

# **18th Topical Meeting of the Radiation Protection and Shielding Division**

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## Plenary

### **Epidemiologic Studies of Radiation Workers\*\*\*\*%**

John D. Boice, Jr. (1,2)

1) National Council on Radiation Protection and Measurements, Bethesda, MD, 2) Vanderbilt University, Nashville, TN

### **Radiogenic Risk in Normal Tissues of Cancer Patients Receiving Radiotherapy\*\*\*\*&**

Phillip J. Taddei

Department of Radiation Oncology, American University of Beirut Medical Center, Beirut, Lebanon

### **Nuclear Analysis of ITER\*\*\*\*(**

Michael Loughlin

ITER Organization, Route de Vinon-sur-Verdon, 13067 St Paul Lez Durance, France

### **Measurements of Space Radiation On, and On the Way To, Mars\*\*\*\*,**

Cary Zeitlin for the MSL-RAD Science Team

Southwest Research Institute, Earth, Oceans and Space, Durham, NH

## Health Physics

### **Aircrew, Cancer and Probability of Causation\*\*\*\*%&**

J. Shonka and E. Bramlitt

SRA, Toccoa, GA

### **A Grid Intensity Map-Based Source Model for Monte Carlo Modeling of IMRT Field Irradiation\*\*\*\*%{**

Hui Lin, Jingfeng Cai, Yumei Dai (1), Xi Pei, Ruifen Cao (2), Zhi Chen (3)

1) School of Electronic Science & Application Physics, Hefei University of Technology, Hefei, China, 2) FDS Team of Institute of Nuclear Energy Safety Technology, Chinese Academy of Sciences, Hefei, China, 3) School of Nuclear Science and Technology, University of Science and Technology of China, Hefei, China

### **Photon and Neutron Fluence-to-Dose Conversion Factors for External Radiation: A Comparison of the New ICRP DCFs with those Currently in Use at LANL\*\*\*\*%}**

A.B. Laptev, O.N. Belousova, C.J. Bianconi, M.A. Griffin, P.S. Hoover, B.T. Keller, G.R. Murrell, R.T. Perry, Jr.

RP-PROG, LANL, Los Alamos, NM

### **Applicability of ICRP 116 Dose Conversion Coefficients to Korean Pediatric Population Exposed to External Photons\*\*\*\*&\$**

Choonsik Lee (1), Choonik Lee (2), Ae-Kyoung Lee, and Hyung-do Choi (3)

1) Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Rockville, MD, 2) Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, 3) Electronics and Telecommunications Research Institute, Daejeon, South Korea

### **Estimates of Internal Dose Resulting from I-131 Patients in Hotels\*\*\*\*&(**

Nolan Hertel (1,2), Michael Bellamy, Shaheen Dewji, Rich Leggett, Keith Eckerman (1), Sami Sherbini and Mohammad Saba (3)

1) Center for Radiation Protection Knowledge, Oak Ridge National Laboratory, Oak Ridge, TN, 2) Georgia Institute of Technology, Atlanta, GA, 3) U. S. Nuclear Regulatory Commission, Rockville, MD

### **Estimated External Doses to Members of the Public from Patients with I-131 Treatment\*\*\*\*&**

Shaheen A. Dewji, Michael Bellamy (1), Nolan E. Hertel (1,2), Rich Leggett, Keith Eckerman (1), S. Sherbini, M. Saba (3)

1) Oak Ridge National Laboratory, Oak Ridge, TN, 2) Georgia Institute of Technology, Atlanta, GA, 3) United States Nuclear Regulatory Commission, Rockville, MD

### **Implementation of a New Dose Record Keeping System\*\*\*\*' &**

Mary E Allan

Atomic Weapons Establishment: Aldermaston, Reading, Berkshire, UK

### **Dose Reconstruction in the Former Village of Metlino in the Contaminated Techa River Region, Southern Urals, Russia.\*\*\*\*' )**

Mauritus Hiller, Clemens Woda (1), Nikolay Bougrov, Marina Degteva (2), Oleg Ivanov (3), Sergey Romanov (4)

1) Helmholtz Zentrum München, Neuherberg, Germany, 2) Urals Research Center for Radiation Medicine, Chelyabinsk Russia, 3) Kurchatov Institute Moscow, Russia, 4) Southern Urals Biophysics Institute, Ozyorsk, Russia

### **Photon Organ and Effective Dose Coefficients for Cranial and Caudal Irradiation Geometries\*\*\*\*' ,**

K.G. Veinot (1), K.F. Eckerman (2) and N.E. Hertel (2,3)

1) Y-12 National Security Complex, Oak Ridge, TN, 2) Center for Radiation Protection Knowledge, Oak Ridge National Laboratory, Oak Ridge, TN, 3) Georgia Institute of Technology, Atlanta, GA

## **Dose Reduction Techniques in a Nuclear Manufacturing Facility\*\*\*\* (&**

Mary E Allan

*Atomic Weapons Establishment: Aldermaston, Reading, Berkshire, UK*

## **Medical Physics**

### **Overview of the Forthcoming AAPM TG-158 Report, “Measurements and Calculations of Doses Outside the Treatment Volume from External Beam Radiation Therapy”\*\*\*\* (\***

Bryan Bednarz

*Department of Medical Physics, Wisconsin Institute for Medical Research, University of Wisconsin-Madison, Madison, WI*

### **Calculated and Measured Dose Distributions in an Anthropomorphic RANDO Phantom\*\*\*\* (,**

Chester Ramsey and Michelle Neeley

*Thompson Cancer Survival Center, Knoxville, TN*

### **A Statistical Approach for Detection of Anatomical Change\*\*\*\*) &**

Alexander Usynin, Chester Ramsey

*Thompson Cancer Survival Center, Knoxville, TN*

### **Preliminary Results of a New Deterministic Iterative Image Reconstruction Algorithm\*\*\*\*))**

Katherine Royston and Alireza Haghighat

*Nuclear Engineering Program, Department of Mechanical Engineering, Virginia Tech, Arlington, Virginia*

### **A 3D Detailed Breast Model for Dose Estimation in Mammography\*\*\*\*) -**

Wenjing Wang, Rui Qiu, Li Ren (1,2,3), Zhen Wu, Chunyan Li (4), Junli Li (1,2,3)

*1) Department of Engineering Physics, Tsinghua University, Beijing, China, 2) Key Laboratory of Particle & Radiation Imaging (Tsinghua University), Ministry of Education, Beijing, China, 3) Key Laboratory of High Energy Radiation Imaging Fundamental Science for National Defense, Beijing, China, 4) Nuctech Company Limited, Beijing, China*

### **Application of the TITAN Hybrid Deterministic Transport Code to Medical Physics\*\*\*\*\* &**

Alireza Haghighat, Katherine Royston (1), Ce Yi (2)

*1) Nuclear Engineering Program, Department of Mechanical Engineering, Virginia Tech, Arlington, Virginia, 2) Nuclear and Radiological Engineering and Medical Physics Program, Georgia Tech, Atlanta, Georgia*

### **Development of a Series of Korean Pediatric and Adult Head Computational Phantoms and Application to Nuclear Medicine Dosimetry\*\*\*\*\*\***

Choonik Lee (1), Ae-Young Lee, Hyung-do Choi (2), and Choonsik Lee (3)

*1) Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, 2) Electronics and Telecommunications Research Institute, Daejeon, South Korea, 3) Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Rockville, MD*

### **Measurement and Analysis of Dose Rate Distribution in the Seismic Base-Isolation pit of the Electron Linac Oncology Facility\*\*\*\*+&**

Koji Oishi, Kazuaki Kosako and Takashi Nakamura

*Koji Oishi, Kazuaki Kosako and Takashi Nakamura*

### **Radiation Protection and Dosimetry in Medicine– An Overview\*\*\*\*+(**

Pedro Vaz (1), Bernadette Kirk (2), Wayne D. Newhauser (3,4)

*1) Instituto Superior Técnico, Universidade de Lisboa, Campus Tecnológico e Nuclear, Bobadela LRS, Portugal, 2) Kirk Nuclear Information Services, Knoxville, TN, 3) Louisiana State University, Nicholson Hall, Baton Rouge LA, USA, 4) Mary Bird Perkins Cancer Center, Baton Rouge LA, USA*

### **Validation of a Monte Carlo model for the MLC-Elekta Precise with MCNP6\*\*\*\*++**

P. Botas, B. Juste, R. Miró (1), S. Díez, J.M. Campayo (2), G. Verdú (1)

*1) Institute for Industrial, Radiophysical and Environmental Safety (ISIRYM), Universitat Politècnica de València, Valencia, Spain, 2) Hospital Clínic Universitari de València, Valencia, Spain*

## **Hybrid Transport Methods**

### **Application of the Hybrid Diffusion-Transport Spatial Homogenization Method to a Pressurized Water Reactor Benchmark Problem\*\*\*\*, %**

Gabriel Kooreman and Farzad Rahnema

*Nuclear and Radiological Engineering/Medical Physics programs, George W. Woodruff School, Georgia Institute of Technology, Atlanta, GA*

### **Comparison of ADVANTG Simulations to Simple Shielding Measurements\*\*\*\*, (**

Douglas E. Peplow and Charles R. Daily

*Oak Ridge National Laboratory, Oak Ridge, TN, USA*

## **ADVANTG Results for a Proposed NDA System for Detecting Pin Diversion from SNF**

Scott W. Mosher, Charles R. Daily (1), and Jeffrey O. Johnson (2)

1) Oak Ridge National Laboratory, Reactor and Nuclear Systems Division, Oak Ridge, TN, 2) Oak Ridge National Laboratory, Global Security Directorate, Oak Ridge, TN

## **Activation Neutronics for a Swiss PWR: Simulations and Validation** - &

Manuel Pantelias and Benjamin Volmert

NAGRA (Swiss National Cooperative for the Disposal of Radioactive Waste), Wettingen, Switzerland

## **The Multi-Step CADIS Method for Shutdown Dose Rate Calculations and Uncertainty Propagation** - \*

Ahmad M. Ibrahim, Douglas E. Peplow, Robert E. Grove, and Seth R. Johnson

Oak Ridge National Laboratory, Oak Ridge, TN

## **Monte Carlo Methods**

### **Development of CSG-based Radiation Shielding Module for ARCHER: Preliminary Results for Photons**

Xining Du, Tianyu Liu, Lin Su, Wei Ji, Peter F. Caracappa, X. George Xu

Nuclear Engineering Program, Rensselaer Polytechnic Institute, Troy, New York, USA

### **Comparisons of Dosimetric Accuracy and Calculation Time of ARCHER and MCNP5 codes for the Ir-192 Brachytherapy Case**

Wanli Huo (1), Tianyu Liu, Lin Su, Xining Du (2), Zhi Chen (1), X. George Xu (1,2)

1) University of Science and Technology of China, Hefei, China, 2) Rensselaer Polytechnic Institute, Troy, New York, USA

### **Parallel Monte Carlo Methods for Heterogeneous Hardware Computer Systems Using GPUs and Coprocessors: Recent Development of ARCHER Code**

Tianyu Liu, Lin Su, Xining Du, Hui Lin, Kris Zieb, Wei Ji, Peter F. Caracappa, X. George Xu

Nuclear Engineering Program, Rensselaer Polytechnic Institute, Troy, NY

### **Evaluation of Low Power ARM Processors for Monte Carlo Particle Transport: MCNP6 on the ARM Cortex-A8**

Jeremy Sweezy

Los Alamos National Laboratory, Los Alamos, NM

### **MCNP6 Elevation Scaling of Cosmic Ray Backgrounds**

Garrett E McMath and Gregg W McKinney

Los Alamos National Laboratory, Los Alamos, NM

### **A Code of Radiation Damage by Gamma**

V. Kumar and Ambika Tundwal

University School of Basic and Applied Sciences, G.G.S. Indraprastha University, New Delhi

### **ITS version 6.4: The Integrated TIGER Series of Monte Carlo Electron/Photon Radiation Transport Codes**

Thomas W. Laub, Ronald P. Kensek, Brian C. Franke, Martin J. Crawford, Greg D. Valdez

Sandia National Laboratories, Albuquerque, NM

### **Analog Neutron Transport for Nuclear Instrumentation Applications with the Monte-Carlo Code TRIPOLI-4**

O. Petit and E. Dumonteil

CEA Saclay, DEN/DANS/DM2S/SERMA, F-91191 Gif-sur-Yvette cedex, France

### **Software Quality Metrics for Geant4: An Initial Assessment**

Elisabetta Ronchieri (1), Maria Grazia Pia (2) and Francesco Giacomini (1)

1) INFN: CNAF Bologna, Italy, 2) INFN: Sezione Genova, Genoa, Italy

### **MCNP6 Gets Correlated with CGM 3.4**

T. A. Wilcox, G. W. McKinney, and T. Kawano

Los Alamos National Laboratory, Los Alamos, NM

### **Uncertainty Quantification for Monte Carlo Simulations**

P. Saracco and M.G. Pia

I.N.F.N. sezione di Genova, Genova, Italy

## Monte Carlo, Charged Particles, Data

### Application of the GBFP Method to Electron Partial-Wave Expansion Elastic Scattering Differential Cross Sections Within the Geant4 Toolkit

David A. Dixon, Anil K. Prinja (1), Brian C. Franke (2)

1) University of New Mexico: Dept. of Chemical and Nuclear Engineering, Farris Engineering Center, Albuquerque, New Mexico, 2) Sandia National Laboratories, Albuquerque, New Mexico

### Comparing Measured ( $\alpha, n$ ) Thick Target Yields to MCNP6 using TENDL 2012 Libraries

M. L. Fensin

Los Alamos National Laboratory, Los Alamos, NM

### Hadron Production Cross-Sections at Relativistic Energies with Large Phase-Space Coverage

Ondrej Chvala

University of Tennessee at Knoxville, Department of Nuclear Engineering, Knoxville TN

### Determination of Attenuation Coefficients of Heavyweight Concretes Containing Colemanite by Using <sup>133</sup>Ba Radioactive Isotope Source

F. Demir (1), G. Budak (2), R. Sahin (3), A. Karabulut (2), M. Oltulu (3), A. Ün (4)

a) Bursa Technical Univ., Nature Sciences, Architecture and Engineering Faculty, Metallurgy and Materials Engineering, Bursa, Turkey, b) Ataturk University, Science Faculty, Physics Department, Erzurum, Turkey, c) Ataturk University, Engineering Faculty, Civil Engineering Department, Erzurum, Turkey, d) Ağrı İbrahim Çeçen University, Arts and Sciences Faculty, Physics Department, Ağrı, Turkey

### Class II Algorithm for Charged-Particle Transport Simulation

Francesc Salvat

1) Universitat de Barcelona, Facultat de Física (ECM and ICC), Barcelona, Spain

### Development and Testing of Nuclear Data Libraries for Improved Energy Deposition Modeling

C. R. Daily, D. Chandler

Oak Ridge National Laboratory, Oak Ridge, TN

## Monte Carlo Methods and Applications

### TRIPOLI-4 Version 9 Shielding for the Shielding Community: Overview, Relevant Benchmarking for Shielding and Licensing Policy

E Brun, F Damian, C Diop, E Dumonteil, FX Hugot, C Jouanne, YK Lee, F Malvagi, A Mazzolo, O Petit, JC Trama\*, T Visonneau, A Zoia

E Brun, F Damian, C Diop, E Dumonteil, FX Hugot, C Jouanne, YK Lee, F Malvagi, A Mazzolo, O Petit, JC Trama\*, T Visonneau, A Zoia

### Geant4 and Beyond: Recent Progress in Precision Physics Modeling

Matej Batic (2), Marcia Begalli (3), Min Cheol Han (4), Steffen Hauf (5), Gabriela Hoff (6), Chan Hyeong Kim, Han Sung Kim, Sung Hun Kim (4), Markus Kuster (5), Maria Grazia Pia, Paolo Saracco (1), Georg Weidenspointner (5)

1) INFN Sezione di Genova, Genova, Italy, 2) Sinergise, Ljubljana, Slovenia, 3) State University Rio de Janeiro, Rio de Janeiro, Brazil, 4) Hanyang University, Seoul, Korea, 5) XFEI GmbH, Hamburg, Germany, 6) PUCRS, Porto Alegre, Brazil

### An MCNP6 Version of the Visual Editor

Randolph Schwarz

Visual Editor Consultants (VEC), Richland, Washington

### Recent Advances in the Use of TRIPOLI-4 Monte Carlo Code for Radiation Protection and Shielding

Yi-Kang Lee and François-Xavier Hugot

Commissariat à l'Energie Atomique et aux Energies Alternatives, CEA-Saclay, Gif sur Yvette Cedex, France

### Using Tally Values to Add a Third Dimension when Viewing Planar Mesh Tallies

Kenneth A. Van Riper

White Rock Science, Los Alamos, NM

### Application of the Geant4 Simulation Toolkit to Medical Physics

Joseph Perl, Makoto Asai, Dennis Wright

SLAC National Accelerator Laboratory, Menlo Park CA

## Deterministic Transport Methods

### On the Ill-Posed Nature of Inverse Problems: An Exactly Solvable Paradigm Inverse Neutron Diffusion Problem Illustrating the Solution's Non-Computability

Dan G. Cacuci

University of South Carolina, Department of Mechanical Engineering, Columbia, SC

## **A New Solution for the 1D Neutral Particle Transport Equation in Heterogeneous Media**

B.D. Ganapol

*University of Arizona, Department of Aerospace and Mechanical Engineering, Tucson, Arizona*

## **Applying Nonlinear Diffusion Acceleration to Fixed-Source Problems with Anisotropic Scattering**

Jeffrey Willert, H. Park, William Taitano

*Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM*

## **Deterministic Simulation of First-Order Scattering in a Clinical X-ray Computed Tomography Scanner**

Xin Liu

*Missouri University of Science and Technology, Nuclear Engineering, Rolla MO*

## **The Preliminary Verification of the 2-D Transport Module of Radiation Shielding Code ARES**

Peng-He Zhang, Bin Zhang, Zhi-Yan Liu, Yi-Xue Chen

*North China Electric Power University, Beijing, China*

## **Radiation Detection and Measurements**

### **Computational Assessment of Naturally Occurring Background Radiation Produced by Extraterrestrial Sources**

Thomas M. Miller (1) and Wouter C. de Wet (2)

*1) Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA, 2) University of Tennessee, Nuclear Engineering Building, Knoxville, TN*

### **Study of $^{31}\text{P}(n,\alpha)^{28}\text{Al}$ reaction using $d(d,n)^3\text{He}$ for the possible interference with $^{27}\text{Al}(n,\gamma)^{28}\text{Al}$**

C. Bhatia, S. H. Byun, D. R. Chettle, W. V. Prestwich

*Department of Medical Physics and Applied Radiation Sciences, McMaster University, Hamilton, ON, Canada*

### **Characterization Techniques for $\text{LiInSe}_2$ Semiconducting Neutron Detector**

Elan Herrera, Eric Lukosi, Rob Milburn (1), Ashley Stowe (2), Brenden Wiggins (3), and Arnold Burger (3,4)

*1) The University of Tennessee Knoxville, Department of Nuclear Engineering, Knoxville, TN, 2) Y-12 National Security Complex, Oak Ridge, Tennessee, USA, 3) Fisk University, Department of Life and Physical Sciences Nashville, Tennessee, USA, 4) Vanderbilt University, Department of Physics and Astronomy, Nashville, Tennessee, USA*

### **Digitalized Two Parametric System for Gamma/Neutron Spectrometry**

Martin Veškrna, Zdeněk Matěj, Filip Mravec, Václav Přenosil (1), František Cvachovec (2), Michal Košťál (3)

*1) Masaryk University, Brno, Czech Republic, 2) University of Defence, Brno, Czech Republic, 3) Research Center Rez Ltd., Husinec-Rez, Czech Republic*

### **Measurements of Ionizing Radiation Doses Induced by High Irradiance Laser on Targets in LCLS MEC Instrument**

J. Bauer, E. Galtier, H-J Lee, J. C. Liu, D. Milathianaki, B. Nagler, A. A. Prinz, S. Rokni, H. Tran, M. Woods, and Z. Xia

*SLAC National Accelerator Laboratory, Menlo Park, CA*

### **A Novel Gamma Spectroscopy Method Based on Coincident Measurement of Two Detectors**

David Zabriskie, Elton Chen, Jennifer Nguyen, and Chris Wang

*Georgia Institute of Technology, Atlanta, GA*

### **AWE Neutron Spectrometry Results from Godiva-IV (NCERC) Characterization**

Leo Clark

*AWE, Aldermaston, Reading, RG7 4PR, UK*

### **Identification of Leakage Spectra from Neutron Activation in Glass/Cherenkov Detectors**

Douglas E. Peplow, Zane W. Bell and Steven P. Hamilton

*Oak Ridge National Laboratory, Oak Ridge, TN*

### **Testing the Delayed Gamma Capability in MCNP6**

R. A. Weldon Jr., M. L. Fensin, G. W. McKinney

*Los Alamos National Laboratory, Los Alamos, NM*

### **Analytical Calculation for the Solid Angle Subtended at an Arbitrarily Positioned Point Source by an Ellipse**

Mahmoud I. Abbas (1), Sami Hammoud (2)

*1) Physics department, Faculty of Science, Alexandria University, Alexandria, Egypt, 2) Physics department, Faculty of Science, BAU, Beirut, Lebanon*

## **Experiment Design of Secondary Neutron and Charged Particles Measurement with Stopping Targets Bombarded by 100- and 230-MeV/amu Helium Ions**

Pi-En Tsai and Lawrence H. Heilbronn

*Department of Nuclear Engineering, University of Tennessee, Knoxville, TN*

## **Study of Plastic Scintillator Properties for Radioactive Sources Dosimetry**

S. M. Tajudin (1), Y. Namito, T. Sanami, and H. Hirayama (2)

*1) The Graduate University for Advanced Studies (SOKENDAI), Tsukuba, Ibaraki, Japan, 2) SOKENDAI and the High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki, Japan*

## **Efficiency Calibration of $4\pi$ NaI(Tl) Gamma-ray Detectors for Plane Sources**

Mahmoud I. Abbas

*Physics department, Faculty of Science, Alexandria University, Alexandria, Egypt*

## **Fission Facility Shielding and Radiation Protection**

### **Radiation Protection for the First Korea Heavy-ion Medical Accelerator (KHIMA) Facility**

Oyeon Kum, Seung Uk Heo, Sang-Hyun Choi, Yongkeun Song, Sung-Ho Cho, Sunju Oh, and Won Gyun Jung

*Korea Heavy-ion Medical Accelerator Center, Korea Institute of Raddiaological annd Medical Sciences, Seoul, Korea*

### **SCALE Enhancements for Detailed Cask Dose Rate Analysis**

Douglas E. Peplow, Georgeta Radulescu, Mark L. Williams, and Robert A. Lefebvre

*Oak Ridge National Laboratory, Oak Ridge, TN, USA*

### **Optimization of the Shielding of a Canister Loading Machine with the Deterministic Code Attila**

Steffen Böhlke, Michael Mielisch

*STEAG Energy Services GmbH, Essen, Germany*

### **Dose Rate Analysis of As-Loaded Spent Nuclear Fuel Casks**

Georgeta Radulescu, Douglas E. Peplow, Mark L. Williams, and John M. Scaglione

*Oak Ridge National Laboratory, Oak Ridge, TN*

### **Total Integrated Dose to Spent Fuel Pool Level Instrument Probes and Refueling Floor Personnel Dose Rates Meeting NRC Order EA-12-051 for a Typical Boiling Water Reactor**

Aaron Clare, Paul Reichert, Kevin Brotherton, Harold Rothstein

*URS Corporation, Fort Mill, SC*

### **Fragmentation Modeling for Space Applications: Charge Dispersion Effects**

Krista Burton, Lawrence W. Townsend

*Department of Nuclear Engineering, The University of Tennessee, Knoxville, TN*

### **Rigorous Two-Step Activation for Fusion Systems with PyNE**

Elliott Biondo, Andrew Davis, Anthony Scopatz, Paul P.H. Wilson

*Department of Nuclear Engineering & Engineering Physics, University of Wisconsin, Madison, WI*

### **Induced Radioactivity Analysis for the NSRL Linac in China Using Monte Carlo Simulations and Gamma-Spectroscopy**

Lijuan He, Weimin Li, Yuxiong Li (1), Zhi Chen (2), Yukai Chen, Guangyi Ren (1)

*1) NSRL, USTC, Hefei, Anhui, P.R. China, 2) School of Nuclear Science and Technology of USTC, Hefei, Anhui Province, China*

## **Space Radiation Protection**

### **Eikonal Corrections for Nucleus-Nucleus Reaction Cross Sections**

Daniel Wentz, Lawrence W. Townsend, Ondrej Chvala

*Department of Nuclear Engineering, The University of Tennessee, Knoxville, TN*

### **The Standalone Package for Enhanced Estimation of Dose Distribution**

Wouter de Wet, Lawrence W. Townsend (1), X. George Xu (2) and Whitney J. Smith (1)

*1) University of Tennessee Department of Nuclear Engineering: Pasqua Nuclear Engineering Building, Knoxville, TN, 2) Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY*

### **Production of Neutrons by Transport of a GCR Solar Minimum Spectrum through Shielding**

L. H. Heilbronn, P. Tsai, L. Townsend, T. Borak, and R. McBeth

*Department of Nuclear Engineering, University of Tennessee, Knoxville, TN*



## **Optimal Shielding Design For Minimum Materials Cost or Mass\*\*\*& (**

Robert D. Woolley

*Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ*

## **Neutron Production in Lunar Habitats\*\*\*\*& ,**

L. H. Heilbronn, A. Srikrishna, H. Green

*Department of Nuclear Engineering, University of Tennessee, Knoxville, TN*

## **Activation Analysis**

### **Comparing the Predicted Neutron Yields and Radioactivities of Two Accelerators in Taiwan: 235-MeV Proton Cyclotron and 3-GeV Electron Synchrotron\*\*\*\* \$&**

Yung-Cheng Hsu and Rong-Jiun Sheu

*Institute of Nuclear Engineering and Science, National Tsing Hua University, Hsinchu, Taiwan*

### **Determination of Activation Products and Resulting Decommissioning Implications for the Varian Truebeam Linear Accelerator\*\*\*\* \$\***

Ed Waller, Rohan Ram, Ian Steadman

*University of Ontario Institute of Technology, Oshawa, ON*

### **Colloid Formation Rates of Radionuclides in Cooling Waters of the 120-GeV Proton Accelerator Facilities at Fermilab, USA\*\*\*\*\* %\$**

Hiroshi Matsumura (1), Shun Sekimoto (2), Yoshimi Kasugai (3), Hiroshi Yashima (2), Akihiro Toyoda (1), Norihiro Matsuda (3), Kotaro Bessho (1), Nikolai Mokhov, Anthony Leveling, David Boehnlein, Gary Lauten, Wayne Schmitt (4), Koji Oishi (5), Yukio Sakamoto, and Hiroshi Nakashima (3)

*1) High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki, Japan, 2) Kyoto University Research Reactor Institute, Kumatori-cho, Sennan-gun, Osaka, Japan, 3) Japan Atomic Energy Agency, Tokai-mura, Ibaraki, Japan, 4) Fermi National Accelerator Laboratory, Batavia, IL, USA, 5) Shimizu Corporation, Koto-ku, Tokyo, Japan*

### **SNS Sample Activation Calculator Experimental Validation\*\*\*\* %&**

T.C. McClanahan, E.B. Iverson, F.X. Gallmeier, M.B.R. Smith

*Oak Ridge National Laboratory, Oak Ridge, TN*

### **Waste Management Analyses for Spent Structures at SNS\*\*\*\*\* %&**

I.I. Popova, F.X. Gallmeier, S. Trotter, M. Dayton

*Oak Ridge National Laboratory, Oak Ridge, TN*

## **Fusion Facility Shielding**

### **Radiation Mapping at JET and ITER Using Advanced Computational Acceleration Techniques and Tools\*\*\*\* &%**

Jonathan Naish, Frances Fox, Zamir Ghani (1), Michael Loughlin (2), Lee Packer, Andrew Turner (1)

*1) Culham Centre for Fusion Energy, Culham Science Centre, Abingdon, Oxford, UK, 2) ITER Organization, Saint Paul Lez Durance, France*

### **Methodological Aspects of Shielding and Activation Analyses for ITER Diagnostics Systems\*\*\*\* &**

A. Serikov (1), L. Bertalot (2), U. Fischer (1), S. Pak, A. Suarez, V.S. Udintsev, M. Walsh (2)

*1) Karlsruhe Institute of Technology (KIT), Institute for Neutron Physics and Reactor Technology, Eggenstein-Leopoldshafen, Germany, 2) ITER Organization, Saint Paul Lez Durance, France*

### **Investigation of Radiation Cross-Talk Effects on Biological Dose Rates in Maintenance Areas Inside the ITER Tokamak\*\*\*\* &-**

Raul Pampin (1), Rafael Juarez (2), Bruno Levesy (3), Fabio Moro (4), Javier Sanz (2), Alejandro Suarez (3)

*1) F4E, Torres Diagonal Litoral B3, Barcelona, Spain, 2) UNED Escuela Superior de Ingenieria Industrial, Madrid, Spain, 3) ITER Organization, St Paul Lez Durance, France, 4) ENEA, Frascati, Rome, Italy*

### **Use of the Portable Decay Gamma Source Feature in the R2Smesh Code System for the Accurate Estimation of Photon Radiation Dose Fields Around Activated Iter Components\*\*\*\* ' ' &**

Haibo Liu, Ulrich Fischer, Arkady Serikov

*Karlsruhe Institute of Technology, Institute for Neutron Physics and Reactor Technology, Karlsruhe, Germany*

### **Neutronics for Diagnostics in ITER\*\*\*\* ' ' +**

A. Suarez, L. Bertalot (1), J. P. Catalan (2), F. Mota (3), A. Serikov (4), V. Udintsev, M. Walsh (1)

*1) ITER Organization, St Paul Lez Durance Cedex - France, 2) UNED, Madrid, Spain, 3) CIEMAT, Avda, Madrid, Spain, 4) Karlsruhe Institute of Technology, Assoc. KIT-EURATOM, Karlsruhe, Germany*

### **Analysis of Shutdown Dose Rate in Fusion Energy Systems Using Hybrid Monte Carlo/Deterministic Techniques\*\*\*\* ( %**

Ahmad M. Ibrahim, Douglas E. Peplow, Joshua L. Peterson, and Robert E. Grove

*Oak Ridge National Laboratory, Oak Ridge, TN*

## Accelerator Shielding

### The Research Progress of Some Key Problems About the Protection of Industrial Electron Irradiation

#### Accelerator\*\*\*\* ( )

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#### Radiation Protection at the SwissFEL Free Electron Laser Facility: Beam Stopping Devices\*\*\*\* ) \$

E. Hohmann, A. Fuchs, R. Ganter, D. Kiselev, R. Luescher, S. Mayer, A. Rehmann, S. Trovati

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#### Neutron and Photon Background Measurements at the Spallation Neutron Source Facility\*\*\*\* ) %

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#### CINDER08 and Scripting Environment for Accelerator Activation Problems\*\*\*\* ) )

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#### Analysis of Archived Prompt Pulse Data from the SNS HYSPEC Instrument\*\*\*\* ) -

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#### Shielding Design of Gantry 3\*\*\*\* \* '

T. Reiss, D. Kiselev, S. Teichmann, M. Wolhmuther

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#### Radiation Transport Calculations in Support of FRIB Target Building Local Shield Design\*\*\*\* \* +

Jeremy Northum, Reg Ronningen, Dali Georgobiani

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#### Air Activation Calculations for Electron Linear Accelerators\*\*\*\* +%

Bradley J. Micklich

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## Radiation Protection

#### FRIB Fragment Preseparator Radiation Environment Studies\*\*\*\* +)

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#### Design of Photosensitive Glass Based X-ray Anti-scattering Grid by Using MCNP Code\*\*\*\* +-

Jun Woo Bae, Uk Jae Lee, Dong Han Yoo, Hee Reyoung Kim

UNIST-Gil 50 Eonyang-eup Ulju-gun Ulsan metropolitan city, Republic of Korea

#### Shielding design for A Chip Irradiation Test Facility at SNS\*\*\*\* , &

W. Lu, I. Popova, F. X. Gallmeier, and B. W. Riemer

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#### Monte Carlo Simulation On X-Ray Produced At High Intensity Laser Facilities\*\*\*\* , \*

Bo Yang, Rui Qiu, Wei Lu (1,2,3), Zhen Wu, Chunyan Li (4), Junli Li (1,2,3)

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