F. Habte. Investigation of Position Sensitive Avalanche Photodiodes for a New High Resolution PET Detector Design. *IEEE Transactions on Nuclear Science* Vol. 51, NO. 3, JUNE 2004 (805-10).
 27. Olcott, P.D.; Talcott, J.A.; **Levin, C.S.**; Habte, F.; Foudray, A.M.K. Compact readout electronics for position sensitive photomultiplier tubes; *Nuclear Science, IEEE Transactions on* Volume 52, Issue 1, Part 1, Feb. 2005 Page(s):21 – 27.
 28. Foudray, A.M.K.; Chinn, G.; **Levin, C.S.**; Component-Based Normalization for PET Systems with Depth of Interaction Measurement Capability. *Nuclear Science Symposium Conference Record, 2005 IEEE* Volume 4, October 23 - 29, 2005 Page(s):2108 – 2111.
 29. Habte, F.; Olcott, P.; **Levin, C.S.**; Foudray, A.M.K.; Investigation of Scintillation Light Multiplexing for PET Detectors Based on position sensitive avalanche photodiodes. *Nuclear Science Symposium Conference Record, 2005 IEEE* Volume 4, October 23 - 29, 2005 Page(s):2027 – 2030.
 30. Olcott, P.D.; Habte, F.; Zhang, J.; **Levin, C.S.**; Charge Multiplexing Readout for Position Sensitive Avalanche Photodiodes. *Nuclear Science Symposium Conference Record, 2005 IEEE*, Volume 5, October 23 - 29, 2005 Page(s):2935 – 2937.
 31. Chinn, G.; Foudray, A.M.K.; **Levin, C.S.**; Comparing Geometries for a PET System with 3-D Photon Positioning Capability. *Nuclear Science Symposium Conference Record, 2005 IEEE*, Volume 3, October 23 - 29, 2005 Page(s):1709 – 1712.
 32. Olcott, P.D.; Zhang, J.; **Levin, C.S.**; Habte, F.; Foudray, A.M.K.; Finite Element Model Based Spatial Linearity Correction for Scintillation Detectors that use Position Sensitive Avalanche Photodiodes. *Nuclear Science Symposium Conference Record, 2005 IEEE* Volume 5, October 23 - 29, 2005 Page(s):2459 – 2462.
 33. **C.S. Levin.** Primer on Molecular Imaging Technology. *European Journal of Nuclear Medicine and Molecular Imaging* Volume 32, Supplement 2, December 2005, p.S325-45.
 34. A.M.K. Foudray, F. Habte, **C.S. Levin**, P.D. Olcott. Positioning Annihilation Photon Interactions in a Thin LSO Crystal Sheet with a Position-Sensitive Avalanche Photodiodes. Submitted to *IEEE Transactions on Nuclear Science* 53 (5): 2549-2556 Part 1 OCT 2006.
 35. P.D. Olcott, **C.S. Levin.** Image Processing Algorithms to Facilitate and Enhance Sentinel Node Detection Using a Hand-Held Gamma Ray Camera in Surgical Breast Cancer Staging. *Physica Medica* VOL. XXI · SUPPLEMENT 1 · 2006, pp.99-101.
 36. A.M.K. Foudray, F. Habte, G. Chinn, J. Zhang, **C.S. Levin**, P.D. Olcott. Optimization of a Cylindrical PET Breast Imaging System Comprised of Position Sensitive Avalanche Photodiodes Utilizing Monte Carlo Simulation. *Physica Medica* VOL. XXI SUPPLEMENT 1 2006, pp. 64-67.
 37. J. Zhang, G. Chinn, A.M.K. Foudray, F. Habte, P.D. Olcott, **C.S. Levin.** Evaluation of a Dual-Head PET Camera Design Dedicated to Breast Cancer Imaging. *Physica Medica* VOL. XXI · SUPPLEMENT 1, 2006, pp. 94-98.
 38. **C.S. Levin**, F. Habte, A.M.K. Foudray, J. Zhang, G. Chinn. Impact of High Energy Resolution Detectors on the Performance of a PET System Dedicated to Breast Cancer Imaging. *Physica Medica* VOL. XXI · SUPPLEMENT 1, 2006, pp. 28-34.
 39. P.D. Olcott, F. Habte, **C.S. Levin**, A.M.K. Foudray. Performance Characterization of a Miniature, High Sensitivity Gamma Ray Camera. *IEEE Transactions on Nuclear Science* 54(5) 1492-1497 Part 1 OCT 2007.

40. F. Habte, A.M.K. Foudray, P.D. Olcott and **C.S. Levin**. Effects of system geometry and other physical factors on photon sensitivity of high resolution positron emission tomography. *Physics in Medicine and Biology* 52 (2007) 3753-3772.
41. J. Zhang, P.D. Olcott, and **C.S. Levin**. A new positioning algorithm for position-sensitive avalanche photodiodes. *IEEE Transactions on Nuclear Science*, Volume 54, Issue 3, Part 1, June 2007 Page(s):433 – 437.
42. J. Zhang, A.M.K. Foudray, P.D. Olcott, C.S. Levin. Performance characterization of a novel thin position-sensitive avalanche photodiode for high resolution positron emission tomography. *IEEE Transactions on Nuclear Science* Volume 54, Issue 3, Part 1, June 2007 Page(s):415 - 421.
43. J. Zhang, P.D. Olcott, **C.S. Levin**. Monte Carlo simulation study on the performance of a novel dual-panel PET camera dedicated to breast cancer imaging. *Medical Physics* February 2007 -- Volume 34, Issue 2, pp. 689-702.
44. S. Keren, O. Gheysens, **C. S. Levin** and S.S. Gambhir. Characterization of a small animal time-domain fluorescence tomography imaging system. *IEEE Transactions on Medical Imaging*. Volume 27, Issue 1, Jan. 2008 Page(s):58 - 63.

C. Research Support

R01CA119056 (Levin, C. PI) 8/01/06-7/31/11
 NIH/NCI/NIBIB
 Title: Advanced PET System Dedicated to Breast Cancer Imaging
 Goal: To construct a high performance 1 mm resolution breast-dedicated PET system prototype

R01CA120474 (Levin, Craig, PI) 07/01/07-6/30/12
 National Institutes of Health (NCI)
 Title: Enhancing Molecular Cancer Imaging with Cadmium Zinc Telluride PET
 Goal: Study a new photon detector crystal material to substantially enhance molecular cancer sensitivity of PET.

R33 EB003283 (Levin, C., PI) 8/01/05-7/31/08
 NIH/NIBIB
 Title: New Scintillation Light Detection Concepts for PET
 Goal: To build several ultra-high resolution PET detector modules using a new scintillation detector technology based upon position sensitive avalanche photodiodes, successfully developed under the R21 phase, for a 1 mm resolution small animal PET system.

P50CA114747 (Gambhir, Sanjiv, PI) 9/01/05-8/31/10
 National Institutes for Health (NCI)
 Title: In-vivo Cellular and Molecular Imaging Center (ICMIC)
 Goal: Small animal imaging resource to support ICMIC small animal imaging projects.
 Role: PI of Small Animal Imaging Core of the P50

12IB-0092 (Levin, Craig PI) 8/01/06-7/31/07
 California Breast Cancer Research Program
 Title: Technologies to enhance the role of PET in Breast Cancer
 Goal: Investigate new imaging technologies for PET breast cancer imaging

Industry-sponsored research grant (Levin, Craig PI)
 GE Healthcare 3/01/07-2/28/10
 Title: A combined PET/MR system
 Goal: To develop a PET insert for an MR system without compromising performance of either.

R13 CA110775 (Levin, Craig, PI) 10/01/04-9/30/09
Conference grant
National Institutes for Health (co-sponsored by NCI and NIBIB)
Title: Workshop on the Nuclear Radiology of Breast Cancer
Goal: Assemble scientists and physicians to discuss status of radionuclide breast cancer imaging.
Role: PI

Completed (past three years)

RG-01-0492 (Levin, C., PI) 6/01/02-8/31/05
Whitaker Foundation
Novel Compact Gamma Ray Imager for Improved Surgical Staging of Cancer
To develop a compact, high sensitivity gamma ray emission camera for surgical staging of cancer
Role: PI

R21 CA098691-01 (Levin, C., PI) 7/01/04-6/30/06
NIH/NCI
A New Photon Sensor to Improve Molecular Cancer Imaging
Initial studies to develop a novel scintillation-based PET camera dedicated to breast cancer imaging.
Role: PI

R21 EB003283 (Levin, C., PI) 8/01/04-7/31/06
NIH/NIBIB
Title: New Scintillation Light Detection Concepts for PET
Goal: To build several ultra-high resolution PET detector modules using a new scintillation detector technology based upon position sensitive avalanche photodiodes, successfully developed under the R21 phase, for a 1 mm resolution small animal PET system.
Role: PI