Radiation Safety Information Computational Center

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Agriculture, manufactures, commerce and navigation, the four pillars of our prosperity, are most thriving when left most free to individual enterprise.—Thomas Jefferson

CHANGES TO THE RSICC CODE AND DATA COLLECTION

CCC-750/SCALE 6

Oak Ridge National Laboratory, Oak Ridge, Tennessee, contributed a newly frozen version of the SCALE system, which was developed for the Nuclear Regulatory Commission to satisfy a need for a standardized method of analysis for the evaluation of nuclear fuel facility and package designs. In its present form, the system has the capability to perform criticality, shielding, radiation source term, spent fuel depletion/decay, reactor physics, and sensitivity/uncertainty analyses using well established functional modules tailored to the SCALE system. Details can be found in the current issue of the SCALE Newsletter posted on the developers' website.

What's New in SCALE 6? http://rsicc.ornl.gov/rsiccnew/Whats_New_SCALE6.pdf

SCALE website: http://www.ornl.gov/sci/scale

The CSAS5 control module contains criticality safety analysis sequences that calculate the neutron multiplication factor for one dimensional (XSDRNPM) and multidimensional (KENO V.a) system models. The CSAS5 module also has the capability to perform criticality searches (optimum, minimum, or specified values of k eff) on geometry dimensions or nuclide concentrations in KENO V.a. The CSAS6 control module contains criticality safety analysis sequences using the KENO VI module for multidimensional models with more complex geometries, including hexagonal arrays. Sequences that provide problem-dependent, multigroup cross sections for use in stand alone codes are also available in the CSAS5 module. Both KENO modules can perform continuous energy calculations in SCALE 6.

In addition, sensitivity and uncertainty (S/U) analysis capabilities for criticality safety are included in SCALE. Both 1-D and 3-D sequences plus several auxiliary codes have been developed into a suite of sensitivity and uncertainty analysis codes called TSUNAMI (Tools for Sensitivity and Uncertainty Analysis Methodology Implementation). TSUNAMI contains a number of codes that were developed primarily to assess the degree of applicability of benchmark experiments for use in criticality code validations. However, the sensitivity and uncertainty data produced by these codes can be used in a wide range of studies. Sensitivity coefficients produced by the TSUNAMI sensitivity analysis sequences predict the relative changes in a system's calculated k-eff value due to changes in the neutron cross-section data. Both TSUNAMI-1D and TSUNAMI-3D fold the sensitivity data with cross-section covariance data to calculate the uncertainty in the calculated k-eff value due to tabulated uncertainties in the cross-section data. The applicability of benchmark experiments to the criticality safety validation of a given application can be assessed using S/U-based integral indices. The TSUNAMI-IP (Indices and Parameters) code utilizes sensitivity data and cross-section covariance data to produce a number of relational integral indices that can be used to assess system similarity.

Two-dimensional (2-D) spent fuel depletion is available in the TRITON control module. TRITON couples ORIGEN-S depletion calculations with the 2-D flexible mesh discrete ordinates code NEWT. TRITON supports branch calculations that allow calculation of cross sections and their first derivatives with respect to fuel and moderator temperature, moderator density, soluble boron concentration, and control rod insertion, as a function of burnup. These cross sections are stored in a database format that can be retrieved and processed as appropriate for use by core analysis codes. The rigor of the NEWT solution in estimating angular flux distributions combined with the world-recognized accuracy of ORIGEN-S depletion gives TRITON the capability to perform rigorous burnup-dependent physics calculations with few implicit approximations.

Three-dimensional (3-D) Monte Carlo spent fuel depletion is available in SCALE via the TRITON and TRITON6 control modules. TRITON couples ORIGEN-S depletion calculations with KENO V.a, while TRITON6 uses KENO-VI.

ORIGEN ARP is an automated depletion decay sequence for both Windows and Unix/Linux systems. It includes a Windows graphical user interface (GUI) for ORIGEN S and ARP (Automated Rapid Processing), which automatically interpolates cross sections on enrichment, burnup, and optionally moderator density using a set of standard basic cross section libraries for LWR and MOX fuel assembly designs. The interpolated cross sections are passed to ORIGEN S. Utility codes are provided so users can generate their own ORIGEN ARP basic cross section libraries via TRITON.

Other automated criticality safety related sequences include the STARBUCS 3-D burnup credit sequence (combining ORIGEN-ARP with KENO V.a or KENO-VI) and the SMORES 1-D material optimization sequence for criticality safety.

A new general purpose 3-D radiation shielding sequence has been developed for SCALE 6. The MAVRIC control module uses the new Monaco Monte Carlo shielding module to perform analyses with the automated 3-D variance reduction CADIS methodology using the new Denovo 3-D discrete ordinates module. This automated scheme generates 3-D Monte Carlo biasing parameters that enable MAVRIC to calculate accurate doses with outstanding efficiency. The Monaco geometry input is identical to KENO-VI. In addition, the capability to perform criticality accident alarm system (CAAS) analysis using KENO-VI coupled with MAVRIC is provided.

Two other shielding analysis sequences are provided in SCALE. SAS1 analyzes general 1-D shielding problems via XSDRNPM S. The QADS module analyzes 3-D gamma ray shielding problems via the point kernel code, QAD CGGP.

SCALE 6 was fully tested on Linux, Intel Mac OSX and personal computers running Windows. The Windows version runs on Pentium personal computers with a minimum of 1 GB RAM (4 GB

recommended). Nominal hard disk requirements are 30 GB for a complete installation, including space for running sample problems. SCALE runs on Windows XP or later.

Included Windows executables were created using the Intel F95 Fortran compiler for Windows version 10.1 on a 32-bit Pentium 4 under Windows XP. Linux and Mac OSX executables were created on the systems listed below. Linux executables are distributed in both 64-bit and 32-bit binaries. Fortran 95 and C compilers are required to build on other computer systems. Makefiles, source files; data libraries, and batch files are included in the package.

This version was tested on the following systems.

- Intel Xeon running Fedora Core 5 with Intel Fortran 95 version 11.0 and GNU gcc 4.1.2
- AMD Opteron running RedHat Enterprise Linux 4 with Intel ifort version 10.1 and gcc 3.4.6
- Intel Mac OS X with Intel Fortran 10.1 compiler and GNU gcc 4.0.1
- Windows XP Service Pack 2
- Windows Vista Service Pack 1

The entire package including binary data libraries is distributed on one set of 3 dual-layered DVDs.

Unix/Linux/Mac version: source codes, Linux executables, Intel Mac OSX executables, binary data libraries, makefiles, scripts, and sample problem input and output, transmitted in GNU compressed tar files.

Windows version: source codes, executables, binary data libraries, makefiles, batch files, and sample problem input and output; written in WinZip self extracting compressed files with programs WinZip International LLC.

References: ORNL/TM-2005/39, Version 6.0, Vols. I–III (January 2009). Fortran 90/95 and C; Linux, Intel Mac OS X and Windows XP (C00750/MNYCP/00).

CCC-553/RASCAL 3.0.5

Athey Consulting, Charles Town, West Virginia, and the U.S. Nuclear Regulatory Commission, Washington, D.C, contributed a newly frozen version of the Radiological ASsessment for Consequence AnaLysis code system designated RASCAL Version 3.0.5 with December 2008 updates. RASCAL can estimate reactor source terms, atmospheric transport and doses resulting from radiological emergencies and can be used to assist in making protective action decisions. It was developed for the U.S. Nuclear Regulatory Commission and is designed to be used in the independent assessment of dose projections during response to radiological emergencies.

The main purpose of the December 2008 update is to replace the Field Measurement to Dose (FMDose) model used in RASCAL v3.0.5. The following problems had been identified in the model:

- The conversion of concentration units was not being done correctly.
- Samples containing Nb-95 were causing the program to terminate.
- The conversion factor from mrem to mR was not being correctly applied in the calculation of DRL dose rates.

Rather than fix the existing v3.0.5 version of the FMDose model, it was decided to release the v4.0 model early. In addition to the fixes of the above issues, this version has the following differences:

- elimination of the inadvertent ingestion option,
- addition of an option for building shielding and occupancy time,
- expansion of the nuclide list for samples,
- reinstatement of the calculation of early phase doses, and
- changes in the calculation of DRLs to match the FRMAC methods.

In addition to the completely new Field Measurement to Dose model, this update includes other changes as follows:

- The various program help files were changed to update some information.
- The facility database was modified to include recent reactor power uprates.
- The nuclide data base was modified to delete some unused data and to add the IAEA RBE-wt acute dose factors.

RASCAL runs on personal computers under Windows operating systems. The software has been tested mostly under Windows XP. Microsoft Visual Basic 6.0 and Compaq Visual Fortran 6.5 compilers were used to create executables included in the package. **No source files are distributed.** The package is transmitted on a CD which includes executables, data, help files, and an install procedure. References: NUREG-1887 (August 2007) and NUREG-1889 (September 2007). FMDose Draft (December 2008). Fortran 77, Basic; Pentium running Windows (C00553PC58610).

CONFERENCES, COURSES, SYMPOSIA

RSICC attempts to keep its users and contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers via email to riceaf@ornl.gov with "conferences" in the subject line by the 20th of each month. Please include the announcement in its native format as an attachment to the message. If the meeting is on a website, please include the url.

Every attempt is made to ensure that the links provided in the Conference and Calendar sections of this newsletter are correct and live. However, the very nature of the web creates the possibility that the links may become unavailable. In that case, please call or mail the contact provided.

TRAINING

Introductory and Advanced MCNP Visual Editor Training

Date 2009	Class	Location
March 16–20	Introduction to MCNP using the MCNP/MCNPX Visual Editor	Seattle, WA
May 18–22	Introduction to MCNP using the MCNP/MCNPX Visual Editor	Las Vegas, NV
June 8–12	Introduction to MCNP using the MCNP/MCNPX Visual Editor	San Francisco, CA
July 20–24	Advanced Visual Editor	Albuquerque, NM
August 10–14	Introduction to MCNP using the MCNP/MCNPX Visual Editor	Anaheim, CA
October 26–30	Introduction to MCNP using the MCNP/MCNPX Visual Editor	Reno, NV

Classes are taught using the most recent (beta) version of the Visual Editor Code. Beta versions will only be available to students who received the RSICC version 5 release. Bring proof of receipt (letter or email) to the class.

The introductory classes combine teaching on MCNP physics, along with instructions on how to use the Visual Editor. The advanced class assumes the user has experience using MCNP or MCNPX and focuses on Visual Editor topics. Computer demonstrations and exercises will focus on creating and interrogating input files with the Visual Editor. Advanced visualization work using MCNP will also be demonstrated. Both the introductory and advanced classes will be taught on Pentium computers running Windows 2000. Attendees are encouraged to bring their own input files for viewing and modifying in the visual editor. The course description and registration information can be found at http://www.mcnpvised.com/index.html.

SCALE Training Courses at ORNL

2009	Title	Description
March 23–27	**TRITON and ORIGEN-ARP**	TRITON: 2-D reactor physics analysis using NEWT ORIGEN-ARP: Isotopic depletion/decay and source terms using latest version of ORIGEN
March 30–April 3	**KENO-VI/MAVRIC**	KENO-VI: Criticality safety using the generalized geometry version of KENO MAVRIC: 3-D automated variance reduction for deep-penetration and complex shielding problems

The registration fee is $1800 for each course. A late fee of $300 will be applied after February 9. A discount of $300 per each additional week will be applied for registration to multiple courses. Class size is limited and course may be canceled if minimum enrollment is not obtained one month prior to the course. Course fees are refundable up to one month before each class. Note that all attendees must be registered SCALE 6 users. All foreign national visitors must register a minimum of 40 days prior to the start date of the training course they plan to attend. Course descriptions may be found at http://www.ornl.gov/sci/scale/course_description.htm.

MCNP Class Schedule

March 23–27, 2009	MCNP/MCNPX Intermediate Workshop	Paris, France
April 20–23, 2009	Advanced: Criticality	Los Alamos, NM
April 27–30, 2009	Advanced: Variance Reduction	Los Alamos, NM
May 18–22, 2009	MCNP/MCNPX Intermediate Workshop	US, Location TBD
June 1–5, 2009	Introduction to MCNP5 and MCNPX	Los Alamos, NM
June 8–12, 2009	Introduction to MCNP5 and MCNPX	Los Alamos, NM

Introductory classes are for people who have little or no experience with MCNP. This class surveys the features of MCNP so the beginning user will be introduced to the capabilities of the program and will have hands-on experience at running the code to solve simple problems. Course topics include Basic Geometry, Source Definitions, Output (Tallies), Advanced Geometry (repeated structures specification), Variance Reduction Techniques, Statistical Analysis, Criticality, Plotting of Geometry and Tallies, and Neutron Photon/Electron Physics.

Intermediate workshops cover the entire spectrum of MCNP/MCNPX but proceed at a much faster pace and are more in-depth than introductory classes. These workshops are open to new users; the first day of class is a review of basics. However, the intermediate workshops are targeted toward more experienced users and are more problem solving than lecture classes. Intermediate workshops feature flexible course content, skip topics of least interest to the participants, and provide significantly more depth than introductory classes.

Advanced classes are for people with MCNP experience who want to extend their knowledge and gain depth of understanding. Most areas of MCNP operation will be discussed in detail, with emphasis on Advanced Geometry, Advanced Variance Reduction Techniques, and other advanced features of the program. Time will be available to discuss approaches to specific problems of interest to students. Classes on specific topics are offered when there is sufficient interest. In the recent past, classes on variance reduction and on criticality have been taught.

Registration and the most current information can be found at http://mcnp-green.lanl.gov/classinformation.html.

8th FLUKA User Course

The 8th FLUKA User Course will be held in Athens, March 30–April 3, 2009. The course is intended for beginners and for more experienced users wishing to deepen their knowledge about the underlying physical models. Registration is open until February 15, 2009 at http://www.fluka.org/fluka.php?id=course&sub=intro&which=demokritos2009. A preliminary program and other details about the course is available on the course website indicated above. The number of participants is limited to 30, and applications will be treated according to the 'first come, first served' policy.

Training Course on Natural Circulation Phenomena and Modelling in Water-Cooled Nuclear Power Plants

The San Piero a Grado Nuclear Research Group (GRNSPG) of the University of Pisa in cooperation with the International Atomic Energy Agency (IAEA), Department of Nuclear Energy, are jointly organizing the "Training Course on Natural Circulation Phenomena and Modelling in Water-Cooled Nuclear Power Plants." The course will be held June 22–26, 2009, on the premises of the San Piero a Grado Nuclear Research Group (GRNSPG) in Via Livornese 1291, San Piero a Grado (Pisa), Italy.

Passive safety systems based on natural circulation are key to evolutionary and innovative water-cooled reactor designs. Education on this issue is of key importance for countries working on the next generation of LWR. The course will provide a transfer of experience and know-how from recognized experts in the natural circulation fields and will transmit information, results and expertise shared through various international activities in the field (i.e. IAEA CRPs and European Commission supported programs). It will thus contribute to maintain and increase technical competence and ensure sustainable development of nuclear technology. Further information may be requested at the following email address: grnspg@ing.unipi.it or from the home page, http://www.grnspg.ing.unipi.it/natural_circulation/, where information on the course, registration form and accommodation can also be found. The deadline for registration is **April 20, 2009**. Additional information may be obtained from Ms. Patricia Pla, San Piero a Grado Nuclear Research Group (GRNSPG), University of Pisa, Via Diotisalvi, 2, 56126 PISA (Italy) (phone + 39 050 2210 371, fax + 39 050 2210 384, email grnspg@ing.unipi.it) url http://www.grnspg.ing.unipi.it/natural_circulation/.

Radiation Shielding for Medical Installations

The Training Course on Radiation Shielding for Medical Installations (RSMI 2009) will be held July 19–21, 2009, in Ericeira, Portugal. This education and training initiative on shielding methodologies for medical imaging and therapy facilities will provide you with:

- The latest information on medical radiation shielding design from a rare assembly of shielding experts and professionals who will be available to provide their special insights into this field, including practical design tips which cannot be found in any formal reports, and observed common shielding mistakes (some very serious) to be avoided. Included will be diagnostic x-ray imaging (conventional, interventional, CT, digital, etc.); nuclear medicine (including PET/CT), and the latest in radiotherapy shielding design (including IMRT, Cyberknife, Tomotherapy, neutrons, and unique solutions to space limitations). These experts include the authors of the latest NCRP shielding design recommendations from the USA (NCRP reports #147 and #151 on Medical X-ray Imaging and Radiation

Therapy Shielding Design), as well as the authors of current European shielding guideline documents as described in the list of speakers on this site, http://www.rsmi2009.itn.pt/index.html.

- Assess trends and needs in view of the rapid technological evolution in CT, PET, radiation therapy (IMRT, IGRT, and other emerging and advanced techniques) as well as in other medical applications of ionizing radiation.

A set of satellite meetings on specific radiation protection, radiation dosimetry and radiation shielding topics, as well as tutorials on topics of interest to the participants, will be organized around the meeting.

If you are a shielding designer (expert or otherwise), or an aspiring designer, this conference is one "not to be missed." Even the shielding experts on the program are looking forward to this rare opportunity to exchange ideas and shielding philosophies with each other, as well as with the attendees. Information about the meeting may be obtained from the website, http://www.rsmi2009.itn.pt/index.html, or by contacting rsmi2009@itn.pt (phone (+351) 21-994 6292 or fax (+351) 21-994 1995).

Bob Dixon and Pedro Vaz
on behalf of the organizers and lecturers

Short Courses on Monte Carlo Analysis and Nuclear Criticality Safety

The Department of Nuclear Engineering at the University of Tennessee-Knoxville is offering short courses for radiation transport and criticality safety specialists during Tennessee Industries Week (TIW-44), August 10–14, 2009.

Radiological Assessment–- This three-day course is based on selected topics from University of Tennessee courses on Radiological Assessment, Internal Dosimetry, and Uncertainty Analysis, and is intended for personnel working in areas associated with radiological assessment or internal dosimetry. Individuals professionally established in a particular area would benefit from exposure to a number of important topics, and those who are new to this area of science would benefit from the integration of a variety of important and relevant topics.

Fundamentals of nuclear physics, health physics, and internal dosimetry will be presented for review and to establish a common framework for subsequent presentations. Information presented on radionuclide transport and pathways analysis will include basic theory and solutions to several tutorial examples. Descriptions of several computer programs used for internal dosimetry and for radiological assessment will be presented, and details from several studies will be used as examples.

Information on external dosimetry generally follows material in the cited text. Materials presented on internal dosimetry will go beyond the reference text and will involve computational methods as well as practical examples. Methods for analyzing bioassay program data will be carefully reviewed and case studies will be discussed.

Nuclear Criticality Safety—Engineers, scientists, and technical managers who wish to increase their knowledge and understanding of nuclear criticality safety will be interested in this intensive one-week short course. The topics covered in the course are based primarily on the experience of the five instructors which totals over 120 years of nuclear criticality safety related experience. Such a wealth of experience needs to be shared with the criticality safety community including both new professionals in the field as well as experienced professionals.

The course topics include illustrative applications using the SCALE system developed at Oak Ridge National Laboratory with emphasis on the Monte Carlo code KENO, standards, regulations, review of

accidents, hand calculation methods, subcritical limits, code validation techniques, accident response planning and management, and transient excursion modeling.

This course is also available remotely via live telecommunications for an additional $600 per student ($1,895 total). The course is delivered synchronously (i.e., live and interactive) to the student's computer via the internet using software provided by the university. For more information contact Caroline Bowers at (865) 974-8772.

Monte Carlo Analysis—Monte Carlo is often the method of choice to solve complex problems in nuclear criticality safety and radiation shielding. To use Monte Carlo effectively, the analyst must understand the theoretical and computational fundamentals of the method, as well as the computational options available in particular computer tools. Also, it is sometimes advantageous to create new special-purpose Monte Carlo programs to solve particular problems rather than use an existing program. The Monte Carlo course runs for 5 days.

1. To familiarize the student with the basic concepts of the Monte Carlo method in a general (non-transport) context to add to the students' ability to apply method to a variety of problems in mathematics, physics, and engineering.
2. To familiarize the student with the particular mathematical techniques and probability distributions that are used in analog Monte Carlo solutions of neutral-particle radiation transport problems. This is reinforced through an in-class exercise that develops an analog Monte Carlo code solution to a simple slab transport problem.
3. To familiarize the student with the mathematical basis for variance reduction techniques: non-analog mathematical methods that increase the efficiency of the calculation without biasing the solution. This is reinforced with a continuation of the in-class exercise to incorporate variance reduction techniques.
4. To apply the lessons learned to the most commonly used Monte Carlo code, MCNP. In a series of hands-on exercises with the PC version of MCNP, the novice user will learn to set up simple problems, and all levels of users will gain experience in using the variance reduction techniques offered by the MCNP code.

Special attention will be given to the understanding of the use of adjoint calculations in transport analyses, both as an alternate means of obtaining system responses and as importance functions for accelerating Monte Carlo forward solutions. Advantages and disadvantages of the adjoint mode versus the forward mode of analysis will be described. In addition, the relationship of Monte Carlo methods to deterministic methods will be described, including strategies involving the hybrid use of both methods to more efficiently solve certain transport problems.

Case Studies in Neutron Transport Theory—- The study of the neutron transport equation is a delicate blend of theoretical mathematics, numerical methods and computational strategies describing the interaction of neutrons and nuclei. Not only do we gain physical insight from the solution to the transport equation, but we also create new mathematics and numerical methods for the solution of equations. This short course is offered to those individuals who want to experience the elegance of analytical transport theory and how this theory can impact the development of transport methods for application.

This course will concentrate on transforming theoretical solution representations of the neutron transport equation into numerically useable forms. The course will study reactor physics from neutron slowing down to multidimensional multigroup theory and criticality. Though the backdrop is reactor physics, our emphasis will be on analytical manipulations of the transport equation and the numerical realization of its solutions.

This course is also available remotely via live telecommunications for an additional $600 per student ($1,895 total). The course is delivered synchronously (i.e., live and interactive) to the student's computer

via the Internet using software provided by the university. For more information contact Caroline Bowers at (865) 974-8772.

The deadline for registration is **July 24, 2009**. Classes are limited in size and will be filled on a first-come, first-serve basis. For additional information on these and other courses offered during TIW-44, contact Kristin England at the University of Tennessee, phone (865) 974-5048, email kengland@utk.edu, url http://www.engr.utk.edu/nuclear/TIW.html.

Practical MCNP for the Health Physicist, Medical Physicist, and Rad Engineer

DATES: 17-21, August 2009
FEE: $1,800 per person
PLACE: The MESA Complex, Room 130, University of New Mexico-Los Alamos Campus

Monte Carlo type calculations are ideally suited to solving a variety of problems in radiation protection and dosimetry. The Los Alamos MCNP™ code is a general and powerful Monte Carlo transport code for photons, neutrons, and electrons, and can be safely described as the "industry standard." This course is aimed at the HP, medical physicist, and rad engineer with no prior experience with Monte Carlo techniques. The focus is almost entirely on the application of MCNP™ to solve a variety of practical problems in radiation shielding and dosimetry. The intent is to "jump start" the student toward using MCNP™ productively. With a little practice and study of the examples, many will find they are able to solve problems that have, in the past, been out of reach.

Course content: Extensive interactive practice sessions are conducted on a personal computer. Topics will include an overview of the MCNP™ code and the Monte Carlo method, input file preparation, geometry, source definition, standard MCNP tallies, interpretation of the output file, exposure and dose rate calculations, radiation shielding, photon skyshine, detector simulation and dosimetry. Students will be provided with a comprehensive class manual and a CD containing all of the practice problems. This course has been granted 32 Continuing Education Credits by the AAHP (2005-00-003), and 4.5 CM points by the American Board of Industrial Hygiene. The course is offered by the Health Physics Measurements Group at the Los Alamos National Laboratory and is co-sponsored by RSICC.

Registration is available online at: http://drambuie.lanl.gov/~esh4/mcnp.htm. Non-US citizens need to register 60 days in advance to allow for necessary visitor approvals. Make checks payable to the University of California (checks must be in U.S. dollars on a U.S. bank) and mail together with name, address, and phone number to:

David Seagraves, Mail Stop J573, Los Alamos National Laboratory, Group RP-2, MCNP Class, Los Alamos, NM 87545.

Inquiries regarding registration and class space availability should be made to David Seagraves, 505-667-4959, fax: 505-665-7686, e-mail: dseagraves@lanl.gov. Technical questions may also be directed to Dick Olsher, 505-667-3364; e-mail: dick@lanl.gov.

Note that this course is separate from and independent of the courses being offered by the MCNP and MCNPX Teams at LANL

3D S.UN.COP 2009

The University of Pisa (UNIPI), the Royal Institute of Technology (KTH), the University of Zagreb (FER), and the School of Industrial Engineering of Barcelona (ETSEIB) are jointly organizing the Seminar and Training to transfer competence, knowledge and experience in the area of **S**caling, **Un**certainty and 3D **Co**u**p**led Code Calculations (3D S.UN.COP 2009).

The Seminar will take place from October 12–30, 2009, Royal Institute of Technology (KTH) in Stockholm, Sweden. The deadline for registration is June 5, 2009. The seminar is divided into three parts and participants may choose to attend a one-, two- or three-week course depending on their interest in the following topics:

1) Fundamental Theoretical Aspects of the Methodologies;

2) Industrial Applications (e.g. AECL, AREVA, Westinghouse, GE) Coupling Methodologies and Code Hands-on Training (e.g. RELAP, CATHARE, PARCS, TRACE, Star-CD) and Special Sessions devoted to Computational Fluid Dymanics and Severe Accident Analysis; BWR Safety Analysis and, WWER, and CANDU Technologies;

3) Code Hands-on Training for Transient Analysis in ITF.

Further details are provided will be available soon at: http://dimnp.ing.unipi.it/3dsuncop.

CONFERENCES

2009 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics

The 2009 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics will be held May 3–7, 2009, in Saratoga Springs, New York. The Conference will provide an international forum to present and discuss recent research in mathematical modeling and computing as applied to nuclear engineering and particle transport. This conference is part of a series of topical meetings organized by the Mathematics and Computation Division of the American Nuclear Society. The technical program will consist of plenary sessions, parallel oral presentation sessions, and poster sessions. There will also be one or more workshops.

Check the conference website http://local.ans.org/ne-ny/topical_2009_neny.html for general conference information. General chair of the conference is Ray Gamino (ray.g.gamino@lmco.com). Note that early registration prices are in effect up to April 1.

ANIMMA

The 1st International Conference on Advancements in Nuclear Instrumentation, Measurement Methods and their Applications (ANIMMA) will be held in France at the Marseilles Convention Center, June 7–10, 2009. The program is focused on instrumentation, but emphasizes the latest developments in all measurement stages: nuclear radiation detection and in-pile measurements, modelling, electronics, signal acquisition and analysis, interpretation and associated training/education activities. For information regarding the conference organization contact: animma@cea.fr (phone 33 442 257 588) url http://www.animma.com/.

Radionuclide Therapy and Radiopharmaceutical Dosimetry

The 3rd International Symposium on Radionuclide Therapy and Radiopharmaceutical Dosimetry and Workshop on Alpha-emitting Radionuclides in Therapy will convene June 13–17, 2009, in Toronto, Canada, in conjunction with the 2009 SNM Annual Meeting. The 3rd Symposium will blend with SNM sessions in oncology, radiopharmaceutical chemistry, radiobiology, and dosimetry. The workshop will highlight current progress in the use of alpha-emitters for cancer therapy, continuing a series of successful alpha-emitter workshops. Further information is posted at http://isrtrd2009.labworks.org/ or may be obtained from George Sgouros, Vice-Chair, at gsgouros@jhmi.edu.

2009 ANS Annual Meeting

Advancing Nuclear Technology for a Greater Tomorrow is the theme for the 2009 ANS Annual Meeting which be held in Atlanta, Georgia, June 14–18. Summaries describing work that is new, significant, and relevant to the nuclear industry may be submitted beginning November 1 in response to the Call for Papers. Summaries must be submitted electronically using Adobe Acrobat (PDF) files and original Microsoft Word documents and the ANS Electronic Submission System. Summaries not based on the ANS template will be rejected. General Chair for the meeting is Jeffrey T. Gasser (Southern Nuclear Operating Company); the Technical Program Chair is Bojan Petrovic (Georgia Institute of Technology). Information regarding the meeting is posted at http://www.new.ans.org/meetings/c_1.

ICENES-2009

The 14th International Conference on Emerging Nuclear Energy Systems (ICENES-2009) will be held June 29–July 3, 2009, in Ericeira, Portugal. The main objective of the ICENES series is to provide an international forum for scientists, engineers, industry leaders, policy makers, decision makers and young professionals to present and discuss various advanced, innovative and non-conventional nuclear energy production systems. A new dimension of ICENES2009 will extend the forum to include innovative non-nuclear technologies, such as hydrogen energy, solar energy, deep space exploration, etc. A special new field in ICENES 2009 will be the discussion and proposals of new tools for a more efficient way to organize R&D in nuclear energy and related fields, and to boost international cooperation. ICENES2009 takes place in a special moment, at the dawn of a new era for nuclear energy, marked by the nuclear energy "renaissance" and following a major step forward towards the development and implementation of nuclear fusion energy, with the recent decision to build ITER. For more information contact the Conference Secretariat at icenes2009@itn.pt or fax: 351 21 994 1995. Check the website, http://www.itn.pt/icenes2009/, frequently for new and updated information.

50th INMM Annual Meeting

The Institute of Nuclear Materials Management (INMM) will hold its 50th Annual Meeting July 12–16, 2009, in Tucson, Arizona. The Institute is a professional membership organization that promotes research and development in new concepts, approaches, techniques and equipment in the field of nuclear materials management (i.e., international safeguards, materials control and accountability, physical protection, nonproliferation and arms control, packaging and transportation, and waste management). Information regarding the conference can be found at http://www.inmm.org/meetings/index.cfm. You may also contact INMM, 111 Deer Lake Road, Suite 100, Deerfield, IL 60015 (email inmm@inmm.org, phone 847-480-9573, fax: 847-480-9282).

GLOBAL 2009

GLOBAL 2009 will be held in Paris, September 6–11, 2009. It will be the 9th in the series of world meetings held bi-annually on the nuclear fuel cycle (NFC) that began in 1993 in Seattle. The series has since been established as an international forum for experts to provide an overall review of the status and new trends of research applications and policies related to the nuclear fuel cycle (NFC). GLOBAL 2009 will highlight the technical challenges and successes involved in closing the NFC and recycling long lived nuclear waste. It will also be an excellent occasion to review and discuss social and regulatory aspects as well as national plans and international policies affecting the future of nuclear energy. This meeting will provide a forum for the exchange of the newest ideas and developments related to the initiatives establishing an acceptable, reliable and universal international non proliferation regime.

The technical program will consist of invited plenary and focused in-depth technical sessions organized along specific areas of technical interests listed below.

- Front end of the fuel cycle
- Current spent nuclear fuel recycling
- Waste management technologies and strategies
- Concepts for transportation and interim storage of spent fuels and conditioned waste
- Nuclear waste repository developments
- Advanced technologies for fuel recycling including partitioning of specific radionuclides
- Advances in reactor cores design and in-core fuel management
- Transmutation systems for long lived radionuclides
- Developments in nuclear non proliferation technology, policy and implementation
- Sustainable fuel cycle options and nuclear material management
- Dismantling, decommissioning and material management
- Crosscutting issues, policies and programs

The contact for the conference is Sylvie Delaplace, SFEN, 5 rue des Morillons, F75015 PARIS (phone +33-(0)1-53-58-32-16, fax +33-(0)1-53-58-32-11, email global2009@sfen.fr). Current news will be posted at https://www.sfen.fr/index.php/plain_site/global_2009/general_scope_overview.

NCSD 2009

NCSD 2009, the topical meeting of the ANS Nuclear Criticality Safety Division, will be held September 13–17, 2009, in Richland, Washington. The theme for the meeting is *Realism, Robustness, and the Nuclear Renaissance*. The program will include work that falls within the following topics:

- Realism and Criticality Safety—Input data, Cross sections, Modeling, Accident scenarios
- Applications and Realism— Benchmark selection, Tsunami and other methods, Sub-critical Measurements, Burn-up credit applications
- Robustness in controls—Development of criticality controls, Requirements documents (DOE, NRC), Standards role, Implementation of criticality controls, Examples, International experience
- Ready for the Renaissance—Status and scope of GNEP, Criticality safety needs for the fuel cycle (enrichment, fabrication, transportation, storage and disposal), Harvesting existing benchmark data (fuel cycle and nuclear data), In-situ measurements, Criticality safety and engineering design, Use of computers in operations controls, People needs, training and education

The meeting website is http://www.ncsd2009.com/.

6th International Symposium on Release of Radioactive Materials from Regulatory Requirements

The 6th International Symposium on Release of Radioactive Materials from Regulatory Requirements will be held September 21–23, 2009, in Hamburg. It will focus on provisions for exemption and clearance. Both exemption and clearance have in common very low concentrations and very low total amounts of radioactivity associated with materials and equipment. These very low levels of radioactivity pose very small risks. As a consequence, regulators are faced with difficult decisions on how to make defensible regulations on how much radioactivity can be released to the general commerce and to the environment and still provide an adequate level of protection.

The scope of this symposium includes nearly all aspects of regulation of very low levels of radioactivity in seven topical sessions:

* Concepts
* Regulatory Framework
* Technical Aspects (including Standardization)
* Administrative Procedures
* Naturally Occurring Radioactive Materials (NORM)
* Public Acceptance
* Exemption and Orphan Radioactive Materials

Participants will present multi-national experiences, approaches and regulations as posters and oral presentations. The language of the Symposium is English. The conference organizer is TÜV NORD SysTec, Germany with support from the European Commission, OECD/NEA, IAEA, and the German Swiss Radiation Protection Association. Current information is posted at the website, http://www.tuev-nord.com/english/clearance.asp.

Nuclear Reactions on Nucleons and Nuclei

The International Conference on Nuclear Reactions on Nucleons and Nuclei will be held October 5–9, 2009, in Messina, Italy. The Conference will focus on the new projects and new lines of research in the field of the nuclear reactions that will be developed in the main laboratories and research centres during the next 10–15 years. Therefore, the conference is open to contributions on various kinds of nuclear reactions (also of astrophysical interest) between nuclei, and between particles and nucleons.

The conference program will consist of invited talks, oral and poster presentations of contributed papers with the main emphasis on the discussion (from experimental and theoretical points of view) of processes leading to heavy- and light-reaction products (with or without compound nucleus formation), synthesis of superheavy nuclei, investigations of baryonic resonances by hadronic or electromagnetic interactions and their decay with the production of scalar and vector mesons. The conference language will be English. Participants are encouraged to present their recent work with a one-page abstract in A4 format submitted before **May 31, 2009**. Submit the abstracts electronically by e-mail, sending a postscript file for the text to conf2009@nucleo.unime.it. Participants will receive information on the acceptance of their contribution for oral or poster presentation before July 10th, 2009.

Young researchers (up to about 40 years old) are strongly encouraged to participate with scientific contributions. Invited talks and oral presentation of all participants will be published in the Conference Proceedings. All correspondence concerning the Conference should be sent to

conf2009@nucleo.unime.it. Information related to the conference will be posted to http://nucleo.unime.it/conf2009/committ.html.

NEUDOS-11

The 11th Neutron and Ion Dosimetry Symposium (NEUDOS-11), hosted by the Laboratory for Accelerator-Based Sciences (iThemba LABS), will be held October 12–16, 2009, in Capetown, South Africa. The Symposium is being held under the auspices of the European Dosimetry Group (EURADOS). All previous Symposia in the series, which began in 1972, have been held in Western Europe.

A full and diverse scientific program will be offered which will encompass the complete range of neutron and ion dosimetry topics. In addition, both oral and poster "young investigators" sessions will be held. At these sessions presentations on any topic related to the dosimetry of any radiation modality (i.e., not limited to neutron or ion dosimetry) can be presented. **March 15, 2009**, is the deadline for submitting abstracts.

Check the website, http://www.neudos11.tlabs.ac.za, frequently for new information. You may also contact Dr. D. Jones / Ms. N. Haasbroek, iThemba LABS, P O Box 722, Somerset West 7129, South Africa (phone +27 21 843 1259 / 1032, fax +27 21 843 3525, email Neudos11@tlabs.ac.za).

2010 Joint Symposium on Supercomputing in Nuclear Applications + Monte-Carlo

Planning has begun for the combined Supercomputing in Nuclear Applications (SNA) and Monte-Carlo (MC) 2010 meeting. The Japan Atomic Energy Agency Center for Computational Science and e-systems and Nuclear Science and Engineering Directorate will host the meeting October 18–21, 2010, at the Hitotsubashi Memorial Hall in Tokyo.

Extended abstracts of 1500 words may be submitted by **September 2009** on the following topics:

- Computational Applications (Nuclear Reactor Analysis, Nuclear Safety, Thermal Hydraulics, Biomedicine, Nano-Science, Nuclear Fuel Cycle / Repository Performance, Materials, Fluid Dynamics, Plasma Physics/Fusion, Earthquake Proof, Structural Analysis, Shielding, Dosimetry, Radiation Effect, Space and Aviation, etc.)
- Computational Science (Applications, Methodology, Modeling, Code Development, Verification, Basic Data, etc.)
- Computer Science (Visualization, Tools, Hardware, Middleware, etc.)
- Information Technology and its Applications (CAE, Communications, etc.)
- Computational Methods using High Performance Computers (Parallel Computing, Grid Computing, Custom computing, etc.)
- Theory for Monte Carlo Simulation
- Physics Modeling in Monte Carlo Simulation

Bookmark the website, http://sna2010.jaea.go.jp/, to keep abreast of developments for the meeting. You may also contact sna2010@ml.jaea.go.jp.

MCTP2009 Second European Workshop on Monte Carlo Treatment Planning

The MCTP2009 Second European Workshop on Monte Carlo Treatment Planning will be held in Cardiff (UK) from October 19–21, 2009. The introduction into clinical practice of more accurate algorithms for patient dose calculation is of paramount importance and algorithms based on the Monte Carlo method are widely regarded as the most accurate available in radiotherapy. MC techniques are also ideal research and development tools increasingly used in emerging areas including, among others, functional imaging, and molecular targeted radiotherapy. The number of publications reporting the use of MC in radiotherapy treatment planning (MCTP) has indeed increased exponentially in the last 25 years. The workshop is supported by the European Work Group on Monte Carlo Treatment Planning, Velindre NHS Trust, Cardiff University, and Cancer Research Wales.

The aim of MCTP2009 is to create a synergistic environment to maximize the integration of research, development and clinical implementation of MC technology in medical radiation physics devoted to the diagnosis and treatment of cancer. The Organizing and Scientific Committees of MCTP2009 invite the submission of papers for consideration in the final program. **March 31, 2009** is **t**he abstract submission deadline for work in the following fields:

- External beam radiotherapy
- Verification imaging
- Sealed and unsealed sources
- Reference dosimetry
- Code and system developments

Check the workshop website, http://www.mctp2009.org/, often for current information. For information that may not be available on the website contact Campus Services Division, Cardiff University, Southgate House, PO Box 533, Cardiff CF14 3XZ (phone + 44 (0)29 2087 5508, fax + 44 (0)29 2087 4990, email workshop@mctp2009.org).

ND2010

The 2010 International Conference on Nuclear Data for Science and Technology will be held April 26–30, 2010, at Jeju Island, South Korea. The meeting is organized by the Korean Nuclear Society and Korea Atomic Energy Research Institute under the auspices of the OECD Nuclear Energy Agency. The conference is the 11th in series held every three years.

The purpose of these conferences is to bring together scientists and engineers involved in the production or use of nuclear data for various applications. The ND-2010 conference will cover measurements, theoretical model developments, evaluation, processing, validation and dissemination activities. The scope of the conference includes the following fields of application: fission and fusion energy, accelerator technology, dosimetry and shielding, astrophysics and cosmology, safeguards and security, space, medicine, environment. The corresponding needs for improved nuclear data will be addressed.

A call for papers has been announced for abstracts on the following topics:

- Nuclear structure and decay data
- Experimental facilities and detection techniques
- Nuclear data measurements and analysis
- Nuclear theories, models and data evaluation
- Standards
- Evaluated nuclear data libraries and processing
- Validation, benchmarking of evaluated data
- Integral experiments

- Uncertainty quantification and covariance matrix
- Data dissemination and international collaboration
- Fission energy applications
- Accelerator-related applications
- Fusion technology applications
- Dosimetry and shielding applications
- Safeguards and security
- Space, cosmic-ray applications, radiation effects on electronics
- Astrophysics and cosmology applications
- Medical and environmental applications

The deadline for submitting an abstract is **September 30, 1009**. Additional information about the conference may be obtained from Jonghwa Chang, jhchang@kaeri.re.kr or Young-Ouk Lee, yolee@kaeri.re.kr. The website is http://www.nd2010.org/.

CALENDAR

March 2009

5th ESARDA Course on Nuclear Safeguards and Non Proliferation, March 30–April 3, 2009, Ispra, Italy. Contact: NUSAF-Secretariat (email jrc-nusaf-secretariat@ec.europa.eu or fax +39 0332 78 9185) url http://esarda2.jrc.it/internal_activities/WC-MC/Web-Courses/index.html.

International Symposium on Nuclear Security sponsored by the IAEA, March 30–April 3, 2009, Vienna, Austria. Contact: IAEA, Conference Services Section, Wagramer Strasse 5, P.O. Box 100, 1400 Vienna, Austria (phone 43-1-26000; fax 43-1-26007).

April 2009

2009 American Nuclear Society Student Conference; "Nuclear Engineers - Reacting To Power The World," April 1–5, Gainesville, FL. Contact: University of Florida ANS Student Section, Attn: ANS, 202 Nuclear Science Center Bldg., P.O. Box 118300, Gainesville, FL 32612 (fax +1-352-392-3380) url: http://ans.nre.ufl.edu/.

Advances in Nuclear Fuel Management IV, April 12–15, 2009, Hilton Head, SC. Contact: General Chair John Siphers (phone 919-546-4032, email john.siphers@pgnmail.com), or Technical Program Co-chairs Ivan Maldonado (phone 865-974-7562, email imaldona@utk.edu) and Atul Karve (phone 910-675-5802, email atul.karve@gnf.com) url http://anfm2009.org.

May 2009

2009 International Conference on Advances in Mathematics, Computational Methods, and Reactor Physics, May 3–7, 2009, Saratoga Springs, NY. Contact: Ray Gamino (ray.g.gamino@lmco.com) url http://local.ans.org/ne-ny/topical_2009_neny.html.

Operational Radiation Protection for Accelerators in Research and Medicine, May 13–20, 2009, Sicily (Italy). Contact: http://www.cern.ch/radschool.

June 2009

ANIMMA, June 7–10, 2009, Marseilles, France. Contact: ANIMMA_2009, CEA/DER/SPEx, Bat. 238 CEA Cadarache 13108, St Paul lez Durance Cedex FRANCE (fax +33 (0)4.42.25.78.76, email: animma@cea.fr) url http://www.animma.com/.

3rd International Symposium on Radionuclide Therapy and Radiopharmaceutical Dosimetry and Workshop on Alpha-Emitting Radionuclides in Therapy, June 13–17, 2009, Toronto, Canada. Contact: George Sgouros (gsgouros@jhmi.edu) or Michael Lassmann (Lassmann_M@klinik.uni-wuerzburg.de) url www.snm.org.

2009 ANS Annual Meeting, "Advancing Nuclear Technology for a Greater Tomorrow," June 14–18, 2009, Atlanta, GA. Contact: http://www.new.ans.org/meetings/c_1.

Training Course on Natural Circulation Phenomena and Modelling in Water Cooled Nuclear Power Plants, June 22–26, 2009, Pisa, Italy. Contact: Ms. Patricia Pla, San Piero a Grado Nuclear Research Group (GRNSPG), University of Pisa, Via Diotisalvi, 2, 56126 PISA (Italy) (phone + 39 050 2210 371, fax + 39 050 2210 384, email grnspg@ing.unipi.it) url http://www.grnspg.ing.unipi.it/natural_circulation/.

ICENES-2009, June 29–July 3, 2009, Ericeira, Portugal. Contact: Conference Secretariat at icenes2009@itn.pt (fax: 351 21 994 1995) url http://www.itn.pt/icenes2009/.

July 2009

50th INMM Annual Meeting, July 12–16, 2009, Tucson, Arizona. Contact: INMM, 111 Deer Lake Road, Suite 100, Deerfield, IL 60015 (email inmm@inmm.org, phone 847-480-9573, fax: 847-480-9282) url http://www.inmm.org.

Radiation Shielding in Medical Installations 2009 (RSM2009), July 19–21, 2009, Ericeira, Portugal. Contact: rsmi2009@itn.pt (phone (+351) 21-994 6292, fax (+351) 21-994 1995) url http://www.rsmi2009.itn.pt/contact.html.

September 2009

GLOBAL 2009, Sept. 6–11, 2009, Paris. Contact: Sylvie Delaplace, SFEN, 5 rue des Morillons, F75015 Paris (phone +33-(0)1-53-58-32-16, fax +33-(0)1-53-58-32-11, email global2009@sfen.fr) url https://www.sfen.fr/index.php/plain_site/global_2009/general_scope_overview.

NCSD 2009, Sept. 13–17, 2009, Richland, Washington. Contact: Technical Program Chairman, David Erickson at David_G_Erickson@rl.gov, url http://www.ncsd2009.com/.

Release of Radioactive Materials from Regulatory Requirements: Provisions for Exemption and Clearance, 6th International Symposium, Sept. 21–23, 2009, Wiesbaden, Germany. Contact: TÜV NORD SysTec, Dr. J. Feinhals, Chairman of Executive Committee, Große Bahnstr. 31, D-22525 Hamburg, Germany (phone +49 40 8557-2253, fax +49 40 8557-2429, email jfeinhals@tuev-nord) url http://www.tuev-nord.com/english/clearance.asp.

October 2009

International Conference on Nuclear Reactions on Nucleons and Nuclei, Oct. 5–9, 2009, Messina, Italy. Contact: conf2009@nucleo.unime.it, url, http://nucleo.unime.it/conf2009/committ.html.

NEUDOS-11, October 12–16, 2009, Capetown, South Africa. Contact: Dr. D. Jones / Ms. N. Haasbroek, iThemba LABS, P O Box 722, Somerset West 7129, South Africa (phone +27 21 843 1259 / 1032, fax +27 21 843 3525, email Neudos11@tlabs.ac.za) url http://www.neudos11.tlabs.ac.za.

October 2010

SNA2010 and MC2010, Oct. 18–21, 2010, Tokyo. Contact: sna2010@ml.jaea.go.jp, url http://sna2010.jaea.go.jp/.