Paul L. Carson, Ph.D.
Active Emeritus Professor of Radiology
Active Emeritus Professor of Biomedical Engineering
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FORMAL EDUCATION

1961-65	Colorado College, Colorado Springs, Colorado, B.S. Degree in Physics, 1965 Magna Cum Laude
1962	University of Denver, Denver, CO, Summer
1964	Columbia University, New York City, New York, summer (space physics)
1965-66	Harvard University, Cambridge, Mass. (high energy physics)
1966-71	University of Arizona, Tucson, AZ, M.S., Degree in Physics, 1969, Ph.D., Degree in Physics, 1972, (Low energy nuclear physics)

ACADEMIC APPOINTMENTS

1962-64	Laboratory Assistant, Colorado College, Colorado Springs, CO.
1965	Research Assistant, Massachusetts, Institute of Technology, Summer.
1965-66	Research Assistant, Harvard University.
1966-71	Graduate Assistant in teaching and research, University of Arizona.
1971-73	Instructor, Department of Radiology, University of Colorado Health Sciences Center, Denver, CO.
1971-76	Coordinator of Medical Physics Training Program and, 1976-77 Codirector, Ultrasound Technology training program, Department of Radiology, University of Colorado Health Sciences Center, Denver, CO.
1973-78	Assistant Professor, Department of Radiology, University of Colorado Medical Center, Denver, CO.
1978-81	Associate Professor, Department of Radiology, University of Colorado Medical Center, Denver, CO.
1981-84	Associate Professor of Radiology and Director, Radiological Physics and Engineering, Department of Radiology, University of Michigan, School of Medicine and Hospitals, Ann Arbor, MI.
1984-2008	Professor of Radiology and Director, Basic Radiological Sciences, University of Michigan Medical Center, Ann Arbor, MI.
1988->2017	Professor of Biomedical Engineering, University of Michigan, Ann Arbor, MI
2001->~2010	Collegiate Professor of Basic Radiological Sciences, Department of Radiology, University of Michigan Medical Center, Ann Arbor, MI.

2008->2017 Associate Director, Basic Radiological Sciences, University of Michigan Medical Center, Ann Arbor, MI.

~2010->2017 Professor of Radiology, University of Michigan Health Sciences System, Ann Arbor, MI.

2017-> Active Emeritus Professor of Radiology and Emeritus Professor of Biomedical Engineering, University of Michigan Health Sciences System, Ann Arbor, MI.

2011-> Concurrent Professor, Nanjing University, Nanjing, China

2011->2013 Scientific Coordinator, Quantitative Imaging Biomarkers Alliance, Radiological Society of North America

2013->2020 Ultrasound Facilitator, Quantitative Imaging Biomarkers Alliance, Radiological Society of North America

SCIENTIFIC ACTIVITIES AT LOCAL, STATE, OR NATIONAL LEVELS

1972-> American Association of Physicists in Medicine:
Chairman, Committee on General Medical Physics, 1974-77
Member of the Science Council 1974-77, 1979-~82
Program Chairman of 1974 Summer School
President of Rocky Mountain Chapter, 1975-76
Representative or alternate representative to ACEMB, 1974~79
Representative to Acoustical Society Medical Standards Board, 1981-~1990
Member of Scientific Program Committee, 1976-77
Chairman, Ultrasound Task Group, 1977-82
Member of Board of Directors, 1979-82
Member NMR Committee and Chairman, NMR Site Planning Task Group, 1982-86
Reviewer, Young Investigators Prize, 1982-4, 1988-91
President-Elect, President and Past-President, 1986-1988
Chairman, Ad Hoc Committee on Medical Physics Diversification, 1986-87
Executive Committee 1986-88
Nominating Committee, Chairman, 1988, Member, 1989-97
Ultrasound Task Group, 1988-89
Representative to Radiology Centennial, 1989-96
Member, Development Committee, 1989- 93, 1995->
Member, Awards Selection Committee, 1990-99
Member, Subcommittee on Graduate Fellowship Selection, 1991->
Member, Research Committee, 1989-1992, (as liaison to Acad. Radiol. Res.) 2001->
Member, Council on Special Interest Groups, 1989-1996
Member, Ultrasound Committee/Subcommittee, 1990-93, Resource Member 1993-2008, Member, 2009-
AIP Board and Executive Committee Representative, 1989-1993
Representative to AIUM/FDA/NEMA Standards Committee on Real Time Labeling of Ultrasound Systems , 1990-92.
Chairman, Radiological Sciences Centennial Ad Hoc Committee, 1991-96
Consultant, Ad Hoc Committee on the Future of Medical Imaging, 1991
Member, Subcom. on Secondary and Community College Educ'n, 1997-98
Member, Ultrasound Task Group No. 1 QA, Phantoms, Standards 1998->
Member, Task Group No. 8 Women in the AAPM, 1998-2000
Member, Secondary Education & Teaching Subcommittee 1999->
Member, Development, Planned Giving Subcommittee, 2000-2009
Cochair, Chair, Member Research Task Group No. 1, NIBIB Implications 2001->2005
Member, Presidential Ad Hoc Committee on Imaging, 2001-3
Representative to Academy of Radiology Research, 2001-2005 or ->

Member, Working Group on Quantitative B-mode Ultrasound QC Test Development, 1995 – 2009, 2012-2015
Member, TG146 BIROW V Conference, …-2009
Chair, Imaging Physics Committee, 2006->2007
Vice Chair, Science Council, 2006->2007
Member, Imaging Physics Committee, 2008, 2015-
Member, Science Council, 2008-2011
Member, Member [AHETAI] Ad Hoc Committee on the Establishment of a Technology Assessment Institute, 2009-2014
Member, Member [TG193] Task Group No. 193 - Image-Guided Focused Ultrasound Surgery (FUS), 2009-2012
Member, [AHCSP] Ad Hoc Committee on Strategic Planning, 2010-
Member, [AH] Awards and Honors , 2010-
Member, MRgFUS, TG241 MR-Guided Focused Ultrasound, 2013-2015, 2021
Member, TG 333, MRI-guided Focused Ultrasound QA, 2017-19
Chair, Ultrasound Subcommittee, 2015-17, Member 2017-19, 2021->
Member US01, Working Group on Quantitative B-mode Ultrasound QC Test Development, 2012-> 2021
Member, TG 316 - Ultrasound Modality-Specific Display Presentation Consistency, 2018->
Member, TG 353 - Pulsed Doppler and Color Flow Ultrasound System Performance Assessment using Flow Phantoms, 2020->

Inauguration of the Carson/Zagzebski Lectureship, ~2016

1973-> American Institute of Ultrasound in Medicine:
Standards Committee Chairman 1976-78
Standards Committee Member, 1973-76 and 1986-92
Vice Chairman 1974-76, 1978-1984; Resource Member or Member, 1992->
Chairman, Sub-committee on Standard Presentation and Labeling, 1974-78; Vice Chairman, 1982-89
Chairman, Manufacturer's Commendation Panel, 1976-7
Manufacturer's Commendation Panel Member, 1979-83, 1989-92
Board of Directors Member, 1976-83, 1995-98
Vice President, 1978-80
ACEMB Committee, 1977-79
Member, AIUM/NEMA Joint Task Group on Safety Standards, 1977-82
Member, Membership Committee, 1979-82
Chairman, Administrative Council, 1978-80
Chairman, Council on AIUM Sections, 1979-82
Chairman, Joint Committee on Guidelines for Education in OB Gyn Ultras., 1980-82
Chairman, Executive Director Search Committee, 1978
Member, Publications Committee, 1983-86

Member, Central Program Committee, 1982-85
Chairman, Tissue Characterization Symposium, 1983-85
Member Instrumentation and/or Tissue Characterization Review Committee, 1980-86
Member, AIUM/NEMA Joint Task Group on Safety Standard Revisions, 1985-91
Member, AIUM/NEMA Joint Task Group on Ultrasound System Performance Measures, 1983-89
Member Ad Hoc Committees on FDA Fetal Regulation and Bioeffects Thresholds, 1987
Member AIUM/FDA/NEMA Standards Committee on Real Time Labeling of Ultrasound Systems and Thermal Index Task Group thereof, 1989-92.
Bioeffects Committee, Resource Member 2000->2019
Member, AIUM/NEMA Joint Task Group on Output Measurement Standard Reconciliation (later Output Standards Subcommittee), 1992-> Cochair 2003->2010?
Liaison to NCRP, 1995-~98
AIUM IEC Subcommittee, Member, ~2005->
Working Group on Developing Quantitative QC tests for Doppler Ultrasound, Member 2018-2021

1974-76 Chairman, Denver Regional Diagnostic Ultrasound Group.

1974-78 Alliance for Engineering in Medicine and Biology:
Project Advisory Committee
Finance Committee
Administrative Council.

1975-78 Consulting Editorial Board, Journal of Clinical Ultrasound.

1975-79 Board of Directors, American Registry of Diagnostic Medical Sonographers, Member, responsible for physics exams.

1976-86 Associate Editor, Medical Physics.

1976- Reviewer, Int. J. Radiation Oncol., Biol., Physics, Radiology, 1986-
Reviewer, Medical Physics, J. Acoust. Soc. Amer., many more.

1976-78 Health Physics Society: Chairman of Proceedings Committee, 1976 Mid Year Topical Symposium, Operational Medical Health Physics

1976-78 National Science Foundation Ultrasound Tissue Signature Data Exchange, Member, Project Working Group.

1976-79 Acoustical Society of America: Member, Committee S1 on Medical Equipment Standards

1977-84 NCI Ad Hoc Diagnostic Review Committees and Radiology Study Section Guest Reviewer.

1977-80 Participated in portions of several winter institutes in Medical Physics on topics of professionalism.

1977-> American College of Radiology:
Member, Commission on Physics and Radiation Protection, 1987-92
Member, Committee on Physics Resources, 1988-89
Chairman, Subcommittee on Physics Manpower in NMR, 1983-85
Member, Committee on Research and Technology, Commission on Ultrasound, 1978-82, 1992-98
Member, Committee on Bioeffects of Ultrasound, 1982-91
Alternate Counselor, Steering Council, 1986-89
AAPM Representative to Intersociety Commission, 1986-89
Member, Committee on MR Technology, 1983-85
Member, Sub-Committee on MR Phantoms and Nomenclature, 1984-90.
Member, Ultrasound Accreditation Committee, 1994-2002
ACR representative, Collaborative Committee to revise the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Real Time Ultrasound Equipment, 2015-2016

1980-> National Council on Radiation Protection and Measurements
Member, NCRP Committee 66--Biological Effects of Diagnostic Ultrasound, 1980 -
Council Member, 1990-1996.

1981-86 Editorial Board, Medical Ultrasound and J. Diagnostic Medical Sonography.

1978-> International Electrotechnical Commission, TC 87--Ultrasonics (formerly SC 29D):
Working Group 9--Pulse Echo Diagnostic Equipment Standards, Acting U.S. Representative, 1978; U.S. Representative, 1981->; CoConvenor, ~2011->2019; Chair, US QC Task Group, WG9, 2010->; Chair, Task Group on US Spatial Measurement Systems ~1999-2006
Working Group 8--Ultrasonic Field Measurement, Acting U.S. Representative, 1992.
Member, US Technical Advisory Group, International Electrotechnical Commission, TC 87, 1991-. Liaison to RSNA, ACR.
Working Group 10—Doppler Ultrasound, Observer, 1981-2008, Member, 2008-> ~2016
Working Group 6 – Therapeutic Ultrasound, Member, 2008->.

1982-> Radiological Society of North America:
RSNA/AAPM: Program Committee/Subcommittee on Nonionizing Modalities, 1982-87
RSNA Refresher Course Committee, 1989-95
3rd Vice President, 1990-91
Representative to US Technical Advisory Committee, International Electrotechnical Commission, TC 87, 1991-
Participant, RSNA/Centennial Future of Radiology Panel, June, 1993
Educational Exhibits Award Committee, 2001?-2003
Quantitative Imaging Biomarkers Alliance, Scientific Coordinator, 2011 - >; Facilitator of PDF MRI, fMRI, COPD/Asthma, Technical Committees 2011-2012 and of fMRI, COPD/Asthma, SWS Ultrasound 2012-2013; Member Metrology Performance Work Group, 2012-2013; Coordinator of Ultrasound 2013->; ExOfficio Member Ultrasound Shear Wave Speed Biomarker Committee and its Clinical and Applications and Systems Dependence and Phantoms Working Groups 2012->; ExOfficio Member, Ultrasound Volume Flow, 2015-> and Contrast Enhanced Ultrasound, 2016-> Biomarker Committees

1982-86 World Federation of Ultrasound in Medicine and Biology - Standards Committee.

1983-91 Editorial Board, International Journal of Cardiovascular Imaging.

1984-88 Diagnostic Radiology Study Section, regular member.

1985-88 Society of Magnetic Resonance in Medicine.
Member, Instrumentation Committee
Member, Phantoms and Nomenclature Subcommittee, 1985-89

1989-> Regular Reviewer/Outstanding Service, Radiographics

1986-88 Council of Scientific Society Presidents.

1986-89 Intersociety Commission on Radiology-Delegate.

1988-92 NIH Reviewers Reserve.

1988-95 Radiology Centennial, Inc.
Member, Executive Committee, 1989 -
Member, Budget and Finance Committee, 1989 -
Member Audiovisual Committee, 1989 -
AAPM Representative, 1988-.
Chairman, Secondary Schools Educational Modules Subcommittee, 1993-95

1989-93	American Institute of Physics: Board of Directors Member 1989-93 Executive Committee Nonvoting Representative, 1989-1991. Executive Committee Member, 1991-1993.
1990-96	American Board of Radiology, Diagnostic Physics Exam Committee Consultant
1993-98	Michigan Radiological Society, Physics Ad Hoc Committee
1994-95	Reviewer, J. National Cancer Institute
1994->	Scientific Sessions and Symposia Organized/Chaired Recently AAPM, Anaheim, July 24-28, 1994 Advanced Imaging Arrays and Algorithms
1993->	Consultant to the Radiological Devices Panel, member 2011->; other panels of the Medical Devices Advisory Committee and the Center for Devices and Radiological Health
1996->2006	Editorial Board, Journal of Ultrasound in Medicine. Guest Editor, Special Section, 1998
1997-~2004	Member US Army Medical Research and Development Command Breast Cancer Research Study Sections
2002-2005	Member, Board of Directors, Academy of Radiology Research
2001-2006	Founding Chair, then member. Executive Committee, Intersociety Biomedical Imaging Research Opportunities Workshop.
2004-	NIBIB Study Sections (SS): Chair NIBIB Conference Grant SS 2/04, Member Training Grant SS 2/04
2004-	Member Bioeng. Research Partnerships Study Section 6/04
2006-	Chair, NIH, Center for Scientific Review Special Emphasis Panel, ZRG1 SBIB-L (51) R, May 23
2006->	Many other NIH scientific review panels
2013->	TomoWave Laboratories, Inc., Scientific Advisory Board

GRANT SUPPORT

a) Past Research Support as PI

1973 Constant Depth Ultrasonic Scanning - Technique Development Research Assistance Fund, January-June, P.I.

1974 Quality Control in Ultrasound, Colorado Regional Medical Program, P.I.

1975 Localization and Diagnosis of Neoplasms with Ultrasound, Milheim Foundation for Cancer Research, 1 year, P.I.

1976 Ultrasound Transmission Tomogram Reconstruction, Institutional Research Funds, January-June, P.I.

1976-78 Training in Ultrasound Instrument Performance Evaluation, Contract addition from N.C.I., October, 1976-October, 1978, Principal Scientist, $50,000.

1976-79 Assessment of the Medical Potential of Ultrasound Transaxial Tomography by Reconstruction, National Science Foundation, May, 1976-May, 1979, P.I., $365,000.

1977-79 Development of a Tissue Equivalent Phantom for Training in Diagnostic Ultrasound, Contract from the Food and Drug Administration, October, 1977-February, 1979, P.I., $63,000.

1979-80 Practical Measurements of Ultrasonic Emissions, Contract from the National Electrical Manufacturers' Association, July, 1979-December, 1980, P.I., $102,000.

1979-86 Ultrasonic Computed Tomography of Breast Cancer, National Cancer Institute Grant #RO1 CA25323 RAD, April 1, 1979-June 30, 1982, P.I., $340,000 total direct and #RO1 CA37857 July 1, 1982-June 30, 1985, P.I. $413,000 direct.

1980-81 Ultrasonic Determination of Fetal Maturity, Contract with Rohe Scientific Inc., July 1, 1980-December 31, 1980, P.I., $50,000 direct, January 1, 1981-December 31, 1981, P.I., $125,000 direct.

1980-83 Development of an Acoustically Coupled Test Generator, Nuclear Associates, Inc., October 1,

1980-March 31, 1983, P.I., $11,750.

1983-90 Ultrasonic Evaluation of Fetal Lung Maturity,
NIH 2 R01 HD17243, P.I.: Paul L. Carson, Ph.D.
Objective: Assess fetal lung maturity, primarily by attenuation, dominant scatterer dimensions, and relative echogenicity, PLC Role: 20%, Total of $800,000 direct.

1991-96 Ultrasonic Generation and Use of Microbubbles for Diagnosis and Therapy,
NIH-RO1 DK42290
Objective: Create and/or sustain microbubble contrast agents with ultrasound for urinary tract
P.I.: Paul L. Carson, 25%, $100,012/yr., direct, $309,475 total direct, with no cost extension to 12/31/97.

1996-00 Enhanced Color Flow Imaging of Breast Cancer
NIH 1R01CA55076
Objective: To improve the diagnosis and of treatment of patients with breast cancer through development and evaluation of more effective techniques for Doppler color flow imaging and quantification
P.I.: Paul L. Carson, 20%, $146,000/yr., direct, $655,000 total direct

1996-00 3-D Ultrasound Vascularity Assessment for Breast Cancer Diagnosis
US Army Medical Research and Development Command MM 95084
Objective: To demonstrate automated image coregistration, and development of image-based 3D position registration, ductography and initial compounding studies.
P.I.: Paul L. Carson, 19%, $142,000/yr., direct

Biomedical Imaging Research Opportunities Workshops, NIBIB Conference Grant.
P.I.: Paul L. Carson, $20,000/yr., direct.

2004-05 Authorizer Application Development and System Evaluation, NIST Cooperative Agreement No. 2001-00-4392, through Cross Match Technologies, Inc.
Develop and test new biophysical indices from finger anatomy and physiology using commercial and developed 3D ultrasound scanners.
PI: Paul Carson, Ph.D. 20%, 2/15/04, Direct Costs, $122,000.

b) Other Past Funded Research

1971-75 Primary responsibilities were to a project, Clinically oriented training in Medical Physics, N.I.H., July, 1971-June, 1975.W. R. Hendee, Ph.D., P.I.

1974-78 South-west Center for Radiological Physics. Senior Scientist. June,1974-July, 1978. W. R. Hendee, Ph.D., P.I.

1977-78 Millimeter Wavelength Thermography, NIH. Grant, June, 1977-December, 1978, W. R. Hendee, Ph.D., P.I., Senior Scientist.

1982-83 Ultrasonic Imaging of Tongue Motion, LS & A Grant, Coinvestigator.

1983-86 Automatic Processing of Digital Echocardiography, National Heart, Lung and Blood Institute, A. Buda, M.D., P.I., Consultant.

1984-85 Radiologic Staging of Non-Small Cell Lung Cancer,
American Cancer Society, G. Glazer, M.D., P.I., Consultant.

1984-87 Research in MR Imaging and Spectroscopy and Digital Image Analysis, G.E. Medical Systems, Coinvestigator.

1984-87 Automated Analysis of MRI System Performance, Diasonics, Inc., Co-P.I.

1985-88 Techniques for Characterization of Atherosclerotic Plaque National Heart Lung and Blood Institute, P.I., C. R. Meyer, Ph.D. Objective: Intra-arterial imaging and tissue characterization with ultrasound PLC Role: Coinvestigator/consultant, 0%

1986-87 Fabrication Techniques for Monolithic Transducers for Medical Ultrasound Imaging, NIH Biomedical Research Support Grant (Vice-President for Research)P.I: Andrew L. Robinson, Ph.D. PLC Role: 0%, 2% actual, coinventor, supervise acoustical design and testing

1986-88 Technology for Fabrication of Device Arrays for Ultrasound Imaging and Materials Characterization, NSF Expedited Award for Novel Research P.I.: Andrew L. Robinson, Ph.D. Objective: 2-D array construction by solid-state electronics technology. PLC Role: 2%, Coinventor, supervise acoustical design and testing

1986-89 Determination of In Vivo Tumor Volume, American Cancer Society, Career Development Award. P.I.: David Williams, M.D. Objective: Self explanatory PLC Role: Sponsor/Mentor, 0%

1987-90 Integration/Evaluation of MRI-Assisted Treatment Planning,
NIH 1 RO1 CA43200, P.I. Benedict Fraass, Ph.D.
Objective: Self explanatory.
PLC Role: 5%, Develop and supervise CT and MR QC and implement automated performance evaluation for treatment planning.

1987-90 Doppler Ultrasound Flow Imaging in Breast Cancer Diagnosis, American Cancer Society, Career Development Award, P.I. Dorit Adler, M.D.,
Objective: This attempts to detect abnormal vasculature in human breast tumors using color flow imaging. No overlap.
PLC Role: Sponsor/Mentor, 5%.

1987-91 National Collaborative Diagnostic Imaging Trials, NIH
P.I.: Isaac Francis, M.D.
Objective: MR and ultrasound of prostate and MR & CT of mediastinal nodes
PLC Role: 2%, help implement QC of cross-sectional imaging

1987-95 University of Michigan Cancer Center, Tumor Imaging Core, NIH.
P.I.: Isaac Francis, M.D.

PLC Role: 0%. Consultant, represented department at weekly preparatory meetings, and presented proposal, 1986-87

1992 NIH, 3 RO1 DK42290 02S1, Research Supplement for Underrepresented Minorities -- Ultrasonic Generation and Use of Microbubbles for Diagnosis and Therapy, Paul L. Carson, Ph.D., P.I., 0%, $18,558, study of acoustic collection and movement of microbubbles to demonstrate urinary reflux.

1990-93 Microelectronic Transducer Array and Electronics - Whitaker Foundation, A. Robinson, Ph.D., EECS, P.I., $49,860 direct, $59,712 1st yr. total, 7/1/90-6/30/93, Consultant, 0%.

1992-2010 Vascular Bubble Generation for Diagnosis and Therapy
NIH 1R01 HL54201, changed to 5 R01 EB000281
Objective: Develop, controlled generation of arterial microbubbles using focused ultrasound pulses to delineate the technique's potential for medical use and for understanding of ultrasound bioeffects
P.I.: Paul L. Carson, Ph.D. 0.60 cal months, no cost time extension

1993-95 NIH 1 R43FD01500, In Vitro, In Vivo, Acoustic Characterization: Aerosomes, JP Fowlkes, Subcontract PI, Consultant, 2%, $57,223 total U of M direct.

1994-95 Ethicon Endo-Surgery, Investigation of Cavitation Mechanisms in the Performance of Ultrasonic Scalpels, JB Fowlkes, PI, Coinvestigator, 3%, $48,810 direct, 8 mo.

1987-96 Automated Analysis of Magnetic Resonance Imaging System Performance, Veterans Administration Merit Review Grant, P.I.: James Ellis, M.D.
Objective: Develop phantoms and software for QC and acceptance testing
PLC Role: Co.-P.I., 05%. Primary responsibility for developmental work.
1987-90 -- $43,000/yr., 1990-93 -- $65,000/yr., 1993-96 -- $84,000/yr, with no cost extension to 9/30/97.

1995-98 NIH, Prostate Cancer Diagnosis and Staging by Sonography. 1-P50 CA69568, P.I., Robert Bree, M.D.

PL Carson, Co P.I., 20% 1st yr., 10% yrs. 2 & 3, $100,447 1st year direct, $308,640 direct, total. Project of a SPORE in Prostate Cancer, Kenneth Pienta, M.D., P.I.

1997-00 US Army Medical Research and Development Command, Ultrasonic Perfusion Measurement for Breast Cancer Diagnosis
Objective: Develop ultrasonic measurements of perfusion for breast cancer and other medical diagnosis and treatment assessment.
JB Fowlkes, PI, Coinvestigator, 7%, $100,250 direct Yr 1, $399,500 total direct (6/1/94-5/31/98).

1999-01 NIH SBIR Breast Cancer Detection by Electromechanical Palpation
Objective: Imaging of detectable hardness of breast tissues is proposed by sensing stress across a pressure-sensitive array. The technique offers relative simplicity, low cost and similarity to palpation with which many clinicians are familiar.
Subcontract to Artann Laboratories, Inc., Armen Sarvazyan, Ph.D., P.I.,
Subcontract P.I., M. Helvie, M.D., Co-P.I., 8%, ~$70,811/yr., $140,008 total direct.

1998-01 Ultrasonic Generation and Use of Microbubbles for Diagnosis and Therapy, NIH-RO1 DK42290
Objective: Create and/or sustain microbubble contrast agents with ultrasound for urinary tract
P.I.: J. Brian Fowlkes, Ph.D., coinvestigator, 15%, ~138,000/yr., direct, ~$424,000 total direct.

1999-01 Potential method improving the sonographic detection of prostate carcinoma
UMMC- Clinical Research Partnership (Bude)
Objective: To evaluate methods of controlling hyperemia to improve sonographic detection of prostate carcinoma
Co-P.I., ~5%, $50,000/yr.

2000-01 Portable Mechanical Imaging Device for Prostate Cancer Detection.
NIH SBIR Phase I.
A system is to be tested for imaging of relative hardness of the prostate. The technique offers relative simplicity, low cost and similarity to palpation with which many clinicians are familiar. The mechanical imaging also offers a better possibility for comparison of serial exams than does simple manual palpation.
Subcontract to Artann Laboratories, Inc., Armen Sarvazyan, Ph.D., P.I.,
Subcontract P.I., R. Bude, M.D., Co-P.I., ~0%, $6000/ 6 mo.

2001 Prostate Cancer Diagnosis and Staging by sonography: correlation of Histopathologic Measures with Quantitative and Qualitative Contrast Enhanced 3D Color Flow Doppler Ultrasound
UMMC Clinical Research New Initiative Application
P.I.: Hanh V. Nghiem, M.D., Co-P.I., 0%.

2000-03 Ultrasonically-Induced Vaporization of Perfluorocarbon Droplets for Occlusion Therapy of Breast Cancer US Army, MRDC BAA, Breast Cancer Research
The major goal of the project is to develop and test perfluorocarbon droplets for use in occlusive therapy of breast cancer.
P.I.: J. Brian Fowlkes, Ph.D., coinvestigator, 4%, ~$74,000/yr., direct

2000-04 Ultrasound Techniques for Tumor Perfusion Measurements in Liver
NIH 1R01 DK56658
P.I.: J. Brian Fowlkes, Ph.D., coinvestigator, 4%.
Description: The goal of this project is to test various methods for measuring liver perfusion with ultrasound contrast agents.

2004-05 Authorizer Application Development and System Evaluation
Research agreement with Cross Match Technologies, Inc.
PI: Paul L. Carson, 15% effort
$121,903 (total award directs), $81,269 (annual direct)

2005-06 Photoacoustic Tomography of inflammatory arthritis, Arthritis National Research Foundation
Roll: Mentoring of P.I., Xueding Wang, Ph.D.
Objective: Verify the capability of functional photoacoustic tomography in diagnosis and monitoring of inflammatory arthritis

2004-05 Evaluation of Initial Ultrasound Systems From Sonetics Ultrasound, Inc.
Sonetics Ultrasound This project is a collaboration with Sonetics Ultrasound Inc. to develop a portable 3D ultrasound scanner. Our group at the University of Michigan will provide expertise in the development and testing of ultrasound imaging systems including the initial array subsystem. The research provides for the initial phase of subsystem testing in order to demonstrate proof of concept for the MTTC project. This portion of the effort will assist in the development of the array subsystem which covers five stages of design and testing.
PI: J. Brian Fowlkes, Ph.D., 10%, Direct Costs, $91,107

2004-06 Evaluations of prototype ultrasound arrays from Sonetics Ultrasound Inc
NSF Phase IIb
PI: J. Brian Fowlkes (of sub award), 5%, $74,921 (total sub award directs)

6/1/02-08 Automatic 3D Registration for Enhanced Cancer Management
NIH 1 P01 CA87634
The general theme of the P01 is to apply 3D registration techniques to a variety of clinical cancer management problems in a preclinical setting to demonstrate potential benefits over existing methods.
Project 3 (Carson project) is directed toward 3D ultrasound image volume registration for quantitatively following patients' responses to chemotherapy. This involves existing registration and calculation techniques (or simple extensions thereof) for registering highly distorted breast volumes and assessing lesion volume and vascularity change without conventional segmentation.
P.I.: Charles R. Meyer, Ph.D., Proj. 3 director, 25%, Direct Costs, Yr 01
$1,412,922

2007-08 Evaluation of Initial Ultrasound Systems From Sonetics Ultrasound, Inc.
Sonetics Ultrasound: This project is a collaboration with Sonetics Ultrasound Inc. to develop a portable 3D ultrasound scanner. Our group at the Univ of Michigan will provide expertise in the development and testing of ultrasound imaging systems including the initial array subsystem. The research provides for initial phase of subsystem testing in order to demonstrate proof of concept for the MTTC project. This portion of the effort will assist in development of the array subsystem which covers five stages of design and testing.
PI: J. Brian Fowlkes, Ph.D., 10%, Direct Costs, $91,107. Role: Co-Investigator

2007-08 Evaluations of prototype ultrasound arrays from Sonetics Ultrasound Inc
NSF Phase IIb
PI: J. Brian Fowlkes (of sub award), 5%, $74,921 (total sub award directs)

2007-08 Technology Development for a Portable Real-time 3D Ultrasound Unit
State of Michigan 21st Century Jobs Fund
PI: J. Brian Fowlkes (of sub award), 10%, $239,927 (total sub award directs)

2007-09 Spectroscopic Photoacoustic Tomography of Prostate Cancer
DOD New Investigator Award
Objective: Adapt SPAT technology to prostate cancer imaging and evaluation, and fill the existing void in the early diagnosis, localization and accurate grading of prostate cancer, as well as in future treatment planning and therapeutic monitoring
PI: Xueding Wang, Ph.D. Role: Co-Investigator

2007-09 High-frequency 3-Dimensional ultrasound elasticity imaging of the cornea
R21 EY018727, NIH. To develop and test high-frequency three-dimensional elasticity measurements on corneal tissue.
PI: Kyle Hollman, Ph.D., 0% effort. Role: Mentor

2007-09 Assessment of Emerging Technology: Comparison of Breast Tomosynthesis and Digital Mammography in the Evaluation of Heterogeneously Dense and Extremely Dense Breasts
PI: Alexis Nees, M.D. 0% effort, Consultant

2005-09 Chemotherapy with Injectable Microdroplets
Yale University, Agreement of 9/7/05 (Kripfgans, O.D.) This research is a combination of Acoustic Droplet Vaporization (ADV) for occlusion therapy and simultaneous drug delivery for chemo-therapy from drugs locally released from droplets during ADV. Existing droplet emulsions will be tested and refined and in vivo verification will focus on localization.
PI: Oliver D. Kripfgans, PhD, 0.48 cal mos, $37,909. Role: Co-Investigator

2006-11 2D Silicon Transducer Compression Plates for Breast Ultrasound,
NIH BRP 1 R01 CA115267. The BRP is to develop a standalone breast imaging system mammographic-type compression paddles replaced by large ultrasound transducer arrays. The U of M subcontract is to implement the arrays in a standalone system, to evaluate basic imaging modes of these 2D arrays on either side of the breast, and to develop and demonstrate several advanced transmission and reflection modes.
PI: Kai Thomenius, Ph.D. U of M Subcontract P.I. Paul Carson, Ph.D., 13% Yr. 2, 23% Yrs 3-5.

2008-12 High-Resolution Integrated Ultrasound and Microwave Imaging for Early-Stage Breast Cancer Diagnosis, NSF CBET 0756338.
Objective: Develop a synergistic ultrasound-microwave imaging technique enabling robust early-stage breast cancer diagnosis. The hypothesis is that folding US-derived information regarding shape and location of unidentified masses and tissue, even if approximate, into quantitative nonlinear microwave

imaging will enable significantly increased resolution, spatial fidelity, and quantitative tissue characterization.
PI: Mahta Moghaddam, Ph.D. 0.60 cal mos, $72,950. Role: Co-Investigator

2008-13 Imaging of Inflammation and Treatment: Basic and Translational Potential
NIH R01 AR055179. To develop a novel noninvasive nonionizing light based imaging technology for molecular imaging an drug delivery research with both excellent sensitivity and high spatial resolution.
PI: Xueding Wang, Ph.D., 1.08 cal mos, $196,020. Role: Co-Investigator

2010-13 Novel Electromagnetic-Ultrasound Synergistic Technique for Treatment of Cancer,
DoD/BCRP Breast Cancer Collaborative Idea Award, BC095397P1.
This grant will investigate a dual-modality thermal ablation treatment system, with microwaves heating more generally for metastases and locations not treated well by ultrasound, as well as contributing to the focal lesion. Ultrasound will treat with higher spatial resolution. Eventually, this noninvasive microwave-ultrasound synergistic thermal (MUST) treatment technology could replace surgery for treating early stage breast cancers with greater accuracy for tumor borders and the ability to trigger systemic biological responses to induce antitumor immune response.
PIs: Mahta Moghaddam, Ph.D. and Paul L. Carson, 1.20 cal mos, $140,394

2002-08 Combined Digital X-ray and Ultrasound Breast Imaging
NIH BRP 1 R01 CA91713 A1: Major goal of this project is to develop and assess a combined full-field digital x-ray and 3D-ultrasound system for breast cancer diagnosis. Advanced ultrasound and x-ray breast imaging techniques particularly relevant to the combined system will be developed and evaluated.
PI: Paul Carson, Ph.D. 22%, ~9/1/02, Direct Costs, Yr. 01 $1.34M.

2008-14 Combined Digital X-Ray, Optical and Ultrasound Breast Imaging
NIH BRP 2 R01 CA91713 and its administrative supplement 3R01CA091713-07S1 (2009-2011): Program will develop a proof of concept system for performing all three, x-ray, ultrasound and optical, imaging modes in 3D and in the same view, with extraction of mutually beneficial image corrections and diagnostic information between the modes. Building on results of the previous BRP, a comfortable, compression system will be demonstrated that will show some of the capabilities of each of these modalities to guide development of clinical systems in a cost effective manner.
PI: Paul Carson, Ph.D. 4.20 cal months, Direct Costs, Yr. 04 $527,045. BRP Admin Supplement: 0.48 cal months, Direct Costs Yr 2, $314,239

2013-14 Substructural Neuromodulation by Ultrasonic Vaporization of Biochemical-loaded Perfluorocarbon Microdroplets
M-Cubed (University of Michigan): Prehuman study using microdroplets of an inert liquid that encapsulates either neuroactive agents for study of brain

function, or drugs, including possibly those that are too concentrated for use throughout the entire body. The droplet vaporization only in the few cubic mm focus of an ultrasound beam releases the agent only in the imaged volume of interest.
PI: Paul Carson with Luis Hernandez-Garcia (OVPR) and Joseph Bull (BME), $60,000 (1/1/2013-6/30/2014). 0%

2011-17 Quantative Imaging Biomarkers Alliance QIBA (Radiological Society of North America)
PI: Paul Carson. Scientific Advisor – Participation in planning for and guiding the QIBA Steering Committee and its associated projects and meetings.

10/1/11-9/29/12	30%
10/1/12-3/31/13	30%
~10/1/013-8/31/014	~10%
9/30/14 to 9/29/15	12.58% (1.51 cal mos)

2015 Ultrasound/DBT Prototype System Evaluation,
Research Agreement GE Global Research UoM N019172
PI: Paul Carson
$34,050 (2/1/2015-8/12/2016), 0.72 cal mos

2014-15 Photonic Acoustic Sensor System
Samsung Global Research Outreach
PI: Xueding Wang, PhD (Z Xie); Paul Carson, PhD, Co-investigator, 0.12 cal mos
$95,279 (9/1/2014-8/31/2015)

c) Current Grants

2019-23 Real time fine needle assessment of architectural heterogeneity in prostate cancer
NCI
PI: Guan Xu; Co-Investigator: Paul Carson 0.36 cal mos
$233,345 first yr., 01/18/2019-12/31/2023

2018-23 Combined radiation acoustics and ultrasound imaging for real-time guidance in radiotherapy
PI: Issam Al Naqa; Co-Investigator: Paul Carson 0.6 cal mos
$403,950, 09/05/2018-07/31/2023

d) Pending Grants

2016-18 Laser System for Clinical Photoacoustic Imaging Applications
Light Age, Inc. / NIH SBIR II
PI: Xueding Wang, Co-Investigator: Paul Carson 0.60 cal mos,
$303,570 (9/1/2016-8/31/2018).

CERTIFICATION AND LICENSURE

1976 Certified in Radiological Physics - American Board of Radiology, June.

1976 Certification in Clinical Engineering - Board of Examiners for Clinical Engineering Certification.

MILITARY SERVICE

None - 2 Years of ROTC.

HONORS AND AWARDS

1960-61 High school student body president

1958-61 Numerous middle and high school honors in academics and sports

1961-65 Boettcher Scholarship

1963- Member, Phi Beta Kappa, physical science and social science honor societies and Blue Key

1964- 65 College student body president

1965 Award for Outstanding Contributions to Colorado College
Graduated Magna Cum Laude

1972-76 Society of Photo-optical Instrumentation Engineers (SPIE) Conference Chair - Application of Optical Instrumentation in Medicine: I, 29 Nov 1972; III, 1 Aug 1974; V, 16 Sept 1976

1974-77 SPIE, Outstanding Service Award, 1974, Service Citation, 1977

1975 Tau Sigma (honorary fraternity) Outstanding Alumnus Award

1977 & 1980 President's Recognition Award, American Institute of Ultrasound in Medicine

1982 Fellow, American Institute of Ultrasound in Medicine

1984 Outstanding Scientific Presentation, Great Lakes Chapter, Health Physics Society

1989 Fellow, American Association of Physicists in Medicine (President, Chairman of the Board, 1987, 1988)

1990 Ultrasound in Medicine and Biology Clinical Prize for most innovative clinical paper of highest scientific quality published in UMB in 1989. (AL Scherzinger, RA Belgam, PL Carson, et al.)

1990 Fellow, Acoustical Society of America, for contributions to medical ultrasonics

1996 Fellow, American Institute for Medical and Biological Engineering

1997 Joseph H. Holmes Basic Science Pioneer Award, American Institute of Ultrasound in Medicine

1997 Fellow, American College of Radiology

1998 Distinguished Committee Service Award, Amer. Col. Radiol., for Research and Technology Assessment Committee

1999 Editor's Recognition for outstanding service in review of manuscripts for RadioGraphics

2001-> Endowed BRS Collegiate Professorship, University of Michigan Dept. of Radiology

Oct. 2004 Colorado College, Lois T. Benezet Alumni Award for outstanding Achievement in one's chosen field

Feb. 2005 Noted as in top 5% of NIH grant recipients over past 25 years

July 2008 William D. Coolidge Award, American Association of Physicists in Medicine

June 2011 Concurrent Professor, Nanjing University, Nanjing, China

June 2012 Distinguished Investigator, Academy of Radiology Research, Washington, DC

April 2013 William J. Fry Memorial Lecture Award, American Institute of Ultrasound in Medicine

May 2013 Certificate of appreciation for contribution as QIBA Scientific Coordinator, Quantitative Imaging Biomarkers Alliance of the RSNA

June 2013 Installation of The Paul L. Carson Collegiate Professorship in Radiology, University of Michigan. Heang-Ping Chan, Ph.D., first recipient.

July 2015 Initiation of annual Carson/Zagzebski Distinguished Lectureship, Amer. Assoc. Physicists Med.

Jan. 2017 Life Senior Member of the IEEE

May 2017 Certificate of appreciation for contributions as Ultrasound Coordinator, Quantitative Imaging Biomarkers Alliance of the RSNA.

PROFESSIONAL SOCIETY MEMBERSHIPS AND OFFICES

1972-	American Association of Physicists in Medicine; President Elect, 1986; President, 1987; Past-President (Chairman of the Board), 1988. Fellow, 1989
1972-76	Society of Radiologic Engineers
1972-78	Health Physics Society
1972-78	International Radiation Protection Association
1973-	American Institute of Ultrasound in Medicine; Fellow, 1982- Vice President, 1978-80
1973-78	American Association of Physics Teachers
1974-79	Alliance for Engineering in Medicine and Biology, Executive Committee
1974-78 2006	Society of Photo-optical Instrumentation Engineers
1975-81 1994-> 2017->	Institute for Electrical and Electronic Engineers Life Senior Member of the IEEE
1996->	IEEE Ultrasonics, Ferroelectrics, and Frequency Control Societ
1976-	Acoustical Society of America Fellow, 1990
1976-	American College of Radiology, Member in Physics
1981-	Radiological Society of North America; 3rd Vice President, 1990-91

1981-	Great Lakes Chapter, Health Physics Society
1984-90	American Association for the Advancement of Science
1985-95	Society of Magnetic Resonance in Medicine
1987-88	American College of Medical Physics
1988-	Michigan Radiological Society, Associate Member
1989-	Association of University Radiologists
1990-93	Sigma Xi, Scientific Research Society
1996-2018	Fellow, American Institute for Medical and Biological Engineering
1997-	Ultrasonic Industry Association

TEACHING ACTIVITIES

Housestaff: (University of Michigan)

1981-84	Radiologic Physics Noon Conference, coordinator, taught approximately l/3 of the weekly conferences.
1982-	Radiologic Physics orientation for new house staff, participated in teaching, one 90 min. lecture, primarily radiation safety, coordinated 1983-.
1982	Physics review for radiology boards, three sessions on ultrasound and other topics.
1982-1999	Physics classes for radiology residents. Taught approximately 1/3 of the topics, 1982-89; ultrasound classes 1989-1999.

Medical Student:

1985->	Radiology Senior Elective - monthly lecture, usually on radiation safety considerations in diagnostic radiology.
1985-92	Supervised a total of four medical student research electives.
1995	Basic Science of Radiology, Senior Medical Student Elective. Taught one two-afternoon laboratory.

Graduate and Undergraduate: (University of Michigan)

1982-84	Three lectures in ECE 422, Ultrasound in Medicine.
1982->	Supervised 2-4 graduate students per year on research topics, usually with Biomedical Engineering 890 credit or Applied Physics.
1982	One to two lectures per year in Bioengineering 495 - Bioengineering seminar, and in Nuclear Engineering 481-Engineering aspects of Radiology and Nuclear Medicine.
1983	Occupational and Radiological Health Seminar and Useful Math Seminar.
1983	Science Research Club Lecture.
1983-86	Biomedical Computing Symposium Presentation.
1985	Biomedical Engineering Seminars 1-2 per year in Bioengineering 495 and 890.
1986	Physics Dept. Research Colloquium
1994->	Supervised ~2 UROP students per semester
1996	Guided two full time, postdoctoral, premedical scholars in medical research topics.
1996->	Taught Biomedical Instrumentation, 2 90 min lectures per year in Biomedical Engineering.
1997	Directed Study, Biomedical Engineering 590, one undergraduate.
1998->	BME 510 Imaging Laboratory, Optical CT laboratory 6 lab and contact hours

Graduate: (University of Colorado) (courses taught)

Particle Accelerators and Applications in Radiation-3 terms.
Imaging Systems in Medical Diagnosis-3 times.
Physics of Nonionizing Radiation-2 terms.
Clinical Experience in Medical Physics- 10 years.
Special Topics in the Physics of Radiation Therapy.
Special Topics in the Physics of Nuclear Medicine.
Medical Ultrasound Physics and Instrumentation - 3 terms.

Technologist: (University of Colorado Course)

Principles of Diagnostic Ultrasound Imaging, two years.

Continuing Education:

Faculty in many local through international courses for physicians, medical physicists, bioengineers, technologists. See local examples here and others in Section g, below.

DATES	SUBJECTS TAUGHT	# OF STU-DENTS	STU-DENT TYPE	HRS PER YEAR
1974-81	Continuing Education **UCHSC**			
1974-80	UCHSC Postgrad. Course on Diagnostic Ultrasound	140	MDs/ Techs	2
1976-79	AIUM Spring Ultras. Course, Basic Physics	150	"	2
1974, 80, 82, 86, 87	Physics of Ultras., AAPM Summer Schools	160 each	Phys't	15
1976-77	Ultras'd Physics ARRS Refresher Courses	~100	MD	1
1974-77	Avg 4/yr Ultras. QC Workshops Nationally, Organized and taught	60	MD/T Phys't	20
1978, 79, 81	Med. Ultras. Phys. & Instrum. Course (Dir) Lecturer	50	Phys't Eng'rs	56 7
1981-->	Continuing Education **Univ. of Mich.**			
1982->	U of M Postgraduate Course on Dx Ultras'd and Course on Obstetrical Ultras.	2-140 ~60	MDs/ Techs	2 1
1983	Medical Ultras. & MRI Course (Director) Lecturer	35	Phys't Eng'rs	32 7
1995	Physics of Ultras. & QC, AAPM Summer School	160	Physi-cists	6
1993-5	RSNA refresher course	90	MD/P hys't/ Techs	1
1995	Ultrasonic Vascularity Assessment Principles, International Breast Ultrasound School, Sept. 30, Indianapolis	45-200	MD/ PhD/ Techs	3x0.5

Dissertations Supervised or Cosupervised:

1. Chenevert, TL, (supervised with C. Meyer) Resolution and Quantitative Accuracy Improvement in Ultrasound Transmission Imaging, Physics, University of Colorado Ph.D. dissertation, University Microfilms, Ann Arbor, MI, 1983.

2. Giesey, J, (supervised with C. Meyer)Speckle Reduction in Ultrasonic Imaging Using Two-Dimensional Phase-Insensitive Receiving Arrays, Biomedical Engineering, University of Michigan Ph.D. Dissertation, University Microfilms, Ann Arbor, MI, 263 pp, 1989.

3. Kripfgans, O., (assisted B. Fowlkes in supervision) Acoustic Droplet Vaporization for Therapeutic and Diagnostic Applications. University of Michigan Ph.D. Dissertation, University Microfilms, Ann Arbor, MI, 2002.

4. Moskalik, AP, Prostate Cancer Diagnosis and Staging by Sonography: Correlation of Histopathologic Measures with quantitative 3D Doppler Ultrasound, Biomedical Engineering, University Microfilms, Ann Arbor, MI, 2000

5. Krücker, JF, Image-based registration for Three-dimensional Ultrasound imaging, Applied Physics, University Microfilms, Ann Arbor, MI, 2003

6. Neemuchwala, HF, (supervised with A. Hero) Entropic Graphs for Image Registration, Biomedical Engineering, University Microfilms, Ann Arbor, MI, 2005

7. Potdevin, TCU, (supervised with B. Fowlkes) Ultrasonic Measurements and Modeling of Blood Flow, Applied Physics, 2005

8. Lo, Andrea, Biomedical Engineering, 2007 (assisted in supervision with B. Fowlkes)

9. Hayworth, Kevin Applied Physics, 2009 (assisted in supervision with O. Kripfgans)

10. Narayanasamy, Ganesh, Applied Physics, 2009

11. Sumedha Sinha, Biomedical Engineering, 2010, "Breast Cancer Detection on Automated 3D Ultrasound with Co-localized 3D X-ray," Dissertation, University of Michigan, 2010, Ann Arbor, 115 pp.

12. Fong Ming Hooi, Biomedical Engineering, 2012, “Optimized Beamforming and Limited Angle Tomography of the Compressed Breast”, Dissertation, University of Michigan, 2012, Ann Arbor, 114 pp.

Numerous M.S. theses and projects, e.g.:

1. Robert Belgam, 1981
2. Paula Fischella Salanitro, 1977
3. Steve Jones, 1980
4. David Taylor, 1978
5. Many more since 1982, e.g.,
6. Donita Bylski 1984
7. Pat Grounds, 1987
8. Brian Murphy, 1992
9. Catherine Orifici, 2004
10. Sakina Zabuawala, 2006
11. Seunghun Baek, 2011

Sharon Dudzinski, 1977
Dale Fitting, 1973
David Herron, 1981
Joe Wong, 1982

Michele Covell, 1986
Ed Chiang, 1989
Demitris Psychoudakis, 2002
Kevin Haworth, 2005
Boyun Wang, 2010
Rungroj Jintamethasawat 2014

Postdoctoral fellows mentored or comentored exclusive of some of my own Ph.D. graduates who stayed on:

1 Sun Shing Leung, 1974
Avtar Ahuja, 1977
3 David Hershen, 1985

Jerome Hallberg, 1976
Rainer Schmidt, 1982-3
Brian Fowlkes, 1992-3

Ed Gardner, 1995
5 Jian-Feng Chen, 1996
Ramon Erkamp, 2003-5
7 Zhi Yang, 2006-7
Sumedha Sinha, 2010
9 Others…

Anurag Govil, 1997
Ralph Fenn, 1997
Xueding Wang, 2005
Man (Maggie) Zhang, 2008-11
Jiusheng Chen, 2010-11

Visiting Professors hosted:
Jie Lie 2009
Frederick Padilla 2009-11
Qian Cheng, 2014

Michael Woydt, 2000
Jie Yuan, 2013 and 2020

Selected residents and notable medical students:
Gary Thieme
Alex Aisen
Ron Adler
Amy Guest

Dorit Adler
Paul Schrieve
James Ivey

Ph.D. thesis committees other than some of those supervised, above:

1. M. Arditi, University of Toronto, 1982
2. J. Jeong, Electrical Engineering and Computer Sciences, University of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/105209, 1990
3. Jian-Hua Mo, Electrical Engineering and Computer Sciences, University of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/103121, 1992
4. Gregory Cunningham, Electrical Engineering and Computer Sci., Univ. of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/103201, 1992
5. Ye Chen, Electrical Engineering and Computer Sci., Univ. of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/103557, 1993
6. Y.T. Zhang, Bioengineering, University of Michigan, 1994
7. Hong Wang, Bioengineering, University of Michigan, 1994
8. Srivathsan Krishnamachari, Electrical Engineering and Computer Sci., University of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/104157, 1994
9. K.R. Raghavan, lectrical Engineering and Computer Sci., University of Michigan, http://deepblue.lib.umich.edu/handle/2027.42/104377, 1994
10. Ralph Seip, Electrical Engineering/Computer Sci.:Systems, University of Michigan, 1996
11. Jian Shen, Electrical Engineering and Computer Sciences:Systems, Univ. of Michigan, 1997
12. Osama Haddadin, Electrical Engineering: Systems, University of Michigan, 1997
13. Claudio Simon, Electrical Engineering and Computer Sciences, Univ. of Michigan, 1998
14. Hong Wan, Biomedical Engineering, 1998.
15. James Hamilton, Applied Physics, 1999.
16. Emma Hwang, Biomedical engineering, 2001
17. Oliver Kripfgans, Applied Physics, 2002

18. Hyunjin Park, Biomedical Engineering, 2003
19. Kathleen Surry, Biomedical Engineering, University of Western Ontario, 2004
20. Siddharth Shah, Biomedical Engineering, 2006
21. Jessica Parsons, Biomedical Engineering, 2006
22. Tim Hall, Biomedical Engineering, 2007
23. Becca Booi, Biomedical Engineering, http://deepblue.lib.umich.edu/handle/2027.42/107472, 2007
24. Andrea Lo, Biomedical Engineering, 2007
25. Nelson Chen, Biomedical Engineering, http://deepblue.lib.umich.edu/handle/2027.42/62377, 2008
26. Ganesh Narayanasmy, Applied Physics, http://deepblue.lib.umich.edu/bitstream/handle/2027.42/64802/gnarayan_1.pdf?sequence=1, 2009
27. Kevin Haworth, Applied Physics, http://deepblue.lib.umich.edu/handle/2027.42/62409, 2009
28. Sumedha Sinha, Biomedical Engineering, 2010
29. Mario Fabiilli, Biomedical Engineering, http://deepblue.lib.umich.edu/handle/2027.42/78925, 2010
30. Fong-Ming Hooi, Biomedical Engineering, http://deepblue.lib.umich.edu/handle/2027.42/91430, 2012
31. Mark S. Haynes, Applied Physics, http://deepblue.lib.umich.edu/handle/2027.42/91585, 2012

Undergraduate Research Opportunity Students Directed or Codirected: ~12

Visiting Scholars Mentored:

1. Qi You, Electrical Science and Engineering, Nanjing Univ., home mentor Jie Yuan, Ph.D., 7/017- ~6/018

COMMITTEE AND ADMINISTRATIVE SERVICE

University of Michigan:

1981-	Numerous Fellow and Faculty recruitment and evaluation efforts.
1981	Digital radiography acquisition and planning.
1981-87	Replacement Hospital Project/AGH-NMR Planning Group.
1981-82	Biomedical Image Analysis Facility Committee-Medical School.
1981-82	RHP Radiology Planning Group.
1981-83	CIPRNET Users Committee.

1982-90	Major equipment funding committee - University and Medical School.
1982-85	Computer Advisory Committee, University of Michigan Medical School.
1982-87	Ambulatory Care Radiology Planning.
1982-83	Computed Tomography Planning and Selection Group.
1983->	Radiology Ultrasound Equipment Acquisition Group. Responsible for specifications, acceptance testing and QC management
1983-85 1990-92	Biomedical Research Council.
1986 & 1988-91 1995-96	Radiology Chairman's Advisory Committee
1986-89	Advisory Committee on Radiology Appointments and Promotions.
1986-88 1994-	Ad Hoc Committee on Medical Physics Training
1986-2004	Laser Safety Officer, Department of Radiology Hospital Laser Safety Committee
1987-92	Radiation Policy Committee, intermittent member. Also, chairman, Applicant Review Subcommittee
1988-91 1993-95	Radiology Quality Control Committee
1989-93	Radiology Clinical Quality Control Committee
1988	Radiology Department Internal Review Committee
1988-90	Search Committee for Bioengineering Director and other Faculty
1995-96	Bioengineering Program Curriculum Committee
1991-95 1996	Radiology Appointment, Promotions and Tenure Committee Chairman, Radiology Appointment, Promotions and Tenure Committee
1995->98	Radiology Research Committee

1994->98	Medical School Animal Imaging Lab Technical Subcommittee
1995->	University Research Council
2010-2013	Radiology Appointment, Promotions and Tenure (Research Track) Committee
2012->	Medical School Mentors Committee
2013->	Radiology Elections Committee
2014->	Radiology BRS Promotions and Tenure Committee
2014->	Radiology Innovations Chief and member, FFMI Innovation Council

University of Colorado School of Medicine:

~1972-77	Manager Medical Physics Graduate Training Program
~1978-80	Directed Ultrasound Technology Training program
1978-79	Chairman, J. H. Holmes Fund Subcommittee.
1978-80	Graduate Representative, Department of Radiology.
1980-81	Alternate Radiology Representative, Executive Committee.

COMMUNITY SERVICE

1976-86 Youth soccer coach

1990-> Habitat for Humanity worker.

1998->2014 Chair, Earth Advocacy Committee, Dixboro UMC, Primary author of two environmental clauses in the UMC Book of Discipline and District enactment resolutions

2016 Lecture/Discussions, "Cancer Basics and its Incidence and Trends in Kenya", 3 biology classes, and "History of European Colonization and Its Impact", history class discussion, and "Assist in dissection demonstration", combined biology classes, Bishop Lawi Imathiu Secondary School, Meru, Kenya, Feb. 15-19, 2016

2016 Health and Science, 5th grade class, Gichunge Primary School, Meru, Kenya, Feb. 19, 2016

BIBLIOGRAPHY

PUBLICATIONS IN SCIENTIFIC JOURNALS AND PROCEEDINGS

a. Peer-reviewed Journals

1. **Carson PL:** Measurement and Analysis of (d,p) Stripping States in 117Sn 123Sn and 125Sn at Incident Deuteron Energies Between 3.35 and 5.55 MeV. Dissertation, 1971, University of Arizona, University Microfilms, Ann Arbor, Michigan.

2. McIntyre LC, Jr., **Carson PL,** Barker DL: Mean Lives of States in ^{27}Mg. The Physical Review, 184, 1105-111, 1969.

3. **Carson PL,** McIntyre LC, Jr.: Coulomb (d,p) Stripping to States in ^{117}Sn, ^{123}Sn, and ^{125}Sn, Nuclear Physics, A, 198, 289-313, 1972.

4. **Carson PL,** Hendee WR: Target-Skin Distance for X Ray Films Used as Templates for Styrofoam Molds in Large Fields Radiation Therapy. Radiology, 107, 447-449, 1973.

5. **Carson PL,** Leung SS, Hendee WR, Holmes JH, Linsey LF: A Sealed Test Tank for Echoscope Performance Evaluation. J Clin. Ultrasound, 1, 208-218, 1973.

6. **Carson PL**, Stoub EW: Bone Densitometry Using Photon Imaging with Multi-Wire Proportional Counter. Application of Optical Instrumentation in Medicine, 1. 211-215, 1973.

7. Wenzel WW, **Carson PL** and Johnson FB: Prostate Localization Using Ultrasound B-Mode Scanning. Ultrasound in Medicine, 1, 149-157, 1974.

8. Leung SS, **Carson PL,** Hendee WR, Holmes JH: Constant Depth Ultrasound Imaging Using Computer Acquisition. Ultrasound in Medicine, 1, 509-517, 1974.

9. Erickson KR, **Carson PL**: (primary authors), The AIUM Standard 100 mm Test Object and Recommended Procedures for Its Use. Reflections, 1:2, 74-91, 1975.

10. Thieme GA, Hendee WR, Ibbott GS, **Carson PL,** Kirch D: Cross-Sectional Anatomical Images by Gamma Ray Transmission Scanning. Acta Radiologica: therapy, physics, biology, l4, 81-112, 1975.

11. **Carson PL**, Wenzel WW, Avery P, Hendee WR: Ultrasound Imaging as an Aid to Cancer Therapy, Part I, Int. J Radiation Oncology, Biol., Physics, 1, 119-132, 1975.

12. **Carson PL,** Wenzel WW, Avery P, Hendee WR: Ultrasound Imaging as an Aid to Cancer Therapy, Part II, Int. J Radiation Oncology, Biol., Physics, 1, 335-343, 1976.

13. Rauch P, Chaney EL, **Carson PL**, Hendee WR: Absolute Kilovoltage Calibration of a Diagnostic X-ray Generator. Medical Physics, 2, 1-4, 1976.

14. Holmes JH, Chavez F, **Carson PL:** Ultrasonic Evaluation of the Thyroid. Applied Radiology, 5:1, 71-75 and 145, 1976.

15. **Carson PL**: Rapid Evaluation of Many Pulse Echo System Characteristics by Use of a Triggered Pulse Burst Generator with Exponential Decay. J. Clin. Ultrasound, 4, 259-263, 1976.

16. Prasad SC, Hendee WR, **Carson PL**: Intensity Distribution, Modulation Transfer Function, and the Effective Dimension of a Line Focus X Ray Tube. Medical Physics, 3, 217-223, 1976.

17. **Carson PL**, Oughton TV, Hendee WR: Ultrasound Transaxial Tomography by Reconstruction, in Ultrasound in Medicine. 2, 391-400, 1976.

18. Erikson KR, **Carson PL,** Stewart HF: Field Evaluation of the AIUM Standard 100 mm Test Object, AIUM Standards Committee, Ultrasound in Medicine, 2, 445-451, 1976.

19. **Carson PL**, Oughton TV, Ghorashi B, Chavez F, Rashbaum C, Holmes, JH: Optimum Gray Scale in Ultrasound Images, Ultrasound in Medicine., 3, 1463-1466, 1977.

20. **Carson PL,** drafted: American Institute of Ultrasound in Medicine Standard Presentation and Labeling of Ultrasound Images: Interim Standard Adopted August, 1976. J Clin. Ultras. 4, 393-398, December, 1976, and Reflections, 3, 24-28, (Winter) 1977, reprinted in System Design of a Clinical Facility for Diagnostic Ultrasound, Alliance for Engineering in Medicine and Biology, Bethesda, MD, 29-34, September, 1977.

21. *Christensen SL, **Carson PL**: Performance Survey of Ultrasound Instrumentation and Feasibility of Routing Monitoring. Radiology, 122, 449-454, 1977.

22. **Carson PL**, Oughton TV: A Modeled Study for Diagnosis of Small Cysts with Ultrasound. Radiology, 122, 765-771, 1977.

23. **Carson PL:** Gray Scale Ultrasound: Understanding an Innovation in Imaging to Speed Realization of Its Potential. Applied Radiology, 6, 185-189, 1977.

24. ***Carson PL,** Oughton TV, Hendee WR, Ahuja AS: Imaging Soft Tissue Through Bone with Ultrasound Transmission Tomography By Reconstruction. Medical Physics, 4, 302-309, 1977.

25. Hallberg JR, Ibbott GS, **Carson PL,** Hendee WR, Aymar MA: Computational Analysis and Dosimetric Evaluation of a Commercial Irregular Fields Computer Program. MedicalPhysics, 4, 528-534, 1977.

26. Dick DE, Bay HP, and **Carson PL**: Hardware, Design of an Ultrasound CT Scanner, Biomed. Sci. Instrum., 13, 31-35, 1977.

27. ***Carson PL,** Fischella P, Oughton TV: Ultrasonic Power and Intensities Produced by Diagnostic Ultrasound Equipment. Ultrasound In Med. and Biol., 3, 341-350, 1978.

28. Ahuja AS, Hendee WR, **Carson PL**: Transport Phenomena in Laminar Flow of Blood. Phys. in Med. and Biol., 23, 928-936, 1978.

29. **Carson PL:** Principal Author: American Institute of Ultrasound in Medicine Standard on Presentation and Labeling of Ultrasound Images. Reflections, 4, 70-75, (Spring), 1978.

30. Ahuja AS, Prasad KN, Hendee WR, **Carson PL:** Thermal Conductivity and Diffusivity of Neuroblastoma Tumor. Medical Physics, 5, 418-421, 1978.

31. **Carson PL,** Johnson M, Holmes JH: Image Quality and Practicality of Scanning Large Abdomens with Large, Low Frequency and Smaller, High Frequency Transducers. Ultrasound in Med., 4, 161-162, 1978.

32. **Carson PL,** Dick DE, Thieme GA, Dick LM, Bayly EJ, Oughton TV, Dubuque GL, Bay HP: Initial Investigation of Computed Tomography for Breast Imaging with Focused Ultrasound Beams. Ultrasound in Medicine, 4, 319-322, 1978.

33**.** **Carson PL:** What a Hospital Physicist Needs in a Transducer Characterization Standard: Are Tissue Equivalent Test Objects Necessary: IEEE Transactions on Sonics and Ultrasonics, 26, 1-6, 1979.

34. Paquett FR, Ahuja AS, **Carson PL**, Mack LA, Ibbott GS, Johnson ML: A Comparative Study of CT and Ultrasound Imaging for Treatment Planning of Prostatic Carcinoma. J Radiation Oncology, Biol, Physics, 5, 289-294, 1979.

35. Dick DE, **Carson PL**, Bayly EJ, Oughton TV, Kubitschek JE, Kitson FL: Technical Evaluation of an Ultrasound CT Scanner, 1977 Ultrasonics Symposium Proceedings, Inst. for Electrical and Electronics Engrs., New York, N.Y., 176-181, 1977, and Collected Papers on Medical & Biological Applications, DeKlerk J, McAvoy BR, ed., IEEE, New York, N.Y., 451-457, 1979.

36. Fischella PS, **Carson PL**: Assessment of Errors in Pulse Echo Ultrasound Intensity Measurements Using Miniature Hydrophones. Medical Physics, 6, 404-411, 1979.

37. **Carson PL,** Pickering N, Erikson KR: AIUM Standard Specification of Echoscope Sensitivity and Noise Level Including Recommended Practice for Such Measurements. Reflections, 5, 12-19, 1979.

38. **Carson PL,** Meyer CR, Scherzinger AL, Oughton TV: Breast Imaging In Coronal Planes with Simultaneous Pulse Echo and Transmission Ultrasound. Science, 214, 1141-1143, 1981.

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