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(Materials from Section iii (page 4) to the end (page 24) has NOT been updated since 2011-2012)

EDUCATION

1986 University of Washington, Seattle, Washington, Ph.D. in Nuclear Engineering
1981 University of Washington, Seattle, Washington, M.S. in Nuclear Engineering
1978 Pahlavi (Shiraz) University, Shiraz, Iran, B.S. in Physics

EMPLOYMENT

Jan 2011 – present	Professor, Nuclear Eng. Program, Mechanical Eng. Department, Virginia Tech
Jan 2015 – present	Chairman of Board, VNEC (Virginia Nuclear Energy consortium) nonprofit organization
Jan 2010-2012	Chairman of Board, SUNRISE (Southeast Universities Nuclear Reactors Institute for Science and Education) nonprofit organization; member since 2007
Sept 2009-Jan 2011	Florida Power & Light Endowed Chair Professor
Sept 2009-June 2010	Director of UFTR (See page 17)
Aug 2001-Sept 2009	Professor and Chair, Nuclear & Radiological Eng (NRE) Department, University of Florida (see pages 16-18)
Oct 2008-Sept 2009	Interim Director, University of Florida Training Reactor (UFTR)
June 2006-June 2007	Chair, Nuclear Engineering Department Heads Organization (NEDHO)
Dec 2005-present	President and CEO of HSW Technologies, LLC (www.hswtech.com)
April 2004-present	Interim Director of Florida Institute of Nuclear Detection & Security (FINDS)
Aug 1999-Dec 2005	President and CEO of H&S Adv. Comp. Tech. Inc. (www.hsact.com)
Aug 1998-July 2001	Professor, Penn State University
Feb 1998-Aug 1998	Visiting Scientist at SCK•CEN, Mol, Belgium
Aug 1993	Associate Professor, Penn State University
July 1990-Aug 1990	Faculty Research Participant, Oak Ridge National Laboratory, Engineering, Physics and Mathematics Division (EPMD)
Aug 1989	Assistant Professor, Penn State University
June 1988	Research Associate, Penn State University
Nov 1986	Research Assistant, Penn State University

HONORS AND AWARDS

- Recipient of the 2011 RPSD Professional Excellence Award, 2011
- Received a recognition award from DOE for his leadership & contributions to design and analysis for the UFTR HEU to LEU fuel conversion, 2009;
- Florida Power & Light Endowed Term Professorship, 2009;
- Served as Chair (2007) and a member (2010) of an International Advisory Council for the Nuclear and Quantum Engineering (NQe) Department, KAIST, Korea;
- Fellow of American Nuclear Society (2002) (For pioneering contributions to the development of accurate and efficient deterministic and stochastic particle transport theory methods and their application to different complex nuclear systems; for major contribution to multigroup cross section generation, differencing schemes, domain decomposition formulations for parallel computing, iterative and acceleration techniques, and for work in automating the Monte Carlo variance reduction of fixed-source problems);
- Published over 210 papers in journals, refereed conference proceedings and transactions (see pages 23-35);

- Received (with students and collaborators) 10 best paper awards (Reactor Physics and Mathematics & Computation Divisions of the American Nuclear Society) (see page 8);
- Presented over 70 invited plenary talks, lectures, and seminars (see page 9);
- Participated at several review panels, IAEA Expert training, and Hosted IAEA Fellows (see page 15);
- Chaired/organized numerous sessions at national and international meetings (see pages 20);
- Contributed to training of outstanding educators, scientists and engineers (see page 6);
- Who's Who in Science and Engineering, 1989-present;
- Sigma Xi - The Scientific Research Society, Penn State University, 1988;
- Alpha Nu Sigma - National Nuclear Engineering Honor Society, Washington Alpha Chapter, 1981.

BOOK

In 2015, Prof. Haghghat published a book entitled *Monte Carlo Methods for Particle Transport*; publisher is CRC Press, Francis and Taylor Group. (<http://www.crcpress.com/product/isbn/9781466592537>)

RESEARCH EXPERIENCE (1989 – present)

Professor Alireza Haghghat is the Director of the Nuclear Science and Engineering Lab which operates under the auspices of the Institute of Critical Technology and Applied Science (ICTAS), and the Virginia Tech Transport Theory Group (VT³G). He has been involved in the development of advanced codes in parallel environments and modification of large computer codes for nuclear reactor simulations for the past 29 years. In particular, he has been involved in the development of accurate and efficient hybrid particle transport theory methods based on the deterministic and Monte Carlo approaches. Moreover, he has been developing these hybrid methodologies and tools codes for the simulation of different complex nuclear systems in power, medicine and homeland security. In support of his activities, Prof. Haghghat has established a specialized PC cluster and planning development of a virtual visualization laboratory.

More recently his efforts has been focused on the development of real-time transport theory calculation methodologies. This has resulted in a novel methodology referred to Multi-stage, Response-function, Transport (MRT) methodology that has resulted in the a number of software tools including INSPCT-s (for inspection of spent fuel pools for safeguards applications), AIMS (for simulation of active interrogation of cargo containers for detection of special nuclear materials), RAPID (for simulation of spent fuel pool for determination of eigenvalue, fission density, and material quantification), and TITAN-IR (for image reconstruction of SPECT)

i) New computational methodologies and algorithms

Ongoing

- Analysis of **GEM*STAR Reactor Design**;
 - In collaboration with the Physics Department, this project is funded by the College of Science
 - The main purpose was to perform detailed analysis using the state-of-the-art methodologies to examine the system performance for conversion of Weapon Grade Pu (WGPu)
- **I²S-LWR** (Integral Inherent Safe Light Water Reactor) design project
 - This is a multi-organization project funded by DOE; started in 2013 and ending in Sept 2016; we have developed a novel software tool referred to as RAPID (Real-time Analysis of spent fuel Pool In-situ Detection); in the process of preparing a patent application
 - Currently performing an experimental benchmark study
 - Extending the capability of RAPID to material accountability
- Design analysis and optimization of the **CHANDLER detection system**
 - This project is funded by Colleges Science and Engineering, Office of VP of Research and ICTAS
 - The main purpose of this project is to perform analysis in support of design and optimization of CHANDER antineutrino detection system. In addition to the use for nuclear nonproliferation and security applications, this effort supports the search for the elusive sterile neutrino.

- Completion of development of a novel **adaptive collision source (ACS)** for effective angular discretization for discrete ordinates codes, e.g., TITAN

Developed

- Various algorithms for parallel/vector processing of the Sn method (1989-present)
- Multigrid, synthetic, and pre-conditioning acceleration algorithms for the discrete ordinates method (1994 – present)
- Methodology/algorithm for generation of multigroup cross sections (including collapsing and selection of energy groups) for fixed-source problems (1994 – present)
- New finite-differencing algorithms for the discrete ordinates (Sn) methods (1995 – present)
- Automated variance reduction methodologies for the Monte Carlo neutron, photon, and electron transport (1994 – present)
- Algorithms for uncertainty analysis for reactor physics problems based on the use of importance function (adjoint flux) (1988 – 1996)
- Methodologies (accurate and efficient) for determination of neutron fluence at the reactor pressure vessels (PWR and BWR) (1988 – 1998)
- Methodologies (accurate and efficient) for optimization of nondestructive detection of waste containers (1998 – 2005)
- New diagnostic and variance reduction algorithms for the eigenvalue Monte Carlo (2007 – 2011)
- Multi-group Theory Enabling Accurate Coarse-Group Simulation of Gen-IV Reactors, under a subcontract with Georgia Tech, funded by DOE) (2011-2013) (Developed a new version of the TITAN code system)
- Innovative hybrid deterministic and Monte Carlo transport algorithms for identification of special nuclear materials (SNMs) (Subcontract with Georgia Tech, funded by DOE) (2009 – 2013) (developed the AIMS code system)
- New hybrid particle transport algorithms for efficient inspection of spent fuel pools for safeguard applications (2008 – 2011) (developed INSPC-s)
- New hybrid particle transport algorithms for improvement of image quality of Single Photon Emission Computed Tomography (SPECT) (2007 – 2015) (Developed TITAN-IR)

ii) Developed software

- PENTRANTM – Parallel Environment Neutral-particle TRANSport code (G. Sjoden and A. Haghghat, 1996); over the last 14 years, new improvements have been added, benchmarking (experimentally and computationally) has been performed, and the code system has been applied to various real-life problems in power, medicine and homeland security.
- A3MCNPTM – Automated Adjoint Accelerated MCNP (J. Wagner and A. Haghghat, 1997); this software uses the CADIS (consistent Adjoint Driven Importance Sampling) methodology, which is based on an estimated deterministic adjoint function; it includes automated algorithms for the generation of input file for a deterministic code; a patch has been prepared and copies have been purchased by various organizations in Japan and Taiwan; improvements have been added in the source definition.
- PENMSH/PENMSHXP– Parallel Environment Neutral-particle MeSH generator (A. Haghghat and C. Yi, 1998 & 2003); this software is used for preparation of input file for the PENTRAN code; it prepares mesh distribution, source distribution, and graphics files for diagnostic and presentations.
- CPXSD – ‘Contributon’ Point-wise Cross-Section Driven (A. Alpan and A. Haghghat, 2003); this software utilizes point-wise cross sections (i.e., ENDF/B) and ‘contributon’ theory, and prepares problem-dependent fine-group and broad-group libraries for shielding applications.
- PENXMSH – Parallel Environment Neutral-particle Expert Mesh generator (A. Patchimpattapong and A. Haghghat, 2003); this software starts with an autocad diagram, and develops an effective mesh distribution (both coarse and fine) for effective parallelization of the PENTRAN code; it also provide recommendation for the strategy for parallel decomposition.

- FASTTM – Flux Acceleration Simplified Transport (G. Longoni and A. Haghghat, 2004); this software utilizes the PENTRAN input data in an Even-Parity Simplified Sn (EP-SSn) formulation to prepare an initial solution for the PENTRAN Sn calculations; it has resulted in significant acceleration for the core physics problems.
- TITAN – A 3-D transport code with a hybrid Sn and Characteristic Algorithm (C. Yi and A. Haghghat, 2007); this software allows for the use of different formulations in different coarse meshes; solutions are matched through the boundaries; the algorithm is very useful for problems with large regions of low scattering materials; the hybrid algorithm has been applied to shielding and medical problems.
- ADEIS – An Angular adjoint-Driven Electron-photon-positron Importance Sampling code system (B. Dionne and A. Haghghat, 2008); it uses a variation of the CADIS methodology accounting for angular dependency and production of coupled particles of different degrees of importance; the methodology has been implemented in the MCNP5 code.
- INSPCT-S (Inspection of Nuclear Spent fuel-Pool Calculation Tool ver. Spreadsheet) (W. Walters and A. Haghghat, 2010); it uses a fast and accurate hybrid methodology for determination of responses of neutron detectors placed in-between spent fuel assemblies for nuclear safeguards application. Current version uses an Excel 2003 spreadsheet with a dynamic-link library (DLL) created using FORTRAN 95.
- AIMS (Active Interrogation for Monitoring Special nuclear materials) (W. Walters, K. Royston, and A. Haghghat); it uses MRT methodologies for determination of gamma flux/current at the face of a gamma detector in a source-detector assembly used for active interrogation of special nuclear materials in a cargo container.
- RAPID (Real-time Analysis for spent nuclear fuel Pool and cask In-situ Detection) (W. Walters, N. Roskoff, and A. Haghghat); it uses MRT methodologies for determination eigenvalue and axially-dependent, pin-wise fission density in a spent nuclear fuel pool or cask. Currently is working on its experimental benchmarking and extension to isotopic identification.
- TITAN-IR (Image Reconstruction with deterministic TITAN transport); it uses a MRT methodology combined with MLEM for image reconstruction in a SPECT (Single Photon Emission Computed Tomography) device.

iii) Applications of new software and methodologies

Real-life problems

A³MCNP, PENTRAN and/or TITAN, and INSPCT-S have been used successfully for simulation of several complex nuclear system problems including PWR cavity dosimetry, BWR core-shroud neutron and gamma DPA calculation, storage cask neutron and gamma dose estimation, PGNA (Pulsed Gamma Neutron Activation Analysis) device analysis/optimization, x-ray room dose distribution, CT-scan image creation, time-of-flight experiment simulation for cross-section measurement, Atuch-1 Spent fuel pool inspection for nuclear safeguards, and SPECT (Single Photon Emission Computed Tomography) device image generation. (Note that Glenn Sjoden and his students have been using the PENTRAN code for other related applications, and recently have completed the benchmarking of a 3-D burnup module (PENBURN) for a large PWR.)

Benchmark problems

Numerical accuracy and performance of PENTRAN and TITAN has been determined by simulation of benchmark problems including the VENU-3 experiment (Belgian critical facility), Kobayashi problems, Takeda and Ikeda Critical experiment, and C5G7 MOX Assembly critical benchmark

iv) Simulation and analysis of research reactors and related facilities

Penn State Breazeal Reactor (PSBR)

- In 1991-1992 academic year, developed models and performed simulations (burnup and flux calculations) for seven PSBR core configurations used over 1966-1992 period;
- In 1995, through detailed simulations, developed a special device for effective generation of thermal neutrons (with low gamma flux) for neutron radiography (it has been used for a number of research projects)

- In 1996, through detailed simulations, developed a Fast Neutron Irradiator (FNI) for irradiation of wafers used for electronic systems for space application (this device generates significant annual revenue for PSBR)

University of Florida Training Reactor (UFTR)

- Led a project on the "HEU to LEU Fuel Conversion of the UFTR (2005-2006) (has received a recognition award from the DOE, 2009)
- Developed a new design for the 'thermal column' of UFTR for improving the flux level (2006-2007) (this work received a best poster award at the 13th International Symposium on Reactor Dosimetry in Belgium, 2007)
- Led a project on design, Licensing, and construction of a fully digital control system for the UFTR (Jan 2007 – June 2011) (raised ~\$1.7 M, and signed agreements with AREVA NP and Siemens Co. for receiving the TXS and T-3000 systems with engineering support). For this efforts, he attracted the following Contracts/ grants: Progress Energy Florida (grant of \$675 k); State of Florida Matching (grant of \$425 k); UFTR Digital Control System Upgrade for Education and Training of engineers and operators, sponsored by FESC (Florida Energy Sustainability Consortium) (\$300 k, Sept 2009 – Oct 2010); Procurement of nuclear and process instrumentations in support of the UFTR Digital Control System Project, DOE NEUP for facility enhancement (Sept 2009 – Aug 2010, \$275 k); Signed agreements with AREVA NP (for TXS safety system with engineering support) and Siemens Corporation (for T-3000 non-safety system with engineering support). Further, supervised characterization of beam ports of the UFTR, and detailed analysis of its core physics (Jan 2009 – Jan 2011, Digital Control Fellowship Program).

v) *Contribution to standards and Regulation Guides*

ANS 19.10 – Particle transport methods for reactor cavity Dosimetry

RG 1.190 - Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence

RESEARCH EXPERIENCE (1986 – 1989)

1988-1989 - Pennsylvania State University, Research Associate 6/1/88 - 7/31/89

Initiated the development of vector/parallel algorithms for particle transport methods, Incorporated S_N algorithms into TWOTRAN-II and implemented the code on the CYBER 205 vector computer and the IBM vector and parallel computers 3090/600VF.

1986-1988 - Pennsylvania State University, Research Assistant 10/1/86 - 5/30/88

Performed neutron transport analyses to investigate the TMI-2 material distribution during and after the 1979 accident; Performed gamma transport analyses to investigate the presence of fuel debris in the TMI-2 lower head; converted the TRAC-BF1 best estimate code from the CDC computers to the IBM computers.

CONTRACTS AND GRANTS

Prof. Haghghat's research has been funded by various industry and government organizations including AREVA, DOE, GPU Nuclear, Harris Semiconductors, IBM, INEEL/INL, LLNL, NIH, NSF, ORNL, Pennsylvania Power & Light, Philadelphia Electric Company, Progress Energy Florida, Sandia National Lab, Siemens Co., State of Florida, and Westinghouse Corporation.

i) *Ongoing and accepted*

1. An Innovative Hybrid Deterministic/Monte Carlo Radiation Transport Method for Modeling Radiation Sensor Systems (Joint with Georgia Institute of Technology (GT)) (Sept 2009 – Oct 2012) [Sponsored by NNSA, ~\$900 k (equal allocations)]
2. Multi-group Theory Enabling Accurate Coarse-Group Simulation of Gen-IV Reactors, (led by GT) (Sept 2010 – Oct 2013) [Sponsored by DOE-NEUP, ~\$900 k (1/3 allocated to UF)]
3. Development of a course on Nuclear Reactor Instrumentation and Control (I&C) and Digital I&C Implementation, 4/1/12-3/31/13, \$69,967, under a subcontract with University of Tennessee, funded by NRC.

4. Virginia Tech Radiation Measurement, Simulation and Visualization Laboratory, 8/1/12-7/31/13, \$249,935, DOE-NEUP, Co-PI
5. Neutronics Simulation in Support of the *mPower* reactor modeling, 6/1/12-12/31/12, B&W, \$78,000; negotiating continuation contract for 1/1/13-12/31/13.
6. “Integral Inherently Safe Light Water Reactor (I²S-LWR),” Department of Energy, 10/1/12 to 9/30/15, \$370,000. (in collaboration with 5 other nuclear engineering universities, one utility, one vendor, two foreign universities), Co-PI.
7. Improvement of SPECT Imaging Using Deterministic Particle Transport Method (Internal funds)

ii) Completed Projects

At University of Florida

- Development of a Calculation Methodology for Determination of Detector Response in a Spent Fuel Pool, LLNL (May 2007 – Sept. 2011)
- Development of Diagnostic Tools and Acceleration Techniques for Monte Carlo Eigenvalue calculations (Internal funds) (2007-2010)
- Research and Development for Improved Source Convergence Reliability & Efficiency in Scale/KENO Eigenvalue (Battelle) (2006-08)
- Locating Bleed Water in Conduits in Post-Tensioned Bridge Members Using Gamma Ray Spectrometry (with a Prof. Minchin from Civil Eng., Florida Department of Transportation (FDOT), 2006-07)
- Using Gamma Ray Spectrometry to Locate Bleed Water in Conduits in Post-Tensioned Bridge Members (with Prof. Minchin from Civil Eng.; NSF; 2006-07)
- UFTR HEU-LEU Conversion (NNSA-DOE) (June 2005 – Sept 2006)
- Novel investigation of Fe cross-section using an iron shell-shield and time-of-flight measurements and particle transport calculation (with NIST and U. of Ohio) (DOE-NERI) (2000-2003)
- Advanced Algorithms and Automation Tools for Discrete Ordinates Methods Parallel Environments (DOE-NEER) (2000-2003)
- Investigation of a new computational code system for the Penn State PSBR reactor (Penn State Nuclear Program)
- Optimization of the Westinghouse PGNA (Pulsed Gamma Neutron Activation Analysis) device for assaying waste (Westinghouse/DOE)

At Penn State University (July 1989 – June 2001)

- Simulation of CT scanning device using PENTRAN and A³MCNP
- PENTRANTM code system NETComputing
- Generation of effective multigroup cross-section libraries for A³MCNPTM (Automated Adjoint Accelerated MCNP)
- Developed improved methodologies for calculation of pressure vessel neutron fluence and associated uncertainties (GPU Nuclear, FERMI Project)
- Defined a benchmark problem for PWR cavity dosimetry
- Domain Decomposition and Iterative Methods for Solving the Linear Boltzmann Equation in Parallel, Pittsburgh Supercomputing Center (PSC)
- Domain Decomposition and Iterative Methods for Solving the Linear Boltzmann Equation in Parallel, Cornell Theory Center (CTC).
- A simplified code system for estimation of overall uncertainties in the PWR fluence (FERMI Project)
- BWR core-shroud cracking – Role of Radiation (FERMI Project)

- Evaluation of neutron and gamma dose for a shipping cask/storage (A³MCNP)
- Developed Monte Carlo MCNP models for the Penn State Breazeale Reactor (PSBR) Core
- Developed a new D₂O tank design for the PSBR based on the Monte Carlo MCNP modeling
- Development, implementation, and analysis of the secondary system of the AP600 power plant (Westinghouse Electric Corporation).
- Development, implementation, and analysis of the primary cycle of the AP600 power plant, Westinghouse Electric Corporation.
- Hot source design project, Gilbert and Commonwealth.
- Design studies for Penn State Fast Neutron Irradiator (FNI), Harris Corporation.
- Parallel algorithms, differencing schemes, acceleration methods, automatic variance reduction techniques, multigroup cross section generations
- Simulation of the VENUS-3 experimental facility located at SCK•CEN, Mol, Belgium (organized by OECD)
- Simulation of the 3-D Kobayashi benchmark problems (organized by OECD)
- Combined research-curriculum development in advanced computation, NSF.
- Development of methodologies for estimation of neutron and gamma flux throughout a BWR reactor internals (using PENTRAN and A³MCNP) (FERMI Project)
- Development advanced methodologies for generation of multigroup cross sections based on the adjoint-weighting approach (FERMI Project)
- Development of new quadrature sets for discrete ordinates methods
- Major Equipment Grant, “Acquisition of Virtual Reality and Visualization Facilities for Advanced Scientific and Engineering Computation, NSF.
- Advanced Algorithms and Automation Tools for Discrete Ordinates Methods In Parallel Environments, Awarded 30000 Service Units, San Diego Supercomputing Center,

GRADUATE STUDENTS (supervised/supervising) (Aug 2001 – present)

Name	Thesis/Dissertation Title	Degree & Year	Current employment
Valerio Mascolino		PhD, 2017	Research Assistant
Vince Wang		PhD, 2017	Research Assistant
Katherine Royston	Development of deterministic-based software for scattering noise reduction of the SPECT device	PhD, 2015	ORNL
	Analysis of TITAN Hybrid Algorithms for SPECT Simulation	MS, Jan 2010	
William Walters	Development of hybrid response function algorithms for identification of SNM	PhD, 2015	Postdoc
	Development of a Calculation Methodology to Determine Detector Response in a Spent Fuel Pool	MS, Dec 2009	Alumni fellow & NRC fellow
Nathan Roskoff	Analysis of the new Subgroup Decomposition Method formulation	PhD, 2017 MS, May 2013	NRC fellow, Research Assistant
Michael Wenner	Development and Analysis of New Monte Carlo Stationary Source Diagnostic and Source Acceleration for Monte Carlo Eigenvalue Problems with a Focus on	PhD, Dec 2010	Westinghouse

	High Dominance Ratio		
	Development of a Monte Carlo Methodology for Investigation of Neutron Cross Sections with a Time Of Flight Experiment	MS, June 2003	Alumni Fellow
Colleen Polit	Characterization and Redesign of the UFTR Thermal Column	MS, June 2009	Westinghouse
Amrit Patel	Detailed Characterization of the Experimental Shield Tank Facility at the University of Florida Training Reactor	MS, June 2009	NRC
Jangyong Huh	Constructing the Response Function for a BGO Detector Using MCNP5 and Developing the Deconvolution Algorithm in the Low Gamma Energy	MS, June 2008	PNNL
Ce Yi	A Hybrid Discrete Ordinates and Characteristic Method For Solving the Linear Boltzmann Equation	PhD, Aug 2007	Georgia Tech
Benoit Dionne	Automatic Variance Reduction Technique for 3-D Monte Carlo Electron-Photon-Positron Simulation Using Deterministic Importance Functions	PhD, Dec 2007	ANL
Gianluca Longoni	Advanced Quadrature Sets, Acceleration and Preconditioning Techniques for the Discrete Ordinates Method in Parallel Computing Environments	PhD, Dec 2004	Westinghouse PNNL
Brian Triplett	Neutron Diffusion Solutions for Homeland Security Applications	Honor Thesis, June 2004	General Electric
Dan Shedlock	Determination and Analysis of 3-D Neutron Flux Throughout a Spent Fuel Storage Cask Using 3-D Sn Transport Method	MS, Dec 2003	Nuclide
Arzu Alpan	An Advanced Methodology for Generating Multigroup Cross sections for Shielding Calculations	PhD, June 2003	Westinghouse
Apisit Patchimpattapong	Development of an EXPERT System for Automatic Mesh Generation for Sn Particle Transport Method in Parallel Environment	PhD, June 2003	Thailand Atomic Energy

GRADUATE STUDENTS (supervised) (July 1989 – Aug 2001)

Name	Thesis/Dissertation Title	Degree & Year	Current employment
James Brown	Simulation of a CT scan using the PENTRAN code	MS, June 2001	
Vefa Kucukboyaci	New Angular Multigrid Formulations for Sn Transport Methods and Their Application to Large 3-D Shielding Problems Using Parallel Computing Environment	PhD, June 2001	Westinghouse
Hikaru Hiruta	Performance Evaluation of A ³ MCNP for the Estimation of Neutron Flux in a Boiling Water Reactor Core Shroud	MS, Aug 1999	INL
John Wagner	Acceleration of Monte Carlo Shielding Calculations with an Automated Variance Reduction Technique and Parallel Processing	PhD, Aug 1997	ORNL
	Monte Carlo Transport Calculations and Analysis for Reactor Pressure Vessel Neutron Fluence	MS, June 1994	
Glenn Sjoden	PENTRAN: A Parallel 3-D Transport Code with Complete	PhD, Dec	Georgia

	Phase Space Decomposition, Adaptive Differencing, and Iterative Solution Methods	1997	Institute of Technology, Professor
Wilford Stevenson	Development of Algorithms for Determination of uncertainties in neutron flux Caused by the Uncertainty in Multigroup Cross Sections	MS, Aug 1996	
Melissa Huner	Parallel Iterative Techniques for the Discrete Ordinates Method	PhD, Aug 1996	Westinghouse
	Spatial Domain Decomposition Algorithms for Discrete Ordinates (Sn) Method on Parallel Computers	MS, June 1993	
Bojan Petrovic	Development of a Directional Θ -Weighted Sn Differencing Scheme for Shielding Applications	PhD, June 1995	Georgia Institute of Technology, Professor
Young-Su Kim	Pennsylvania State Breazeale Reactor (PSBR) Core Monte Carlo Modeling and Analysis	MS, June 1995	Korea
Heath Hanshaw	Multigroup Cross Section Generation with Spatial and Angular Adjoint Weighting	MS, Aug 1995	Sandia National Lab
Chris Pozsgai	Reduction of Iron Displacement From Fast Neutrons at the Reactor Pressure Vessel	MS, Dec 1994	Nuclear Naval Lab
Asam Khan	A Neutron/Gamma Transport Analysis of the Hot Source for Use in the Proposed Advanced Neutron Source Facility	MS, Aug 1993	President & CEO, UAE
Basil Nanayakkara	A Sensivity Study on the Use of Adjoint Transport Theory to Determine Neutron Fluence at Reactor Pressure Vessel	MS, June 1992	
Ronald Mattis	The Development of Two-Dimensional Parallel Processing Discrete Ordinates Algorithms	PhD, June 1991	University of Pittsburgh, Professor
John DeMarco	Vector and Parallel Algorithms for Solving the Neutron Diffusion Equation	Honor thesis, BS, June 1991	UCLA, Physicist
George Pristas (co-advisor)	Development and Implementation of a Secondary System for the AP600 Power Plant	MS, Dec 1990	

BEST PAPER AWARDS

- "Albedo Boundary Condition Algorithms for a Diffusion Code," presented at the 1986 ANS Western Regional Student Conference, Oregon State University (April 1986).
- "Theoretical Analysis of the Gamma Detector Data from the TMI-2 Reactor Lower Head," American Nuclear Society Summer Meeting, San Diego, CA (June, 1988) (with Tony Bratta)
- "New Vector/Parallel Algorithms for the Two-Dimensional Curvilinear Sn Methods," International Topical Meeting on Advances in Mathematics, Computation, and Reactor Physics, Pittsburgh, PA (April 1991) (supervised and provided direction to the student who received the one the best student paper awards, presented by Ron Mattis).
- "Estimation of Neutron Source Uncertainties in Pressure Vessel Fluence Calculations," American Nuclear Society Winter Meeting, San Francisco, CA (Nov., 1993) (with M. Mahgerefteh and B. Petrovic)
- "Benchmarking of Synthesized 3-D Sn Transport Methods for Pressure Vessel Fluence Calculations with Monte Carlo," International Conference on Mathematics and Computations, Reactor Physics, and Environmental Analyses, Portland, Oregon (April 30 - May 4, 1995) (with John Wagner, former graduate student)

- “Development of the Regional Angular Refinement and its Application to the CT-Scan device, American Nuclear Society Summer Meeting, Hollywood, FL (June 2002) (with Gianluca Longoni, former graduate student)
- “Developing an Expert System for Preparing an Effective Mesh Distribution for the Sn Method in the Parallel Environment, 11th International Symposium on Radiation Dosimetry (2002 ISRD), Aug. 17-21, 2002, Brussels, Belgium. (with Apisit Pachimpattapong, former graduate student)
- “Development of the ADEIS Variance Reduction Methodology for Coupled Electron-Photon Transport,” Proceedings of MC2005 Conference, April 4-7, 2005, Chattanooga, TN. (with Benoit Dionne, former graduate student)
- “UFTR Thermal Column Characterization and Redesign for Maximized Thermal Flux,” 13th International Symposium on Reactor Dosimetry, May 25-30, Amsterdam, Netherland. (with Colleen Polit, former graduate student)
- “A Methodology for Determination of Detector Response for Inspection of Spent Fuel Pool, “PHYSOR 2010, Pennsylvania, USA, May 9-14, 2010. (Authored by W. Walters (graduate student), A. Haghghat, M. Wenner (graduate student), S. Sitaraman (LLNL) and Y. Ham (LLNL)) (Best student paper award for merit, 1st prize)

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS

Date	Title	Meeting/Institution	Note
June 1989	Lecture on input preparation of the TRAC-BF1	2nd TRAC-BF1 Workshop, EG&G Idaho, Idaho Falls -	
Fall 1990	Particle Transport Theory Methods on Supercomputers	Nuclear Engineering Program, Ohio State	Funded
November 1991	Spatial and Angular Domain Decomposition Algorithms for the Curvilinear SN Transport Theory Method	US-USSR Workshop on "Frontiers in Numerical Transport Theory," Texas A&M	Partially Funded
May 26-29, 1992	New Spatial Parallel SN Algorithms for the 1-D Spherical Geometry	International Symposium on Numerical Transport Theory, Moscow, Russia	
March 1993	Parallel Computing for Neutron Transport Problems	Chemical and Nuclear Engineering Department, University of New Mexico, Albuquerque, New Mexico	Funded
Nov 1993	Discrete Ordinates (Sn) Algorithms for Parallel Computers	Nuclear Engineering Department, University of Michigan, Ann Arbor, MI	Funded

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS (continued)

Date	Title	Meeting/Institution	Note
April 1994	Sn Algorithms for Parallel Computers	1994 Topical Meeting in Reactor Physics, Knoxville, TN	
August 7-11, 1995	Parallel Sn Algorithms for Shared- and Distributed-Memory Machines	1995 X ENFIR/ III ENAN Joint Conference, Aguas de Lindoi, Brazil	Funded
August 7-11, 1995	Methodology and Benchmarking of Pressure Vessel Neutron Fluence	Federal University of Rio de Janeiro, Rio de Janeiro, Brazil	Funded
July 1995	Sn Particle Transport Methods on the Distributed Memory SP1	" SCSC'95, Ottawa, Ontario, Canada	
March 3-15, 1996	* Neutron and Gamma Transport Calculations for Deep-Penetration	VTT Research Center of Finland, Epsoo, Finland; Rossendorf Research	Partially Funded

	Problems - Uncertainty, New Developments * Parallel Algorithms for SN Transport Method - Phase Space Decomposition, Iterative, and Differencing Schemes	Center, Institute for Safety Research, Dresden, Germany; Nuclear Research Institute, Rez, Czech Republic; Skoda Nuclear Machinery Plant, Plzen, Czech Republic; Belgium Nuclear Research Center, Mol, Belgium; CEA/Saclay, Saclay, France; OECD Nuclear Energy Agency, Paris, France	
July 1996	Parallel Algorithms for Linear Boltzmann Equation Based on Complete Phase Space Decomposition	1996 SIAM Annual Meeting, Kansas City, Missouri	
Sept 2-6, 1996	*Sn and Monte Carlo Methods for Reactor Dosimetry and PV Neutron Fluence Calculation *Multigroup Cross Section Generation with a Bilinear Adjoint Weighting Approach and its Application to PV Dosimetry	Ninth International Symposium on Reactor Dosimetry, Benchmark & Intercomparison Workshop, Prague, Czech Republic	
Dec 2-3, 1996	* PENTRAN- A 3-D Discrete Ordinates Transport Code with Complete Phase Space Decomposition for Parallel Computers *Implementation of PENTRAN on Distributed Memory Architectures * An Adaptive Differencing Strategy and A Simplified Multigrid Acceleration Method with TPMC in PENTRAN * Determination of Neutron Flux at the BWR Core Shroud Using PENTRAN	3D Deterministic Radiation Transport Computer Programs - Features, Applications, and Perspectives," OECD Chateau de la Muette, Paris, France	
Jan. 17, 1997	Advances in Deterministic Methods for Solving the Neutron Transport Equation	Bettis Atomic Power Laboratory	Funded

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS (continued)

Date	Title	Meeting/Institution	Note
Aug 22, 1997	A mini-workshop on Methodologies for Particle Transport and Their Application to Nuclear Systems	X ENFIR/V ENAN Joint Nuclear Conferences, Pocos de Caldas, MG, Brazil	Funded
Oct 6-10, 1997	* PENTRAN - A 3-D Cartesian Parallel Sn Code with Angular, Energy, and Spatial Decomposition * Monte Carlo PWR Cavity Dosimetry Calculations Using an Automatic Variance Reduction Technique * The Exponential Directional Weighted (EDW) Sn Differencing Scheme in 3-D Cartesian Geometry	Joint International Conference on Mathematical Methods and Supercomputing in Nuclear Applications, Saratoga Springs, NY	

	* PENTRAN - Parallel Environment Neutral-particle TRANsport in 3-D Cartesian Geometry,"		
Nov 1997	Particle Transport Methods for LWR Dosimetry Developed by the PSTTG Group	ANS Winter Meeting, Albuquerque, NM	
April 24-25, 1998	Adjoint Transport Methodology, Application, and Calculation	DORT/TORT workshop, Nashville, TN	
Jan 8, 1999	Parallel Processing in Particle Transport Theory - PENTRAN, A 3-D Parallel Sn Code	High Performance Computing Invited Seminar Series IHPCA, Penn State University, University Park	
Sept 12-17, 1999	*Modeling of BWR for Neutron and Gamma Fields Using PENTRAN *Design and Characterization of a Facility for Fast Neutron Irradiation of Semiconductors at Penn State (presented by B. Petrovic, GT) *VENUS-3 Modeling with PENTRAN	Tenth International Symposium on Reactor Dosimetry, Osaka, Japan	
May 10-15, 1999	Significance of Adaptive Differencing for Sn Differencing in Void and Pure Absorber	XVI International Conference on Transport Theory, GaTech, Atlanta, GA	
May 7-11, 2000	* Graduate Education in Reactor Physics – Influence of Advancements in Computing Technologies * Angular Multigrid Acceleration for Parallel Sn Method with Application to Shielding Problems	International Topical Meeting on Advances in Reactor Physics and Mathematics and Computation into the Next Millennium (PHYSOR 2000), Pittsburgh, PA	
June 2000	Advanced 3-D Deterministic and Monte Carlo Codes for Simulation of Real-Life Complex Nuclear Systems	ANS 2000 Annual Meeting, San Diego, CA	

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS (continued)

Date	Title	Meeting/Institution	Note
Feb. 19-22, 2001	*Discrete Ordinates (Sn) Transport Methods *Monte Carlo methods and variance reduction techniques *Demonstration of PENTRAN code system Demonstration of A3MCNP	A short course on "Neutron & Radiation Transport Simulation: Theory and Applications, KAIST, Taejon, Korea	Funded
June 2001	Monte Carlo Methods in Reactor Physics	ANS 2001 Summer Meeting, Milwaukee, WI	
Jan 22, 2002	High Performance Computing Methods in Particle Transport Theory	University of National Autonomous of Mexico, Mexico City, Mexico	Funded

Feb 24-26, 2002	*High Performance Computing Methods in Particle Transport Theory *Monte Carlo methods: Automated CADIS Variance Reduction Methodology, A ³ MCNP	Committee formed by JAERI (Japan Atomic Energy Research Institute) to discuss the future requirements on the system of the Information Technology Based Laboratory (ITBL), especially in the field of nuclear technology, Japan	Funded
May 9-14, 2004	Plenary talk - Advancement in Particle Transport Methods and Future Needs and Directions	International Conference on Radiation Shielding (ICRS-10) and 2004 Radiation Protection and Shielding (RPS 2004) Joint Conference (ICRS-10/RPS 2004), Madeira, Funchal, Portugal	
July 11-14, 2004	Recent Applications and Advancements in the PENTRAN and A ³ MCNP Code Systems	International Joint Meeting Cancun 2004 LAS/ANS-SNM-SMSR XV SNM Annual Meeting and XXII SMSR Annual Meeting, Cancún, Q.R., Mexico	
Aug 28 – Sept. 1, 2005	3-D Particle Transport Methods and Their Applications (could not attend; presented by G. Sjoden)	Applied Modeling and Computations in Nuclear Science, 230th ACS Meeting, Washington DC	
Aug 28 – Sept 2, 2005	Recent Advances in Hybrid Methods Applied to Neutral Particle Transport Problems	International Nuclear Atlantic Conference, INAC 2005, Santos, SP, Brazil	Funded
Dec. 14-16, 2005	Hybrid and Parallel Computing Particle Transport Methods for Shielding and Core Physics	Workshop on Advanced Simulations: A Critical Tool for Future Nuclear Fuel Cycles, LLNL	Funded
Feb 23-24, 2006.	Real-World World Neutronics Calculations	Workshop on High End Computing for Nuclear Fission Science and Engineering, Salt Lake City	Funded

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS (continued)

Date	Title	Meeting/Institution	Note
April 3-6, 2006	Plenary Talk - A Guide to Detailed Transport Simulations: Hybrid Methods	The Radiation Protection and Shielding Division of the American Nuclear Society's Biennial Topical Meeting, Carlsbad, New Mexico	
Aug 23 – Sept 1, 2006	Three-part lecture series on '3-D Particle Transport Techniques, Applications, and Issues'	2006 Frederic Joliot/Otto Hahn (FJOH) Summer School on Nuclear Reactors, addressing	Funded

		'Neutron Physics Issues and Fuel Cycle Optimization,' Cadarache, France	
July 8–12, 2007	Methodologies and Related Issues – University of Florida HEU to LEU Fuel Conversion Project	GTRI Reactor Conversions Session, 48th Annual INMM Meeting, Tucson, Arizona	Funded
August 27, 2007	Nuclear Power	2007 Alternative Energy Summit, Jupiter, Florida	
Jan 31, 2008	Nuclear Energy – Status & Future	FTN Energy Debate, University of Florida	
May 24-29, 2008	Neutron and Gamma Ray Transport Calculations: Needs for Benchmarks	13th International Symposium on Reactor Dosimetry (ISRD-13), Netherlands	
Jan 2009	Nuclear Power Generation in Florida and Related Opportunities	Florida Energy Office, Tallahassee, Florida	
Feb 2009	Nuclear Power Generation (Status, Job, Workforce, Education).	FESC Community College Summit, University of Florida	
March 2009	Nuclear Power Generation (Status, Job, Workforce, Education).	Levy Public Hearing, Crystal River, Florida	
March 26, 2009	Hybrid 3-D Transport Methods,” Symposium on Reactor Physics and Nuclear Data (Honoring Prof. Takeda)	Tokyo Institute of Technology, Japan	Funded
May 3-7, 2009	*Analysis and Benchmarking of PENTRAN Code using the OECD-NEA Benchmark Problems,” *A Perspective on Nuclear Engineering Education in the New Era	Proceedings of the International Conference on Mathematics, Computational Methods & Reactor Physics (M&C 2009) Saratoga Springs, New York	

INVITED PAPERS, SEMINARS, LECTURES & WORKSHOPS (continued)

Date	Title	Meeting/Institution	Note
June 29 - July 3, 2009	3-D Parallel Hybrid Particle Transport Methods and their Application to Nuclear Systems (Reactors, Medical Devices, and Detection Systems) <i>Day 1</i> – Parallel computing concept and methods, and their application to particle transport methods -The MPI (Message Passing Interface) library was used for development of simple parallel algorithms in distributed computing environments	2009 CEA-EDF-INRIA Summer School on Particle Transport Numerical Methods and Applications, the Port Royal seminar centre, 78470 Saint-Lambert-des-Bois, France.	Funded

	<p>Day 2 – Hybrid (Deterministic/Deterministic) particle transport methods for reactor applications -Here, the 3-D parallel PENTRAN (Parallel Environment Neutral-particle TRANsport) computer code was utilized.</p> <p>Day 3 – Hybrid (Deterministic/Monte Carlo) particle transport methods for reactor applications; here, PENTRAN was used to determine the adjoint function for detector, and then the adjoint distribution was used to determine the detector response.</p> <p>Day 4 – Hybrid (Deterministic/Deterministic) particle transport methods for medical applications -Here, the recently developed 3-D TITAN code was utilized.</p> <p>Day 5 – Hybrid (Deterministic/Monte Carlo) particle transport methods for design of detection/interrogation systems</p>		
Oct 24-30, 2010	Hybrid Particle Transport Methodologies	17 th Pacific Basin Nuclear Conference Cancún, Q.R., México	
May 8, 2011	Workshop on Hybrid Particle Transport Methods and their Application to Nuclear Systems (Reactors, Detection Systems, and Medical Devices)	International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2011) Rio de Janeiro, RJ, Brazil, May 8-12, 2011, Latin American Section (LAS) / American Nuclear Society (ANS)	

Date	Title	Meeting/Institution	Note
Sept 15, 2011	Hybrid Particle Transport Methods for Real-Time and Accurate Simulation of Nuclear Systems	Nuclear Engineering Seminar Series, Department of Mechanical and Nuclear Engineering, Penn State, University Park	Funded
Sept 2, 2012	<ul style="list-style-type: none"> • Unique Formulations in TITAN and PENTRAN for Medical Physics Applications • Panel discussion on ‘Role of Computing in Medical Physics’ 	ICRS-12 & RPSD- 2012 September 2-7, 2012, Nara Prefectural New Public Hall, Nara, Japan	

Nov. 13, 2012	Advanced Hybrid Transport Methodologies for Medical Image Reconstruction in Real-Time	ANS-ASME Annual Meeting, Lynchburg, VA	Funded
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TEACHING EXPERIENCE (1986 – present)

Courses Taught *(Virginia Tech)

Fall (2011)	NSEG 5134	Monte Carlo Methods for Particle Transport (Graduate)
Spring (2012)	NSEG 5124	Nuclear Reactor Analysis (Graduate)

Courses Taught *(University of Florida)

Spring (2003)	ENU 4103	Nuclear Reactor Computation – Statics (undergraduate)
Spring (2002 – 2010)	ENU 6052	Neutron Transport Theory (Graduate)
Fall (2002 – 2010)	ENU 6973	Monte Carlo Methods (Graduate)
Spring (2005 – 2010)	ENU 4192	Capstone design (undergraduate) (4-member team) (established this new format)
Fall (2007- present)	ENU 4191	One-credit preparation course (undergraduate) (4-member team) to precede the new 3-credit ENU 4192

Courses Taught* (Penn State)

Spring (1996-2001)	NucE 530	Parallel/Vector Algorithms for Scientific Applications (Graduate)
Fall (1989-2001)	NucE 525	Monte Carlo Methods (Graduate)
Spring (1991-2001)	NucE 521	Neutron Transport Theory (Graduate)
Fall (1991-2001)	NucE 403	Advanced Reactor Physics (Undergraduate)
Spring (1989-1990)	NucE 302	Nuclear Reactor Theory Design (Undergraduate)
Sum (1987-1989)	NucE 297/497	Introduction to Reactor Theory and Design (Undergraduate)

*Note: Prof. Haghghat developed all the courses in the Penn State section; he also prepared an unpublished primer on the Monte Carlo methods, and extensive lecture notes on reactor theory and particle transport theory and numerical methods. Similar courses were taught at the University of Florida

ORGANIZED WORKSHOPS and SYMPOSIA

- Contributed to the organization of Forum on Nuclear Regimes: Future Outlooks, Nov.5, 2012, Virginia Tech Research Center, Arlington, VA, sponsored NSEL, NCR, & AREVA.
- Organized 2012 Symposium on Low Power Critical Facilities, March 11-12, 2012, Virginia Tech Research Center, Arlington, VA, sponsored by the SUNRISE LLC.
- Organized 13th International Workshop on Methodologies for Particle Transport Simulation of Nuclear Systems, Nov 7-11, 2011, Virginia Tech Research Center, Arlington, VA (restarted with changes considering discussion on new hybrid methodologies and their application to nuclear reactors and nuclear safeguards) (Co-taught with Prof. Glenn Sjoden from Georgia Tech)
- Mini-workshop on PENTRAN code and its application, M&C 2009, May 3-7, 2009, Saratoga Springs, NY
- Organized a five-day annual international workshop* entitled “International Training Course/Workshop on Methodologies for Particle Transport Simulation of Nuclear Systems (Design, Shielding, & Dosimetry) (eight workshops, 1995-2001, at Penn State and one at Stuttgart University; four workshops. 2002-2005, at UF) (Over 90 professionals from Asia, Europe, and US participated.)

*Prepared a detailed manual (over 400 pages) on theory and computational methodologies, code input and output processing, code limitations, and hands-on exercises; different students assisted in this effort, however, Prof. Bojan Petrovic (as a research scientist at Penn State) is co-editor on this document; he is currently works at Georgia Institute of Technology.

- Two mini-workshops entitled “ PENTRANTM – 3-D Parallel Sn Code Package,” and “Automated

Variance Reduction with A³MCNPTM for Shielding Applications,” at the International Reactor Physics Conference, PHYSOR 2002, Oct. 7-11, 2002 Seoul, Korea.

- Two mini-workshops entitled “ PENTRANTM – 3-D Parallel Sn Code Package,” and “Automated Variance Reduction with A³MCNPTM for Shielding Applications,” at the International Reactor Physics Conference, PHYSOR 2000, May 7-11, 2000 Pittsburgh, PA.
- June 1990- Pennsylvania State University, University Park - Instructor for the first TRAC-BF1 User's Group Workshop.

CONSULTING, REVIEW PANELS, IAEA EXPERT/HOSTING

2012	Panel discussion on " <i>The Role of Computing in Medical Physics</i> ," ICRS-12 & RPSD-2012 September 2-7, 2012, Nara Prefectural New Public Hall, Nara, Japan
2010	DOE – Review of LLNL’s “Fast Fission Chain Neutron and Gamma Ray Detection”
2010	A member of International Advisory Council for Department of Nuclear & Quantum Engineering, KAIST, Korea
2010	DOE – Review of ORNL’s “Activation Foils”
2009	DOE – Review of LLNL’s “Develop Method for Partial Defect Verification”
2009	DHS/NSF Academic Research Initiative (ARI) Review Panel
2008-09	Hosted (jointly with G. Sjoden), T. Courau, R&D Division, EDF, France
2007-08	Hosted B. Lee, KAERI, Korea
2007	Chair of International Council for Department of Nuclear & Quantum Engineering, KAIST, Korea
2006	Hosted IAEA Fellow, Desi Kirilova, Institute of Nuclear Research and Nuclear Energy, Bulgaria
2004-06	NuSAFE Co. – Simulation of Nuclear Detection Systems
2003	Nuclear Power Engineering Corporation (NUPEC), Japan; Training on the use of A ³ MCNP
2002	TEPCO Systems Corporation (TEPSYS), Japan; Training on the use of A ³ MCNP
2002	National Tsing Hua University (NTHU), Taiwan; Training on the use of A ³ MCNP
2002	Institute for Nuclear Energy Research (INER), Taiwan; Training on the use of A ³ MCNP
2002	IAEA Expert, lectured on parallel computing methods, and their application to particle transport methods and virtual reality software design, University of National Autonomous of Mexico (UNAM), Mexico.
2002	Mitsubishi Heavy Industries (MHI), Yokohama, Japan; Training on the use of A ³ MCNP
2001	Global Atomics Inc., Processing Photonuclear cross sections, and their use for evaluation of a novel accelerator driven system.
1998-99	KOPEC, Korea; provided training on performing transport calculations for reactor cavity dosimetry
1998	SCK.CEN, Belgium; provided advice on deterministic and Monte Carlo Simulations
1997	Hosted (jointly with another faculty) IAEA Fellow, Malaysian Institute of Nuclear Technology (MINT), Malaysia.
1997	Supervised two students from INSTN, France
1996	IAEA Expert, reviewed studies on reactor neutronics and lectured on transport theory methods, Institute of Electrical Investigations, Nuclear Energy, Mexico.
1993	B&W Owner's Group - reviewed the B&W fluence project.
1989-90	KEMA (an energy organization in the Netherlands) for implementation of the TRAC-BWR code on the APPOLO Computer System
1988	Battle Columbus, Ohio - Use of the adjoint transport methodology for the fluence estimation at the reactor pressure vessel

NEW PROGRAMS/INITIATIVES DEVELOPMENT (1989 – Present)

1992-2001, PSTTG

Established the Penn State Transport Theory Group (PSTTG) (1992 – 2001); organized an annual international workshop entitled “International Training Course/Workshop on Methodologies for Particle Transport Simulation of Nuclear Systems (Design, Shielding, & Dosimetry). Dates and locations of these workshops are as follows: June 19-23, 1995, PSU; June 2-7, 1996, PSU; May 19-23, 1997, PSU; June 9-13, 1997, Stuttgart, Germany (with assistance from OECD and IAEA); May 25-29, 1998, Mol, Belgium (with assistance from SCK.CEN Nuclear Research Lab, Mol, Belgium); May 17-21, 1999, PSU; June 26-30, 2000, PSU; June 25-29, 2001, PSU.

1996-2001, IHPAC

Contributed to the establishment of the High Performance Computing (HPC) Graduate Minor and Institute for HPC Applications (IHPAC) at Penn State (1996-2001) - Professor Haghghat, under a NSF-sponsored project, developed a graduate course entitled “Vector/Parallel Algorithms for Scientific Applications.” Through this project, he and his colleagues from the Penn State College of Engineering received equipment grants from IBM, and initiated the IHPAC, and a graduate minor in High Performance Computing (HPC). His courses on “Monte Carlo Methods” and “Transport Theory Methods” were included in the numerical courses used for the HPC minor.

2001-2011, UFTTG (<http://ufttg.nre.ufl.edu>)

Established the University of Florida Transport Theory Group (UFTTG) (2001 – present); established the Particle Transport & Distributed Computing (PTDC) lab, which with contributions from Prof. Sjoden, currently included 110 processors, over several hundred gigabytes of memory, and a few high-speed networks; the annual workshop was offered at UF for three years until 2005.

2004-2011, FINDS (<http://finds.nre.ufl.edu>)

Established (with assistance from Prof. Sjoden) the Florida Institute of Nuclear Detection and Security (FINDS) (2004) – To serve as a design-basis center for research, development, testing, and engineering (RDTE) projects that directly satisfy critical nuclear detection problems facing both the State of Florida and our nation.

2006-2011, CMPP/CMPWG(<http://cmpwg.ans.org>)

Established the Computational Medical Physics Track within the Medical Physics Program at UF (2006) – This program, which is designed for students pursuing a PhD degree, is aimed at development of new devices and algorithms for medical physics therapy and diagnosis. Students in this track are required to take advanced courses in radiation transport and detection, and generally are advised by co-advisors from nuclear engineering and medical physics programs; assisted Bernie Kirk (ORNL) (2006) to establish a Computational Medical Physics Working Group, which operates under auspices of Mathematics and Computation, and Biology and Medicine Divisions.

2007-2011, UFTR

Enhancement of the UFTR – To make UFTR beneficial to the university community and nuclear community as a whole, initiated a project on Design, licensing, and construction of fully digital protection and control systems; at completion of this project, UFTR will become the first nuclear reactor operating with digital systems, and therefore, create the opportunity for providing training and benchmarking activities, and potentially establishing a Center of Excellence in Nuclear Reactor Digital Control; as part of this new initiative, a new hydraulics system has been designed and constructed for the UFTR.

2011-Present, VT³G(<http://www.ne.vt.edu>)

Established the Virginia Tech Transport Theory Group (VT³G) (2011 – present); established a specialized PC clusters at the Virginia Tech Research Center (VTRC) in Arlington; offering an annual workshop (see Section on Organized Workshop)

2011-Present, NSEL(<http://www.ICTAS.vt.edu>)

Under the auspices of the Institute for Critical Technology and Applied Science (ICTAS), the Nuclear Science and Engineering Lab (NSEL) has been established. NSEL enables the Virginia Tech Nuclear Engineering Program to take a leading role in Nuclear education and research at the National Capital Region (NCR).

ADMINISTRATIVE EXPERIENCE (www.nre.ufl.edu/AnnualReport/AnnualReport.php;
www.nre.ufl.edu/newsletter/newsletter.php)

NRE Chair (Aug 2001 – Sept 2009)

In 2009, the University of Florida NRE Department achieved its highest graduate school ranking in recent history, finishing tied for 8th in the nation with Georgia Tech. Over the course of my tenure as chair, enrolment increased from 65 students to a high of 208 students. In 2001, the graduate enrolment was 35, of which 29 were in Medical Physics (MP) and 6 were in Nuclear Engineering (NE). By the fall of 2008, there were 80 graduate students, with 44 in MP, 31 in NE, and 5 in HP. The total research funding, grants, and fellowships increased from ~\$2.4 M in 2000-01 to \$5.6 M in 2008-09. Five outstanding faculty members were hired; one is tenured, one is up for tenure, two started in July, and one moved to the Radiation Oncology Department.

The number of MS and PhD graduates has increased significantly during my tenure; e.g., in 2007-08 and 2008-09 academic years, 24 MS and 8 PhDs, and 21 MS and 7 PhDs were awarded, respectively, and last summer, 12 MS and 9 PhDs were awarded. This last graduation figure was achieved with only seven faculty members in the department during the 2008-09 academic year.

Furthermore, Prof. Haghghat significantly enhanced the Department's fund raising efforts, raising a total of \$611,875 in contributions (not including the funds for the UFTR) from various organizations. These funds were used for various projects, including the establishment of several laboratories: PTDC (Particle Transport and Distributed Computing), PE-ADRAD (Progress Energy Advanced Radiation Detection), ALRADS (Advanced Laboratory for Radiation Dosimetry Studies), and RSD (Radiography by Selective Detection). With assistance from Jerry Paul (former Majority Whip of the Florida State House) and Glenn Sjoden, Prof. Haghghat established the Florida Institute of Nuclear Detection and Security (FINDS), which has helped the Department attract several research contracts from various organizations. Prof. Haghghat supervised the renovation of the front office, the Nuclear Reactor Annex Building, and the space for the aforementioned labs and the Institute. Through the Digital Control project funds, Prof. Haghghat is supervising a major renovation at the reactor building.

Over the last eight years, Prof. Haghghat has spearheaded the revision of the undergraduate and graduate curriculums. He introduced a new format for the undergraduate capstone design course, which addresses all aspects of system design by involving multiple faculty members and developing an elaborate system of reporting, review, and evaluation. As a result, the NRE students have been able to do excellent work and participate at the American Nuclear Society (ANS) annual design competition. Since the change in the format 5 years ago, the NRE students have been finalist four times, and earned first place in the fall 2009 ANS competition. Additionally, Prof. Haghghat coordinated and contributed to the successful renewal of the NRE's 2006 ABET certification.

Prof. Haghghat hired new staff members for various functions of the department, established three new positions including academic support, Chair Assistant, and Information Technology expert. Since our last budget cut, the Chair's Assistant position has not been filled with a full-time employee.

Since 2005, Prof. Haghghat became heavily engaged in the activities of the UFTR. In 2005, he received a contract (\$425,000) from the DOE to perform the necessary analysis for the HEU (Highly Enriched Uranium) to LEU (Low Enriched Uranium) fuel conversion and prepared the necessary licensing documentation for this purpose. This effort was completed in 15 months through the collaboration of two other faculty members, 11 graduate students, and the reactor personnel. NRC approved the UFTR license amendment application (LAR) in September 2006. Then in 2007, with major assistance from Progress Energy Florida, Prof. Haghghat started the Digital Control Project. Considering the complexity of the project, especially in the areas of licensing and construction, and the upgrades needed in the hydraulic system, Prof. Haghghat decided to step down from the Chair position so that he could devote more time to the project.

To effectively promote the NRE's many accomplishments, Prof. Haghghat dedicated a significant amount of time to revising the department webpage (five times over 8 years), and publishing annual reports and biennial newsletters. Annually, a one-page department overview was also prepared (See Fig. 1 for the last issue dated July 2009).

Interim Director & Director of the UFTR (Oct 2008 – Sept 2009; Sept 2009 – June 2010)

As Director, he engaged in the daily supervision of the facility, and was responsible for supervising relevant educational and research activities. During this time, he hired a reactor manager, a Senior Reactor Operator, and a trained reactor operator.

For the relicensing of the UFTR, Prof. Haghight prepared responses to the NRC's Request for Additional Information (RAI's); supervised necessary analyses related to effluent releases, such as Ar-41; revised the reactor's Technical Specifications to comply with ANSI/ANS 15.1 standards; supervised the cost estimate analysis associated with decommissioning the reactor facility; and supervised the design and construction of a new hydraulic system for the UFTR. For Licensing Amendment Request (LAR) for the Digital Control Upgrade, Prof. Haghight (Director of the project) has met with the NRC several times, and has written and revised documents for the LAR.



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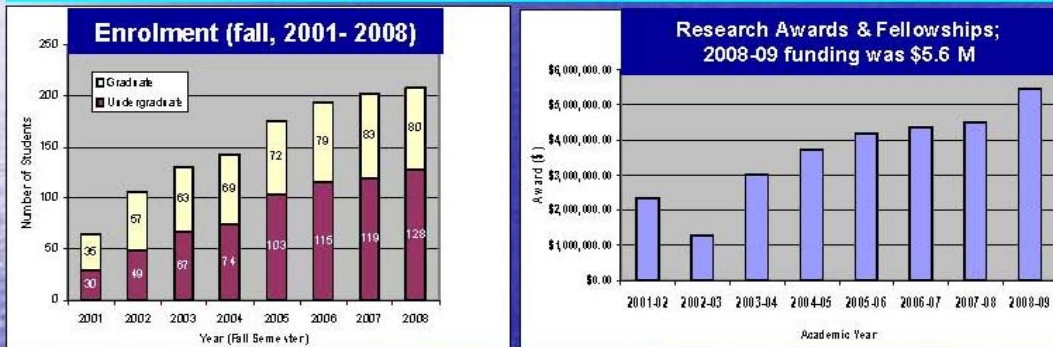
Degrees offered

Nuclear Engineering - Ph.D., Engineer, M.S., M. Eng., B.S.
 Medical & Health Physics - Ph.D., M.S.
 Nuclear and Radiological Sciences (Pre-Med) – B.S.

Faculty

Tenure/Tenure-track: 11 (3 Professors, 4 Associate Professors, 3 Assistant Professor &, one search)
Fixed-term: 4 (1 Research Assistant Professor, 1 Adjunct Professor, 2 research scientists)
Affiliate faculty: 15 (teach 6 courses in MP, and involved in MP research);
Emeritus Faculty: 4
Visiting Scholars: 1 from Hunyang University, Korea

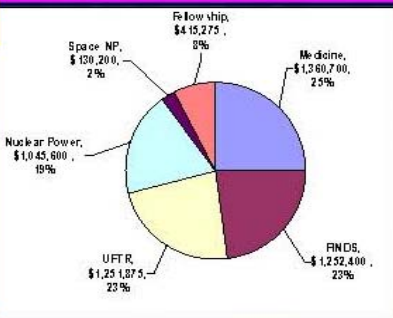
US News & Work Report Graduate Ranking: 8th, tied with Georgia Tech



Graduate student support 23
 RA, Fellows, Alumni (8) NRC (3)
 DOE (3) NSF (1) NANT (1) NIH (5)

Number of graduates (2008-09) - 26 (BS), 21 (MS), 7 (PhD)

Distribution of Awards



Laboratories and Facilities

- Advanced Laboratory for Radiation Dosimetry Studies (ALARDS)
- Advanced Nuclear Fuel (ANF) Laboratory
- Florida Institute of Nuclear Detection and Security (FINDS)
- Particle Transport and Distributed Computing (PTDC) Lab
- Progress Energy Advanced Radiation Detection (PE-ARDAD) Lab
- Selective X-ray Imaging (SXI)
- University of Florida Training Reactor (UFTR)

Digital Control Initiative – Design, Licensing, and Construction of a Fully Digital Control System for the UFTR - **Progress Energy** provided an award of \$675,000; State of Florida has provide a match of \$425,000, **AREVA NP Inc. and Siemens Co.** have agreed to provide the TXS safety and T-3000 non-safety systems free of charge, complete with significant engineering time and management support, received a contract from **DOE** for procurement of NIs and sensors, and **Canberra** has agreed to provide radiation monitors.

Based on 2008-09 Academic Year

Figure 1- UF NRE Status, July 2009

SOCIETY MEMBERSHIP

American Nuclear Society
American Society for Engineering Education
SIAM
American Institute of Physics

PROFESSIONAL ACTIVITIES

Chair, ANS Reactor Physics Division, 2012-13
Vice-Chair, ANS Reactor Physics Division, 2011-12
Treasure, ANS Reactor Physics Division, 2010-11
Technical Program (Co-Chair), 2010 NPIC & HMIT, 2009-2010
Chairman, Board of SUNRISE LLC (Jan 2010); a member of the Executive Committee, since 2007.
Member, International Organizing Committee of the Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo (SNA + MC2010), 2009
Organized special sessions on Hybrid Transport Methods, M&C 2009, May 3-7, 2009
Secretary, ANS Reactor Physics Division, 2009-10
Co-Chair, Technical Program of 2010 NPIC & HMIT conference, 2009-10
Chair, NEDHO (2006-07); Executive Committee of NEDHO, 2007-08
Co-Chair, Computational Medical Physics Working Group, 2007
Chair, MCD, ANS, 2005-2006.
Member, International Scientific Committee, International Conference on Physics and Technology of Reactors and Applications: PHYTRA1, 2006-2007
Track Leader, Deterministic and Hybrid Methods, ICRS10-RPS2004, May 9-14, 2004, Madeira Island, Portugal.
Member, Scientific Advisory Committee, MC 2000, Oct 23-26, 2000, Lisbon, Portugal.
Member, Technical Committee, M&C Topical Meeting, 1992 – present.
Member, Technical Committee, PHYSOR Topical Meetings, since 2002
Member, ASTM Program Committee, International Symposium on Reactor Dosimetry, since 2002.
Member, Scientific Committee of the MC2000 Conference, Oct. 2000, Lisbon, Portugal.
Co-Chair of the Workshop on Benchmarking at the Tenth International Conference on Reactor Dosimetry, Sept. 12-17, 1999, Osaka, Japan.
Co-organized a special session on "Advances in LWR Fluence and Dose Evaluations," for the 1997 ANS Winter Meeting, Albuquerque, NM, Nov. 16-20, 1997.
Member of the Guest Advisory Board of the XI ENFIR/IV ENAN Joint Brazilian Nuclear Conferences, Aug. 18-22, 1997.
Co-organized a special session on "Methods for Ex-Core Neutron Response Calculations," for the Joint International Conference on Mathematical and Supercomputing for Nuclear Applications, Saratoga Springs, NY, Oct. 6-10, 1997.
Organized a special session on "Estimation of Uncertainties in Particle Transport Calculations," ANS Summer Meeting, Reno, NV, June 16-20, 1996.
Member of the Technical Committees of the ANS Topical Meetings organized by the Mathematics & Computation (since 1991), Reactor Physics (since 1994), and Radiation Protection and Shielding (since 1996) Divisions.
Member of the ASTM Program Committee for the 10th Symposium on Reactor Dosimetry, 1996.
Member of an OECD Task Force on "Computing Radiation Dose and Modeling of Nuclear Radiation-Induced Degradation of Reactor Components (TFRDD) (1996-2000).
Participated at OECD activities on transport codes and their application and Benchmarking (1995- present).
Co-Chair of Program Committee for the M&C Division of the ANS, 1994-1999.
Co-Organizer for a special session on the "M&C Codes in Medical Applications," 1994.
Member of the Organizing Committee for the "7th International Symposium on Domain Decomposition Methods in Scientific and Engineering Computing," 1993.
Member of an OECD committee on "Adaptation of Nuclear Codes to Parallel Computers" (1993-1999).
Chair, ANS Standards Subcommittee on transport theory calculations for cavity dosimetry, 1992-02.

Organized a special session on the "Computational Needs for the Space Nuclear Propulsion Systems," 1992.

Conducted a research collaboration with Russian scientists from the Moscow Engineering Physics Institute (MEPHI) and the Keldysh Institute of Applied Mathematics (KIAM) (1992-1994).

Co-organizer of a Plenary Session on "Future Hardware Designs" at the International Meeting on Advances in Computation, Mathematics, and Reactor Physics," 1991.

Participated in the Executive Committee Meetings of the Mathematics and Computation (M&C) Division of the American Nuclear Society (ANS), 1989-2008.

Served as the Secretary for the Mathematics and Computation (M&C) Division of the American Nuclear Society (ANS), 1990-1991 term.

Editor of the newsletter for the M&C Division of the ANS, 1991-present.

UNIVERSITY COMMITTEES

Department (Penn State)

Member, Ph.D. Candidacy Examination Committee (1989-1990)

Chair, Ph.D. Candidacy Examination Committee (1990-1991)

Member, Ph.D. Candidacy Examination Committee (1994-1995)

Member, Strategic Planning Committee (1989-1991)

Advisor, American Nuclear Society (ANS) Student Chapter (1990-1994)

Advisor, Alpha Nu Sigma Student Honor Society (1990-2001)

Chair, Strategic Plan for Computer Usage Committee (1990-1991)

Advisor, University Scholars Program (1989-2001)

Member, Allocation Committee for Undergraduate Surcharge Funds (1991-1992)

Member, Faculty Search Committee (1991-1992)

Member, Climate Committee (1991-2001)

Member, Department's ME & NE merger transition committee (1997)

Chair, Ph.D. Candidacy Examination Committee (1995-2001)

Chair, Faculty Search Committee (1995-1996)

Member, Promotion and Tenure (1997)

Chair, Computer and Mathematics Skills in Curricula (1998-1999)

Member, Undergraduate Curriculum Committee (1998-2001)

Member, Radiation Science and Engineering Program 'Ad Hoc' Committee (1998-1999)

Member, Faculty Search Committee (1998-1999)

Member, Tuition Surcharge Committee (1998-2001)

Member, Assessment and Improvement in Nuclear Engineering Curriculum 'Ad Hoc' Committee (1998-1999)

Department (UF)

Department Chair, and several committees

College (Penn State)

Departmental Technical Contact for College's Computer Network (1989-1990)

Departmental Representative to the College's Computer Committee (1990-1992)

Member, College of Engineering Climate Committee (1991-1992)

MS WIZ Program (Summer 1992)

Department's representative for the Engineering Open House

High Performance Computing (HPC) Initiatives:

- Major role in establishment of one HPC lab for teaching and research
- Member, Advisory Board of the Institute for High Performance Computing Applications (IHPCA) (1996-2001)
- Major contributor to developing a new graduate minor in HPC member, Computer Advising Committee (1998-present)

College (UF)

Chair's Committee

University (Penn State)

Department's representative for the Scholar's Orientation Day
Member, Center for Academic Computing Faculty Advisory Committee (CACFAC), representative of the Provost office, 1992-2001
Member, Breazeale Nuclear Reactor Safeguard Committee (1997-2003)
Member (1996-1997), Cultural Diversity Subcommittee, University Faculty Senate, representing the College of Engineering
Chair (1997-1998), Cultural Diversity Subcommittee, University Faculty Senate, representing the College of Engineering
High Performance Computing (HPC) Initiatives:
- Major role in establishment of one HPC lab in the College of Science for teaching and research
- Member, Massively Parallel Computing Interest Group (1993)
Provost's representative, CACFAC (Center for Academic Computing Faculty Advisory Committee)
Faculty Representative, Engineering Open House (1988-2001)
Judge - The graduate research exhibition (1994)
Prepared a strategic plan for the computer usage in the Nuclear Engineering Department, 1991.
Coauthor of a survey report on the Future of the Engineering Computer Laboratory (ECL), 1992.
Contributed to a justification document for the Penn State Massively Parallel Computing Initiative, 1993.
College Representative (Cultural Diversity Subcommittee, University Faculty Senate)
Gave a talk on his experience on Tenure and Promotion at the College of Engineering Promotion and Tenure Workshop
Served on the climate committee of the college of engineering; discussed the issues at the department's faculty meeting; initiated a climate committee at the department (1990).
Serving on a Senate Cultural Diversity Subcommittee; this Subcommittee evaluates Course Proposals for Cultural Diversity (1996-1999).

University (UF)

High Performance Committee (HPC)
University of Florida Committee on Energy
RSRS – UFTR Safeguard Committee
Volunteer for several committees

Virginia Tech (VT)

Member, Commission on Graduate Studies and Policies, 2012-2015
Virginia Tech *ad hoc* committee on establishment of a certificate on High Performance Computing and Visualization (HPCV) (2011-present)
Nuclear Engineering program (curriculum, degree, faculty search) (2011-present)
Chair, Faculty Search Committee (2011-12)
Member, Dean Search Committee (2012)