REVIEWS

Meetings

XLVII ETRAN Conference
Activities of the Nuclear Engineering and Technology Commission

The Commission for Nuclear Engineering and Technology of XLVII ETRAN Conference, held on June 8-13, 2003, in Herceg Novi, Serbia and Montenegro, was presented with 19 papers. The Review Committee accepted all the papers that were applied and included them into the Conference Program. The papers comprised wide range of topics, and the Committee grouped them into three sections.

The Commission for Nuclear Engineering and Technology began its work at the *Reactor and Accelerator Systems* section. All of the accepted papers of this section (seven papers) were presented at the Conference. The paper by Lj. Kostić gives the analysis of neutron fluctuations in subcritical systems with a stochastic impulse source. The paper by M. Milošević, E. Greenspan, and J. Vujić, completed within the cooperation of the University of California at Berkeley and the VINČA Institute of Nuclear Sciences, presents a new methodology for reference calculations of fuel burnup in 3D models of nuclear reactors with fast neutrons. The methodology has been applied to the analysis of a new reactor of IV generation cooled by liquid lead, showing that it is possible to prolong the exchange period of nuclear fuel (with enrichment of 10% ^{239}Pu) up to 240 months (the current period is 12 or 18 months). The paper by V. Ljubenov and M. Milošević describes the procedure for determination of neutron flux density in the fields with various energy spectra, based on the application of standard methods for measuring irradiated foil activity and the SCALE-4.4a code system for determination of averaged neutron cross section values. The paper by S. Stanković, M. Vukčević, B. Lončar, A. Vasić, and P. Osmokrović shows that n-γ discrimination level at MSV signal processing by Campbell's method is about fifty times higher than at traditional measuring methods, while the paper by M. Pešić, O. Šotić, and N. Dašić describes the contribution of Serbia and Montenegro to the international program of reduction of enriched uranium in research reactors. The prominent paper by J. Ristić-Đurović, P. Beličev, S. Ćirković, A. Dobrosavljević, V. Vujović, Đ. Košutić, M. Rajčević, and N. Nešković describes the extraction and transport of the ion beam for production of radioisotope ^{18}F with the VINCY Cyclotron in the VINČA Institute, and the paper by S. Ćirković and J. Ristić-Đurović presents the influence of the flatter on the accuracy of calculated isochronous field in the VINCY Cyclotron.

The second section, *Use of the Ionizing Irradiation*, had seven accepted papers, one of which was not presented due to the authors' absence. The paper by P. Marinković and M. Steljić presents a new model for reconstruction of a picture in single photon emission tomography (SPET), while the paper by R. Simović and S. Marković gives the results obtained by the application of consistent analytical method for studying low energy photon reflection. The paper by P. Beličev presents the influence of geometric parameters of the collimator on neutron source energy spectrum with ^{252}Cf, and the paper by J. Vučina and R. Han presents the obtaining of rhenium radionucleids for the purpose of medical treatment. The prominent paper by S. Janković and B. Milovanović describes the realization of the multichannel amplitude analyzer with 4096 channels, based on fast 12-bit analogous digital converter and the connection with a PC computer established by the means of optoinsulator and a cable for serial data transmission. The paper by S. Perović and S. Bauk gives the review of an iteration procedure in the theory of special trans functions.

In the course of the third section, *Ionizing Radiation Protection*, all accepted papers were presented (five papers). The invited paper by M. Ninković presents the minor accidents and the incidents which occurred at the RA reactor in the VINČA Institute, their influence on reactor systems and increased irradiation of the staff, as well as measures taken with the aim to reduce irradiation consequences. The paper by J. Raičević, M. Gajić, and Z. Popović describes a new module for estimation of stochastic effects following nuclear accidents. The paper by I. Plećaš and R. Pavlović gives the review of radioactive material deposit in the world and in Serbia and Montenegro, while the prominent paper by O. Ciraj, S. Marković, and D. Košutić presents the preliminary results of estimated values of patient doses for nine traditional X-ray diagnostic procedures. The paper by S. Dimović and I. Plećaš gives the review of procedures used for processing of radioactive waste at decommissioning of nuclear reactors.

Despite all difficulties, the general impression and evaluation performed by the editors, Review Committee, Chairmen of Sections and participants involved in the work of the Commission for Nuclear Engineering and Technology at XLVII ETRAN Conference, is that the applied, chosen, and presented papers were at traditionally high scientific level judging by their content, quality and way of presentation.

Miodrag Milošević

ECE International Workshop

An International Workshop, officially called the Promotion of the New Electrochemical Etching Facility (ECE) and Its Application in Natural Radiation Studies in Western Balkan Countries – ECE International Workshop, was held in Belgrade from June 30 to July 2, 2003.

The workshop was officially opened by Prof. Dr. Dragan Domazet, the Minister of Science, Technologies and Development of the Republic of Serbia, in the presence of His Excellency Ryuichi Tanabe, Ambasador of Japan in Belgrade, Dr. Kenzo Fujimoto, President of the Scientific Comitee of the ECE Workshop, Mr. Radojica Pešić, Deputy Minister of Science, Technologies and Development and Dr. Krunoslav Subotić, Acting Director of the VINČA Institute of Nuclear Sciences.

The workshop was organized with the aim of promoting the new ECE Laboratory of the VINČA Institute. The entire equipment for this Laboratory, costing around 200.000 USA dollars, was generously donated by the Japanese National Institute for Radiological Sciences (NIRS), Chiba, Japan. The establishment of this Laboratory is the result of the free transfer of technology from Japan and it is now the only such laboratory in the Western Balkan Countries region. The equipment, designed and produced in Japan, was donated the VINČA Institute on November 16, 2002. This was as a direct result of the scientific cooperation carried out jointly between VINČA Institute and NIRS in the period from 1998 to 2000 on the measurement of naturally occuring radioactive materials (NORM) in Gornja Stubla (Kosovo and Metohia). This work concentrated in particular on assessment of population exposure to indoor radon and thoron using passive radon/thoron UFO type detectors designed and constructed by NIRS in Japan. In the course of the very short period from November 2002 to March 2003 the physical facilities of the ECE laboratory were constructed with the financial support of the Ministry of Science, Technologies and Development, and by actions carried out by VINČA Institute staff. The ECE Laboratory was completed and commissioned March 16, 2003. This rapid and successfully completion of the laboratory was greatly assisted by the repeated visits of scientists Dr. Kenzo Fujimoto and Dr. Sarat Kumar Sahoo from NIRS, Japan.

The basic role of the ECE Laboratory is measurement and monitoring of population exposures to natural radiation environmental sources and the assessment of the associated radiation risks. The laboratory also has much wider potential applications.

In addition to the VINČA Institute which was the initiator and principal organizer of the ECE Workshop, the co-organizers were the NIRS, and the Jožef Stefan Institute, Ljubljana, Slovenia, who has been working jointly with the VINČA Institute on intercomparison of the methods and results of the measurements of technologically enhanced natural occurring radionuclides.

The goals of the ECE Workshop among other things were:

– establishment of a new state of the art European laboratory for the application of electrochemical etching methods,

– establishemnt of a National Laboratory for monitoring the exposure of the population to all components of ionizing radiations from nature,

– establishment of a Regional centre for natural radiation-epidemiological studies, and

– establishment of an Educational and Training Regional Center for innovation of knowledge and transfer of technology in the field of both radiation and geomedicine.

The scientific event comprised lectures given by scientists from eleven countries of Europe and from Japan, concerning the theory and practice of the electrochemical etching of nuclear track detectors in both basic research (neutron dosimetry, cosmic rays, new measuring methods) and detection and monitoring the population exposure to natural ionizing radiations environment (radon, thoron, external penetrating radiations).

Active participation in the work of the ECE Workshop was given by the scientists prominent in the fields of NORM and TENORM, most of whom have, in their own countries, carried out national programmes for radon: from Japan, Dr. Kenzo Fujimoto and Dr. Sarat Kumar Sahoo (NIRS), from Poland, Dr. Pawel Olko (Institute for Nuclear Physics, Polish Academy of Sciences, Krakow), from France, Dr. Georges Monchaux (Institute de protection et de sûreté nucléaire, Clamart), from Ireland, Dr. James P. McLaughlin (University College, Dublin), from Italy, Dr. Luigi Tommasino (Italian National Agency for Environmental Protection, Rome) and Dr. Francesco Bochicchio (Italian National Institute of Health, Roma), from Russia, Dr. Ilia V. Yarmoshenko and Dr. Ivan Kirdin (Institute for Insdustrial Ecology, Ural Branch of Russian Academy of Science, Ekaterinburg), from Slovenia, Dr. Ljudmila Benedik, Dr. Janja Vaupotič (Jožef Stefan Institute, Ljubljana) and Mr. Martin Lesjak (AMES, Ljubljana), from Belgium, Dr. Andre Poffijn (Federal Agency for Nuclear Control, Brussels, and of Gent University, Gent), from Albania, Dr. Durim Krezgiu (Institute for Nuclear Physics, Tirana), and from Greece, Dr. Nick Petropoulos (National Technical University of Athens – NTUA).

In addition to the invited lecturers (13), who all came by means of their own personal funds, around forty (40) participants of the Workshop, from Kragujevac, Novi Sad, Kosovska Mitrovica and Belgrade, were present. Two scientists from the Faculty of Natural Sciences and Mathematics at the University of Kragujevac gave platform presentations as did five researchers of the VINČA Institute (ECE laboratory team and the Electronics Department). During the Workshop the participants were also shown a demonstration of a newly developed distributed microcontroller system HYPERION for the continuous monitoring natural radiation environment. This was fully developed in the VINČA Institute. Perhaps the highlight of the workshop took place on the final day when a detailled demonstration of the whole experimental ECE procedure was demonstrated to the participants in the ECE Laboratory itself. This included both the methodology and the technique of electrochemical etching of nuclear track detectors.

The ECE Workshop was an activity planned within the current Project 1965 of the Ministry of Science, Technologies and Development of the Republic of Serbia under the title: "Field Investigations on the Population Exposures to Radon and Penetrating Radiations from Natural Environment in Yugoslavia". It should be stressed upon that the Ministry not only helped financially in the completion of the ECE Laboratory, but also provided the main financial support for holding this scientific event and issuing a booklet containing the programme, information of the demonstration of the experimental work and abstracts of the presented lectures.

The services of the VINČA Institute, National Institute of Radiological Sciences, Jožef Stefan Institute, Local Community Čukarica and Hotel TRIM in Belgrade gave essential help in the Organization of this event.

The participants also had a chance to visit the Nikola Tesla Museum in Belgrade, the Archaeological site Vinča and at the Workshop dinner which took place on a boat they saw a panorama of Belgrade from the rivers Sava and Danube.

Zora S. Žunić

The Fifth General Conference of the Balkan Physical Union

The Fifth General Conference of the Balkan Physical Union (BPU-5) was held in Vrnjačka Banja from August 25 through August 29, 2003. It was the first time that this triennial conference took place in Serbia and Montenegro.

The conference programme of BPU-5 was fairly dense and included 44 invited papers (duration 30 minutes, comprising discussions), in plenary and parallel sessions, 156 oral contributions (duration 15 minutes, including discussions) in 19 parallel sessions, about 400 posters in four poster sessions, and two round-table disscussions: "Interregional exchange of Young Physicists' in the Balkans" and "European Education Area and the Balkans". Young Physicists, Day, sponsored by UNESCO-ROSTE, has brought together young Ph. D. students and young professors of physics from secondary schools. Six best posters of the Young Physicists, selected by the Panel of Judges during the Young Physicists' Poster Competition Session, were presented orally.

The Nuclear Physics and Nuclear Energy Section included 4 invited papers, about 24 oral contributions and 15 posters. The invited papers were entitled:

– "New Nuclear Physics Experimental Techniques Applied to the Nuclear Waste Transmutation Project", presented by G. Rudolf for n-TOF collaboration (VINČA Institute participated also), gave a brief overview of the work performed on a number of (n, γ) and (n, f) reactions. The work mainly concerns reactions on given isotopes which have the specificity of being difficult to measure, but with an enhanced importance in the scope of the evolution of the nuclear energy technique;

– "Spallation Reactions in Energy Production and Nuclear Waste Transmutation", presented by M. Zamani Valasiadou from Thessalonika, deals with the recent revival of interest in spallation-based neutron sources and their applications in energy production by accelerator driven systems (ADS) and in transmutation of radioactive waste;

– "Nuclear Moments: A Sensitive Tool to Probe the Structure of the Exotic Nuclear State", by D. L. Balabanski from Sofia, presents recent and future developments in the production of exotic nuclei which have influenced the development of novel experimental tools for nuclear moment studies, *e. g.* the EXOSOBERT project in Europe;

– "The Synthesis and Decay Properties of Super-Heavy Nuclei", by Yu. V. Lobanov from Dubna and K. Subotić from the VINČA Institute, deals with the results of the experiments aimed at producing long-lived super-heavy elements located

near the spherical shell closures with Z more than 110 and N more than 162 in the Pu-244, and Cm-248 plus Ca-48 reactions.

Details about the following, very interesting oral presentations by researchers: (a) from Romania, on Romanian nuclear strategy, Contribution to the JSRI project, Irradiation facility at the TRIGA reactor, Use of the Scale code system, *etc*; (b) from Novi Sad, Serbia and Montenegro, on Gama-spectroscopy, Calibration of GMX HPGe, Double beta decay of ^{50}Cr, Nuclear magnetic moments and beta NMR on oriented nuclei, *etc*; (c) from Belgrade, Serbia and Montenegro, on different nuclear reactions, *etc*; (d) from Turkey and Bulgaria, on the Spectroscopy of ^{191}Au, Cross-section measurements, *etc.*, can be found in the Book of Abstracts and CD Proceedings of the Fifth General Conference of the Balkan Physical Union, Vrnjačka Banja, Serbia and Montenegro, August 25-29, 2003 (Editors: S. Jokić, A. Balaz, I. Milošević, Z. Nikolić, Serbian Physical Society, Belgrade, 2003).

The Conference was held under the auspices of the Balkan Physical Union (BPU) and organized by the Yugoslav Physical Society, Institute of Physics, Belgrade, VINČA Institute of Nuclear Sciences Belgrade, Faculty of Physics, University of Belgrade, Institute of Physics, University of Novi Sad, Faculty of Sciences, University of Niš, Faculty of Sciences, University of Kragujevac, and Faculty of Sciences, University of Montenegro.

We gratefully acknowledge the generous support of the Ministry of Science, Technologies, and Development of the Republic of Serbia, UNESCO-ROSTE and the European Physical Society.

Stevan Jokić