RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ATOMIC ENERGY COMMISSION

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In science, by a fiction as remarkable as any to be found in law, what has once been published, even though it be in the Russian language, is spoken of as known, and it is too often forgotten that the rediscovery in the library may be a more difficult and uncertain process than the first discovery in the laboratory.

....Lord Rayleigh

REACTOR PHYSICS AND SHIELDING TOPICAL MEETING

A national topical meeting on *NEW DEVELOPMENTS IN REACTOR PHYSICS AND SHIELDING* will be held in Kiamesha Lake, New York on September 12-15, 1972. The Conference, which will consist of both invited and contributed papers, will present a comprehensive program covering the full energy range (10^{-9} to 20 MeV) of interest in reactor physics and shielding applications. New methods and data relevant to the solution of current problems for the reactor and shield design physicist will be emphasized. The meeting is being co-sponsored by the Reactor Physics Division, the Shielding and Dosimetry Division, and the Northeastern New York Section of the American Nuclear Society.

Contributed papers are solicited and summaries (600 words or less) should be mailed in triplicate to

Dr. Norman C. Francis
P. O. Box 1072 - KAPL
Schenectady, New York 12301

by May 1, 1972. The contributor should indicate the session category of the paper. The general guidelines for the preparation of summaries of ANS papers should be followed (see Nuclear News, December 1971). The complete Proceedings will be published and available at the Conference. Authors of those papers selected for presentation will be notified regarding the date and format for submitting the complete text of the paper.

A banquet and a series of luncheons are being planned wherein invited speakers will cover topics of general interest.

The Conference will take place at the Concord Resort Hotel on Kiamesha Lake in the Catskill Mountains of New York. Located in aesthetically

beautiful surroundings, the Concord Hotel will provide accommodations at a minimum cost to attendees and their guests. Sports facilities at the Hotel include golf, swimming pools, tennis and complete health clubs. A ladies program is being planned.

Limousine and bus transportation is available between New York City airports and the Concord Hotel which is located ninety miles north of the city. Limousine service must be arranged for one week in advance.

Registration forms and additional information may be obtained by writing to

Dr. Thomas J. Kurey
P. O. Box 1072 - KAPL
Schenectady, New York 12301

Early registrations are encouraged.

A tentative program follows. All sessions will include contributed papers.

NEUTRON AND REACTOR PHYSICS IN THE THERMAL ENERGY RANGE

Chairman/Donald H. Roy (B&W)

1. Physics of PWR Reactors - R. L. Hellens (CE)
2. Energy-Dependent Cross Sections in the Thermal Range - B. R. Leonard, Jr. (PNL)
3. Physics Measurements of BWR Reactors and Comparison with Theory - R. L. Crowther (GE)
4. The Physics of Gas Cooled Reactors

NEUTRON PHYSICS IN THE RESOLVED AND UNRESOLVED RESONANCE RANGE

Chairman/Felix Adler (University of Illinois)

1. The Current Status of Nuclear Data
2. The Fast Neutron Doppler Effect - C. E. Till (ANL)
3. The Basis of Current Evaluated Data Files - M. K. Drake (BNL)

REACTOR THEORY

Chairman/Martin Becker (RPI)

1. Fast Neutron Slowing Down Theory and Group Constant Generation - W. M. Stacey, Jr. (ANL)
2. Advances in the Variational Method and Perturbation Theory - J. Lewens (University of London)
3. Advances and Current Problems in Reactor Kinetics-K. Ott (Purdue)

REACTOR SHIELDING

Chairman/J. R. Beyster and E. Straker (SAI)

1. Current Status of Calculational Methods and Nuclear Data in Shielding - J. L. Rathbun (WARD)
2. Fast Reactor Shielding Methods Development - F. Mynatt (ORNL)
3. Measurement and Evaluation of Cross Sections - V. J. Orphan (GGA)
4. Integral Experiments and Benchmark Calculations

FAST REACTOR PHYSICS I

Chairman/Max Yeater and Bimal K. Malaviya (RPI)

1. Review of FBR Physics - R. Avery (ANL)
2. Physics of Fast Test Reactors - P. L. Hofmann (PNL)
3. Significance of Integral Parameters in the Design and Performance of FBRs
4. Demonstration Reactor Benchmark Program

FAST REACTOR PHYSICS II

Chairman/Frank Feiner (KAPL)

1. Fast Neutron Spectra - C. A. Preskitt, Jr. (GGA)
2. Summary of Plate Versus Pin Measurements Emphasizing Sodium Void Effects - T. A. Pitterle and N. C. Paik (WARD)
3. SEFOR: Verification of the Doppler Transient Shutdown Capability of LMFBR's - L. D. Noble and G. Pflasterer, Jr. (GE)
4. Benchmark Testing of Nuclear Data for Fast Reactors - H. Alter (AI)

RSIC ACTIVITIES IN CY 1971 DETAILED

In the spring of each year RSIC makes an effort to analyze the record of the calendar year completed in order to plan constructively for the year to come. We are pleased to share the statistics with the shielding community. Due to the annual check on our distribution following which we purge the names of those no longer interested in receiving shielding materials, the RSIC distribution remains fairly constant. Currently, 1162 people receive the RSIC Newsletter. Use of the selective dissemination of information (SDI) and of retrospective search services increase as they become known. The current SDI distribution is 290. In CY 1971, 135 separate requests for special literature searches were processed.

ADDED TO THE INFORMATION INVENTORY

There were 1,412 new bibliographic entries made to the storage and retrieval information system (SARIS), an increase of 17% over the previous year. The following improvements were made to the computer code collection (CCC's and PSR's); 33 new computer code systems were packaged; 39 code packages in the collection were updated with modifications and extensions; 18 new hardware versions of existing code packages were fed back into RSIC by installations where conversions were made. The data library collection (DLC) was altered: one new data set was collected and packaged; three updates were made to existing data packages; two existing sets were obsoleted.

SERVICES TO THE SHIELDING COMMUNITY

A total of 2,313 separate letters/telephone calls of request were logged into the Center - an average of 193/month - resulting in 5,766 separate actions to satisfy the requests. General information requests accounted for 847 of the communications, while 1,466 were concerned with information about and requests for data and/or code packages.

RSIC shipped 636 separate code packages (including full documentation) - an average of 2.5 per working day, and 176 separate data library packages - an average of 3.5 data shipments per work-week. Additional shipments of 79 sets of updating material for computer codes were made during the year.

Other items mailed to requesters include: 455 RSIC publications, 1,459 shielding documents (1,196 code documents not counted in code package shipments), and 117 packets of RSIC introductory literature.

A total of 136 calls were serviced in which staff members assisted a requester as he was learning to use a specific program. Research was done and advice and descriptive material were given to help in the selection of computer codes to fit the requester's problem and his local computer environment in 1,021 instances.

In 1,565 instances, time was spent by RSIC staff members in assisting the requester to solve his shielding problem - giving general advice and counsel. Of these, at least 461 research efforts were non-trivial, requiring technical expertise, considerable time, and occasionally a need to use the computer to find solutions to the requester's difficulty.

During CY 1971, RSIC performed 122 separate data handling activities involving the use of the computer in connection with the National Neutron Cross Section Center (NNCSC) and the Shielding Subcommittee of the Cross Section Evaluation Working Group (CSEWG). No effort was made to analyze RSIC's Clearinghouse activities associated with the DNA Cross Section Working Library.

One Seminar-Workshop (Radiation Transport in Air) was sponsored by RSIC under DNA auspices, in which 83 people from 27 different installations participated. RSIC staff members participated in a Seminar-Workshop

on the WANL-developed computer codes sponsored by the NASA Marshall Space Flight Center along with 22 participants from 7 different installations. Thirteen complex codes were considered and were placed in the RSIC collection for processing and packaging.

In addition to the attendance at seminar-workshops, RSIC received 140 visitors for orientation and/or to use the Center's facilities. Twenty-five visitors were from foreign countries: 9 from Germany; one each from Brazil, India, Sweden, Japan, Hungary, Denmark, Italy, and Australia; one from IAEA, Vienna; one from ENEA in Paris and 3 from the ENEA Computer Programme Library in Italy; and 3 from EURATOM, Italy.

WEAPONS RADIATION SHIELDING HANDBOOK'S CHAPTER 3 REISSUED

Chapter 3, "Methods for Calculating Neutron and Gamma-Ray Attenuation," of the Defense Nuclear Agency Weapons Radiation Shielding Handbook, originally issued in 1968, has been revised and enlarged and is now available as DNA-1892-3, Rev. 1. The authors are Paul N. Stevens of Oregon State University and D. K. Trubey of RSIC. Several portions of the chapter have been extensively revised, especially the section on discrete ordinates calculations and kernel methods. New appendices are included, giving a derivation of the integro-differential and integral forms of the adjoint Boltzmann transport equation and a derivation of time-dependent discrete ordinates equations. The total number of pages have increased by 50%. The chapter is available from NTIS for $3.00; a limited number is available from RSIC upon request.

CURRENT WORK AND PROBLEMS

RSIC continues to welcome statements encapsulating work in progress at different installations. Outstanding problems in shielding will be noted as they are called to our attention. We hope to stimulate communication and exchange of ideas while the work is being carried on, presumably the time when a fresh outlook does the most good. Success of this feature depends on the voluntary contributions of our readers. The name in parentheses is our 'on-the-spot' correspondent.

An Information Centre (Ing. St. Otýs) functions within the Nuclear Power Construction Department of the SKODA National Corporation, Plzen, Czechoslovakia, collecting literature on science and technology and related topics for the use of its employees. The Centre also publishes reports describing the work and results achieved within the department and sends them to interested organizations throughout the world.

Institut für Reaktorentwicklung, Der Kernforschungsanlage Julich GMBH, Germany (Dr. J. Darvas) is involved in blanket neutronics calculations for fusion reactors, mainly trying to find out tritium breeding ratio, power density distribution and optimum shield layout for fusion reactor blankets. Methods used are discrete ordinates (ANISN) and Monte Carlo (MORSE), allowing for anisotropic neutron scattering. SUPERTOG and MUG are used for generating multigroup cross section data.

SDI NOTICE AND WARNING . . . MAY 15 IS PROFILE DEADLINE

SPACE-ACCELERATOR SDI PARTICIPANTS are urged to respond, if not having done so already, to the request for SDI Review. If RSIC has not received a revised profile or an indication that the current profile is satisfactory before May 15, YOUR NAME WILL BE DELETED from the Space SDI file. Remember,MAY 15 is the deadline! Call or write now so that you may continue to receive your SDI service.

ADDITIONS TO THE CODE COLLECTION

Operable, tested with a sample problem, and available for distribution are the following code packages.

CCC-175/PICFEE — Fission Product Inventory Code, contributed by the CEA Nuclear Research Center, Fontenay-aux-Roses, France, through the ENEA Computer Programme Library (ENEA CPL), Ispra, Italy. Reference: CEA-N-1203 (ORNL-tr-2527). FORTRAN IV, IBM 360/50/75/91.

CCC-176/CASCADE — Monte Carlo Simulation of the Transport of High Energy Electrons and Photons in Matter, contributed by the USAEC Health and Safety Laboratory, New York. Reference: HASL-213. FORTRAN IV, CDC 6600.

PSR-39/DEM — Monte Carlo Calculation of Photopeak Efficiency, Photofraction and Response Function, and Total Detection Efficiency for a Thick Disk Source, contributed by Department of Nuclear Engineering, Kyoto University, Japan. FORTRAN IV, FACOM 230-60.

Recent Code Package Updates include the following.

PSR-34/EVP XIX — Code package announced in Newsletter No. 83, October 1971 has been extended by a new hardware version. PSR-34A is operable on the CDC 6600. RSIC converted it to run on the IBM 360 and packaged it as PSR-34B. This peripheral code represents an analytical model of the evaporation step in spallation reactions. It is a contribution from Sweden through the CERN Computer Science Library.

CCC-127B/MORSE — The IBM 360 version of MORSE has been completely updated to reflect the several changes made to it since originally packaged. For those who have been following the additions, improvements, and corrections publicized by RSIC and who wish to keep their version current, it is suggested that you send for the updated package. In this way, all changes can be easily verified. Originally packaged in early 1970, MORSE is a general purpose Monte Carlo multigroup neutron and gamma-ray transport code.

CCC-167/ELF — ELF code package has been updated by the addition of UKNDL-2 Data Libraries. Requesters are reminded that the new package contains more than 75,000 records. It can be transmitted on one 9-track, or four 7-track-written reels of magnetic tape. ELF is a Monte Carlo neutron transport code for cylinders and spheres contributed by CEA/CEN/Fontenay-aux-Roses, France, through ENEA-CPL.

PERSONAL ITEMS

MAGI has announced the removal of its offices to 3 Westchester Plaza, Elmsford, New York 10523. New telephone number: 914-592-4646.

Recent changes of address have been made for two former NASA Lewis Research Center employees. M. Ray Clark is associated with the Westinghouse Advanced Reactor Division at Madison, Pa., working in shielding development for the Fast Flux Test Facility. Lester Clemmons, Jr. is employed in the Radiation Analysis Group of the Westinghouse Nuclear Energy Systems in Pittsburgh. His group is concerned with problems associated with radiation sources in the primary coolant loop of the PWR system.

Bill Atwell is currently with North American Rockwell in Houston, Tex. His work includes solar physics support, radiation shielding, spacecraft descriptions, and radiation dose computations for the Skylab program and advanced missions.

Jacob Weitman has left the Aktiebolaget Atomenergi (Studsvik, Sweden) shielding and dosimetry group to head the Industrial Program and Market Development of the company. His previous research work, now being finished, dealt with helium production cross sections of importance for the swelling and embrittlement of fuel cladding. He hopes to continue to keep in touch with shielding and dosimetry as a member of the IAEA Working Group on Reactor Radiation Measurements.

VISITORS TO RSIC

In March, Professors J. C. Courtney and F. A. Iddings and the following graduate students of Louisiana State University visited RSIC: M. C. Stansbury, D. K. Wolcott, R. M. Wyatt, R. W. K. Czepluch, L. W. Miller, Jr., S. Mahajan, J. J. Phillips, E. L. Landry, J. W. Robinson, L. R. Posey.

INTERNATIONAL CONFERENCE REMINDER

Attention is called to the need to make plans for those expecting to attend the Fourth International Conference on Reactor Shielding, to be held in Paris, France, on October 9-13, 1972. RSIC Newsletter No. 84, November, 1971, includes a complete statement on the provisional program. Deadline for summaries of papers to be submitted was March 15, 1972. However, it is hoped that the U.S. shielding community will be well-represented at the Conference. If you are able to go, your participation will be welcomed. RSIC still has copies of the General Information Booklet, which you may have upon request.

MARCH ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22151.

RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies are available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

Special bibliographies and selected computer-printed abstracts of the literature in the RSIC system are available upon request. The Selective Dissemination of Information (SDI) Service is available by submitting a list of subject categories defining the recipient's interests.

REACTOR AND WEAPONS SHIELDING

Fission Chambers as Secondary Standards for Neutron Flux Density Measurements.
Leake, J. W.
AERE-M-2453
1971, July
Dep., NTIS(U.S.Sales Only)

Radioactive Fallout in Air and Rain. Results to the Middle of 1971.
Cambray, R. S.; Fisher, F. M. R.; Brooks, W. L.; Peirson, D. H.
AERE-R-6923
1971, Nov.
Dep., NTIS (U.S.Sales Only)

Potential of a Laser-Induced Fusion Device as a Thermal Neutron Source.
Brugger, R. M.
ANCR-1034
1971, Nov.
Dep., NTIS

Evaluation of the 239-Pu Cross Sections in the Resonance Region for the ENDF/B Version III Data File.
Simpson, O. D.; Simpson, F. B.
ANCR-1045 (ENDF-162)
1971, Dec.
Dep., NTIS

Evaluation of the Westinghouse Capacitor Discharge Mobile X-Ray Machine.
Grove, G. F., Jr.
BRH/DEP-71-8
1971, May

Studies of Neutron Spectra Obtained from the Unfolding of Pulse-Height Spectra Produced by Recoil Protons in an Organic Liquid Scintillator.
Lepretre, A.; Garganne, P.
CEA-N-1489 (In French)
1971, Nov.
Dep., NTIS(U.S.Sales Only)

Need for Radiation Protection.
Morgan, K. Z.
CONF-720105-1
1971
Dep., NTIS

Weapons Radiation Shielding Handbook. Chap.3. Methods for Calculating Neutron and Gamma-Ray Attenuation.
Stevens, P. N.; Trubey, D. K.
DNA-1892-3, Rev. 1
1972, March
NTIS

X-Ray Cross Section Compilation from 0.1 keV to 1 MeV.
Veigele, W. J.; Briggs, E,; Bates, L.; Henry, E. M.; Bracewell, B.
DNA-2433F(Formerly DASA-2433)Vol.II, Rev.1 (KN-71-431(R)
1971, July 31
Director, Defense Nuclear Agency, Washington, D. C. 20305

An Analysis of Forward Compton Scattering.
Tait, N. R. S.; White, J. N. J.
DNPL/P-96
1971, Nov.
Daresbury Nuclear Physics Lab., Great Britain

Savannah River Laboratory 60-Co Power and Heat Sources. Quarterly Progress Report, July-September 1971.
Angerman, C. L.(comp.)
DP-1286
1971, Nov.
Dep., NTIS

Spectral Unfolding using Stepwise Regression of System Response Functions.
Beers, R. H.
EGG-1183-5000
1971, April 1
NTIS

Neutrons from Thick Targets Bombarded by Photons at 11.5 MeV.
Daruga, V. K.; Matusevich, E. S.; Vozyakov, V. V.; Dulin, V. A.
FEI-225
1970

Shielded Container for Internal Transport in the Geesthacht Reactor Station.
Borohers, F.; Fries, S.; Petersen, G.
GKSS-71/E-3 (In German)
1971
Dep., NTIS (U.S.Sales Only)

Protection of the Patient in Radionuclide Investigations.
ICRP
ICRP-17
1971
New York, Pergamon Press

Construction and Dosimetry of Biological Irradiation Facilities at Light-Water-Moderated Reactors.
Makra, S.; Zarand, P.
KFKI-71-74
1971
Central Res. Institute for Physics, Hungarian Academy of Sciences, Budapest.

Nuclear Accident Dosimetry Measurements at the 2nd I.A.E.A. Intercomparison at Oak Ridge, USA, May 1971.
Makra, S.; Zarand, P.
KFKI-71-82
1971, Oct.
Central Res. Institute for Physics, Hungarian Academy of Sciences, Budapest

Triangular Mesh Difference Schemes for the Transport Equation.
Reed, W. H.
LA-4769
1971, Nov.
Dep., NTIS

Space- and Time-Dependent Slowing Down in Heavy Media.
Weisbin, C. R.; Forster, R.; et al
LA-4775-MS
1972, Jan.
NTIS

Factors Affecting the Design of Albedo-Neutron Dosimeters Containing Lithium Fluoride Thermoluminescent Dosimeters.
Hankins, D. E.
LA-4832
1972, January 18

Model Experiment for Dimensioning a Radiation Shield.
Moellerberg, R.
LUNP-7008 (In Swedish)
1970, July
Dep., NTIS (U.S.Sales Only)

Comparison of Photon Interaction Cross Section Data Sets.
I. Storm-Israel and ENDF/B.
Simmons, G. L.; Hubbell, J. H.
NBS 10 668
1971, Dec. 28
Office of the Director, NBS, Washington, D.C. 20234

Health Physics Instrument Manual.
Davis, D. M.; Gupton, E. D.
ORNL-332(4th Ed.)
1970, Feb.
Dep., NTIS

Parametric Study of Shipping Casks for Solid Radioactive Wastes.
Perona, J. J.; Blomeke, J. O.
ORNL-TM-3651
1971, Feb.
Dep., NTIS

Setup and Control Routines for a Pulsed Neutron Time-of-Flight Spectrometer.
Gilley, L. W.
ORNL-TM-3683
1972, Feb. 4

Multilevel Analyses of the 235-U Fission and Capture Cross Section.
de Saussure, G.; Perez, R. B.; Kolar, W.
ORNL-TM-3707
1972, March

Heterogeneity Effects in the ZPR-III Assembly 48 by Monte Carlo.
Cramer, S. N.
ORNL-TM-3730
1972, March 8

Bibliography on Invariant Imbedding and Related Topics.
Scott, M. R.
SC-B-710886
1972, Jan.
Dep., NTIS

Proton-Recoil Spectrometer for Neutron Spectrum Measurements in the Sandia Pulsed Reactor-II Facility.
Powell, J. E.; Matthews, J. W.
SC-RR-710453
1971, Sept.

Power Spectral Density Distribution Function.
Brown, G. W.
SC-RR-710643
1971, Dec.
Dep., NTIS

Compton Scattering at High Energies.
Shibaseki, I.
TUEP-71-2
1971
NTIS

Reaction History Notes.
Gathers, G. R.
UCRL-51107
1971, August 1
NTIS

Application of Sn Method to Spherically Symmetric Radiative-Transfer Problems.
Chien, K. Y.
AIAA J., 10(1), 55- (1972)

The Measurement and the Calculation of Neutron Spectra in Iron Assemblies.
Kimura, I.; Sekimoto, H.; Nishihara, H.; Kobayashi, K.; Hayashi, S. A.; Kobayashi, K.; Hayshi, M.; Yamamoto,S.; Shibata, T.
Annu. Rep. Res. Reactor Inst. Kyoto Univ., 3, 58-74(1970)

Measurements of Neutron Spectra in Light Water.
Fujita, Y.; Aizawa, O.; Fujino, M.
Annu. Rep. Res. Reactor Inst. Kyoto Univ., 3, 121-9(1970)

Radiation Damage Studies Using the Low Temperature Irradiation Facility. I. Instrumentation.
Kitajima, K.; Koiwa, M.; Itoh, N.; Saidoh, M.; Kato, R.; Tsuboi, T.; Furukawa, K.; Kawano, O.; Liu, K.S.; Fujita, E.; Akasaka, Y.; et al.
Annu. Rep. Res. Reactor Inst. Kyoto Univ., 3, 198-201(1970)

Suitability of MgO, SiO2 and Bi Single or Quasi Single-Crystals as Filters for High-Intensity Subthermal and Thermal-Neutron Beams.
Bauer, G.; Seyfarth, H.
Atomkernenergie, 18(3), 236-246(1971)

Health Physics Aspects of Fast Breeder Reactors.
Heine, W. F.; Hart, R. S.
Health Phys., 21(3), 449-52(Sept.1971)

Fast Neutrons and Pi- Mesons in Cancer Therapy.
Boone, M. L. M.; Wiley, A. L., Jr.
IEEE Trans. Nucl. Sci., 18(3), 36-45(June 1971)

Fast Neutron Cancer Therapy with the TAMVEC.
McFarlin, W. A.; Suttle, A. D., Jr.
IEEE Trans. Nucl. Sci., 18(3), 780-1(June 1971)

Flux Attenuation in a Steel Side Shield at the AGS.
Bennett, G. W.; Foelsche, H.; Lazarus, D.; Levine, G.;
Moore, W.; Toohig, T.
IEEE Trans. Nucl. Sci., 18(3), 778-9(June 1971)
Mean Scattering Cross Section of Radiation during Diffusion.
Mohanty, R. C.
Indian J. Phys., 43(12), 730-4(Dec.1969)

A Method of Dosimetry for a Bulk-Grain Irradiator.
Tilton, E. W.; Bower, J. H.; Cogburn, R. R.
Int. J. Appl. Radiat. and Isotop., 22(10), 577-80(Oct.1970)

Calculation of the Block System by the Dose Rate for
High-Rate Isotopic Gamma-Installations with a Labyrinth
and Labyrinth-Less Shielding.
Videnskaya, M. M.; Kurovich, V. N.; Shirokovskikh, G. I.
Izotopy SSSR, No.19, 8-11(1970) (In Russian)

Experiences and Problems in Design and Engineering Construction
of Radiation Shielding.
Okajuma, N.; Kasamarsu, T.; Kawai, Y.; Higashihara, Y.
J. At. Energy Soc. Jap., 13(7), 387-409(July 1971)(In Japanese)

Implicit Monte-Carlo Scheme for Calculating Time and
Frequency Dependent Nonlinear Radiation Transport.
Fleck, J. A.; Cummings, J. D.
J. Comput. Phys., 8(3), 313- (1971)

A Generalized Energy Exchange Kernel for Inelastic Neutron
Scattering and Thermonuclear Reactions.
Williams, M. M. R.
J. Nucl. Energy, 25(10), 489-501(Oct.1971)

On the Concept of Energy-Dependent Buckling in Multi-Group
Diffusion Theory.
Beynon, T. D.
J. Nucl. Energy, 25(10), 503-11(Oct.1971)

Pulsed-Source Investigations. II. The Effect of Cylindrical Void Channels in a Neutron Diffusing Medium.
Bull, S. R.; Connolly, T. J.
J. Nucl. Energy, 25(4), 179-87(April 1971)

Absorbed Fractions for Small Volumes Containing Photon-Emitting Radioactivity.
Ellett, W. H.; Humes, R. M.
J. Nucl. Med. Suppl., 12(5), 25-32(March 1972)

The Effect of the Neutron Energy Spectrum on Neutron Displacement Damage in Niobium.
Blow, S.
J. Phys. D, 4(8), 1107-13(Aug.1971)

Precautions for Accuracy in the Generation of Truly Random Binary Numbers.
Vincent, C. H.
J. Phys. E., 4(11), 825-8(Nov.1971)

Secondary Shielding in the Nuclear Ship MUTSU.
Sekine, M.
Nippon Zosen Gakkaishi, No.499, 3-7(Jan.1971) (In Japenese)

Implications of the Differences in Neutron Spectra Predicted for Reactor Pressure Vessel Walls by Transport and the P1MG Codes.
Serpan, C. Z., Jr.
Nucl. Eng. Design, 16(1), 24-34(May 1971)

Reduction of the Background in a NaI(Tl) Scintillation Spectrometer by the Use of Geiger Anticoincidence and Massive Shielding.
Stenberg, A.
Nucl. Instrum. Methods, 96(2), 289-99(1971)

Intensity Estimation for a Neutron Beam for Biological and Medical Applications.
Goebel, K.; Miller, A. J.
Nucl. Instrum. Methods, 96(4), 581-7(1971)

Precautions for Accuracy in the Generation of Truly Random Binary Numbers.
Vincent, C. H.
J. Phys. E., 4(11), 825-8(Nov.1971)

Secondary Shielding in the Nuclear Ship MUTSU.
Sekine, M.
Nippon Zosen Gakkaishi, No.499, 3-7(Jan.1971)

Implications of the Differences in Neutron Spectra Predicted for Reactor Pressure Vessel Walls by Transport and the PIMC Codes.
Serpan, C. Z., Jr.
Nucl. Eng. Design, 16(1), 24-34(May 1971)

A Dead Time Correction for Gamma-Ray Spectroscopy.
Filippone, W.; Munno, F. J.
Nucl. Sci. Eng., 47(1), 150-151(Jan.1972)

Two-Group Neutron Transport Theory with Anisotropic Scattering.
Reith, R. J.; Stewart, C. E.
Nucl. Sci. Eng., 47(1), 156-162(Jan.1972)

The Air-Ground Interface Problem for Disk Isotropic Cobalt-60 Sources.
Rubin, R. M.
Nucl. Sci. Eng., 47(2), 221-24(Feb.1972)

The Formulation and Application of the Transfer-Scattering Matrix Method to Space-, and Angular-Dependent Fast Reactor Kinetics.
Dodds, H. L., Jr.; Robinson, J. C.; Buhl, A. R.
Nucl. Sci. Eng., 47(3), 262-74(March 1972)

The Measurement of Total Delayed-Neutron Yields as a Function of the Energy of the Neutron Inducing Fission.
Krick, M. S.; Evans, A. E.
Nucl. Sci. Eng., 47(3), 311-18(March 1972)

Experimental and Analytical Studies of Fast Neutron Transport in Iron.
Malaviya, B. K.; Kaushal, N. N.; Becker, M.; Burns, E. T.; Ginsberg, A.; Gaerttner, E. R.
Nucl. Sci. Eng., 47(3), 329-48(March, 1972)

A Last-Collision Model of the Air-Ground Interface Effect on Fast-Neutron Angle Distributions.
Mooney, L. G.; French, R. L.
Nucl. Sci. Eng., 47(3), 375-381(March 1972)

Radiation Units and the Measurement of Ionizing Radiation.
Spiers, F. W.
Phys. Educ., 6(5), 257-62(Sept.1971)

Attenuation of X-Radiation Generated at Constant Potentials Sufficient to Excite K-Radiation in a Tungsten Target.
Soole, B. W.
Phys. Med. Biol., 16(3), 427-37(July)1971)

Calculated Effective Atomic Number and Kerma Values for Tissue-Equivalent and Dosimetry Materials.
Jayachandran, C. A.
Phys. Med. Biol., 16(4), 617-23(Oct.1971)

Bremsstrahlung Power Density: Semiclassical Calculations.
Modesitt, G. E.
Phys. Rev. Lett., 27(15), 971-3(Oct.11,1971)

Simplified Calculations for Radiation Shielding.
Moulthrop, H. A.
Power Eng., 75(11), 42-3(Nov.1971)

On the Diffusion Approximation in Transport Theory.
Matkowsky, B. J.
SIAM Rev., 13(2), 273(April 1971)

Energy-Dependent Transmission and Reflection in Thin Slabs.
Larson, H. A.; McCormick, N. J.
Transp. Theory and Stat. Phys., 1(1), 5-23(Jan.1971)

The Time-Dependent Rectilinear Transport Equation.
Montagnini, B.; Pierpaoli, V.
Transp. Theory and Stat. Phys., 1(1), 59-75(Jan.1971)

Code of Practice for the Protection of Persons Exposed to Ionising Radiations in Research and Teaching.
London, HMSO
1968
Pendragon House, Redwood City, Calif.

SPACE AND ACCELERATOR SHIELDING

Evaluation of Stopping Power and Range of Charged Particles of 10 MeV to 30 GeV in Matter.
Bertel, E.; Pages, L.
CEA-R-4198 (In French)
1971, July
NTIS

Radiation Problems Encountered in the Design of Multi-GeV Research Facilities.
Goebel, K. (ed.)
CERN-71-21
1971, Sept. 29
Dep., NTIS (U.S. Sales Only)

Fundamental Data on Radiation Physics 1.
Sugiyama, H.
Circ-170 (N72-13626)
1970, Dec.
NTIS

Cosmic Radiation in the Atmosphere, 1969-1970.
O'Brien, K.
HASL-248
1972, January

Design Study of a Pi- Beam for Biomedical Applications at LAMPF.
Thiessen, H. A.
LA-DC-9789;(CONF-680734-1)
1971
Dep., NTIS

Cosmic-Ray Proton and Helium Measurements over Half a Solar Cycle 1965-1969.
Rygg, T. A.
NASA-CR-119013 (N71-28308)(Thesis)
1970, June
NTIS

FASTER 3: A Generalized-Geometry Monte Carlo Computer Program for the Transport of Neutrons and Gamma Rays. Vol. 2: Users Manual.
Jordan, T. M.
NASA-CR-124637 (ART-45-Vol.2; N72-12683)
1970, Nov. 16
NTIS

Measurement of the Nuclear Electromagnetic Cascade Development in Glass at Energies above 200 GeV.
Gillespie, C. R.; Huggett, R. W.; Humphreys, D. R.; Jones, W. V. Levit, L. B.
NASA-CR-124697 (HE-58; N72-13631)
1971
NTIS

Nuclear Electromagnetic Cascades from Alpha Particles Incident on an Iron Absorber.
Jones, W. V.
NASA-CR-124698 (OG-56; N72-13630)
1971
NTIS

Comparison of the Energy Response of an Ionization Spectrometer for Pions and Protons.
Jones, W. V.; Verma, S. D.
NASA-CR-124729 (HE-36; N72-13632)
1971
NTIS

Shielding Against Neutrons in the Energy Range 15 to 75 MeV.
Roussin, R. W.; Alsmiller, R. G., Jr.; Barish, J.
ORNL-TM-3659
1971, Dec.
Dep., NTIS

Monte Carlo Calculations of the Dose Induced by Charged Pions and Comparison with Experiment.
Armstrong, T. W.; Chandler, K. C.
ORNL-TM-3678
1972, Feb. 4

Linear Accelerator Project. Progress Report, 1 Oct.-31 Dec.1970.
Rensselaer Polytechnic Inst., Troy, N. Y.
RPI-328-209 (N72-12690)
1970, Dec.
NTIS

High Energy Physics. Progress Report.
Tufts Univ., Medford, Mass.
TID-25852
1971, Sept.
Dep., NTIS

Radiation Exposure on High Altitude Passenger Flights.
Schaefer, H. J.
Advan. Biol. Med. Phys., 13, 153-206(1970)

Quasi-Free Scattering of Electrons on Atoms.
Amaldi, U., Jr.
Ann. Ist. Super. Sanita, 5, 680-692(1969)

Measurements of the Charge and Isotope Composition of Cosmic-Ray Li, Be, and B Nuclei.
Weber, W. R.; Damle, S. W.; Kish, J. M.
Astrophys. Lett., 9(3), 125-9(Oct.1971)

Energy Spectra of keV Backscattered Protons as a Probe for Surface-Region Studies.
Van Wijngaarden, A.; Miremadi, B.; Baylis, W. E.
Can. J. Phys., 49(19), 2440-8(Oct.1, 1971)

High-Intensity Beam of Negative Particles having a Momentum of 10 to 16 GeV/c.
Golovnya, N. I.; Grachev, M. L.; Gubrienko, K. I.; et al.
Instrum. Exp. Tech.(USSR)(Engl. Transl.), 14(1), 23-5(Jan.-Feb. 1971)

Space-Charge Scattering and Electron-Transport in n GaAs.
Hamerly, R. G.; Heller, M. W.
J. Applied Phys., 42(13), 5585- (1971)

Balloon Measurements of Cosmic-Ray Protons and Helium over Half a Solar Cycle 1961-1969.
Rygg, T. A.; Earl, J. A.
J. Geophys. Res., 76(31), 7445-69(Nov.1, 1971)

Nucleon and Pion Star Production from High-Energy (>40 GeV) Protons Incident on Iron.
Santoro, R. T.; Gabriel, T. A.
Nucl. Instrum. Methods, 95, 369-370(1970); ORNL-TM-3335

Electron Shielding in Doped Semiconductors.
Lam, C. S.; Varshni, Y. P.
Phys. Rev., B, 4(12), 4452- (1971)

Hadron-Induced Spectra from 200- and 400-GeV Proton Interactions.
Santoro, R. T.; Gabriel, T. A.
Trans. Amer. Nucl. Soc., 14(2), 891-892(Oct.1971); CONF-711009

COMPUTER CODE LITERATURE

AI-67-TDR No. 108 August 1967 COMRADEX
Description of the COMRADEX Code
by Spangler, G.W.; Boling, M.; Rhoades, W.A.; Willis, C.A.
Atomics International, Canoga Park, Calif.
FORTRAN V; UNIVAC 1108; IBM 360/50

ANCR-1010 September 1971 FPFM
An Analytical Method for Calculating Steady-State Fission Gas Release - Fission Product Fuel Model Code
by Baston, V.F.; McFadden, J.H.; Yuill, W.A.
Aerojet Nuclear Co., Idaho Falls, Idaho
FORTRAN IV; IBM 360/75
AVAIL: Dep., NTIS

BNWL-SA-3939 October 1971 ICRP
Modeling of Environmental Pathways and Radiation Dose from Nuclear Facilities
by Soldat, J.K.
Battelle Pacific Northwest Labs., Richland, Wash.
AVAIL: Dep., NTIS

BRL-CR-62 January 1972 SAM-CEP
SAM-CEP: An Application of Correlated Monte Carlo to the Simultaneous solution of Multiple, Pertubed, Time-Dependent Neutron Transport Problems in Complex Three-Dimensional Geometry
by Hui, S.; Spielberg, D.; Steinberg, H.; Troubetzkoy, E.S.; Kalos, M.
Mathematical Applications Group Inc., Elmsford, N.Y.
FORTRAN; CDC 6600
AVAIL: NTIS

Bull. Inform. Sci. Tech.,(158),15-20 (April 1971) PILAX; PROFIS
Theoretical Aspects of Radiological Safety Studies in Installations and the Use of an Electronic Computer
by Bessis, J.; Lemenez de Kerdelleau, J.; Mairet, G.; Salle, R.
CEN de Saclay, Gif-sur-Yvette, France

CEA-R-4198 (In French) July 1971 BERTHE-BLOCH
Evaluation of Stopping Power and Range of Charged Particles of 10 MeV to 30 GeV in Matter
by Bertel, E.; Pages, L.
CEA/CEN, Saclay, France
FORTRAN IV; IBM 360/91
AVAIL: Dep., NTIS (U.S. Sales Only)

DP-1278 (ENDF-152) October 1971 FLANGE II
FLANGE II (Version 71-1): A Code to Process Thermal Neutron Data from an ENDF/B Tape
by Honeck, H.C.; Finch, D.R.
Savannah River Labs, Aiken, South Carolina
FORTRAN IV
AVAIL: NTIS

EGG-1183-2275 July 1971 FLUX
Moments Method Calculation of the Scattered Angular Energy Flux for Point Isotropic Gamma Sources in an Infinite Homogeneous Air Medium
by O'Dell, A.A.
EG&G, Santa Barbara Div., Goletta, Calif.
AVAIL: NTIS

EGG-1183-5000 April 1971 SPUN
Spectral Unfolding Using Stepwise Regression of System Response Functions
by Beers, R.H.
EG&G, Los Alamos, N.Mex.
FORTRAN; CDC 6600
AVAIL: NTIS

FRA-TM-28 February 1972 MCsuper2-2
Specifications for the new Multigroup Cross Section Code MCsuper2-2
by Toppel, B.J.
Applied Physics Div., Argonne National Lab., Argonne, Ill.
FORTRAN; CDC 7600

GULF-RT-10486 May 1971 FERDOR; MAZE 1
Numerical and Experimental Studies of Spectral Unfolding, Volume 1 and 2
by Kendrick, H.; Harris, L.
Gulf Radiation Technology, San Diego, Calif.
AVAIL: Dep., NTIS

HEDL-TME-71-168 December 1971 HERMES
HERMES: A Digital Computer Code for Estimating Regional Radiological Effects from the Nuclear Power Industry
by Fletcher, J.F.; Dotson, W.L.
Hanford Engineering Development Lab., Richland Wash.

LA-4557;ORNL-4662;SAI-70-125 August 1970 TDA (ANISN)
Time-Dependent Neutron and Photon Transport Calculations Using the Method of Discrete Ordinates
by Dupree, S.A.; Sandmeier, H.A.; Hansen, G.E.; Engle, W.W.; Mynatt, F.R.
Naval Weapons Evaluation Facility, Albuquerque, N. Mex.; Los Alamos Scientific Laboratory, N. Mex.; Oak Ridge National Laboratory, Tenn.
AVAIL: Dep., NTIS

LA-4750-MS (ENDF-156) January 1972 LAPHANO
LAPHANO: A P0 Multigroup Photon-Production Matrix and Source Code for ENDF
by Dudziak, D.J.; Seamon, R.E.; Susco, D.V.
Los Alamos Scientific Laboratory, Los Alamos, N.Mex.
FORTRAN IV; CDC 6600; CDC 7600; IBM 360; UNIVAC 1108

ORNL-TM-3164 January 1972 ESP
ESP: A General Monte Carlo Reactor Analysis Code
by Cramer, S.N.; Carlsmith, R.S.; Morrison, G.W.; Perry, G.W.; Lucius, J.L.
Oak Ridge National Lab., Oak Ridge, Tenn.
FORTRAN IV; IBM 360/75/91
AVAIL: NTIS

Phys. Fluids, 14(12), 2703-7 (December 1971) ECH NUM
Computer Calculations of Electron Cyclotron Heating in a Nonuniform Magnetic Field
by Sprott, J.C.; Edmonds, P.H.
Oak Ridge National Laboratory, Tenn.

RD/B/N-1834 January 1971 EGMONT
User's Guide to the Monte Carlo Neutronics Program EGMONT
by Johnson, P.W.
Central Electricity Generating Board, Berkeley, England
FORTRAN; IBM 360
AVAIL: Dep., NTIS (U.S. Sales Only)

RD/B/N-2119 October 1971 FISPA
FISPA: An Automated Version of the FISP Program for Operational Health Physics Applications
by Beynon, S.M.
Central Electricity Generating Board, Berkeley, England
AVAIL: Dep., NTIS (U.S. Sales Only)

TKK-F-A-161 1971 MCSUP-OTA
MCSUP-OTA: A Monte Carlo Computer Program for Computation of Resonance Integrals
by Wasastjerna, F.
Technical Univ. of Helsinki, Otaniemi, Finland
AVAIL: Dep., NTIS (U.S. Sales Only)

Trans. Nucl. Sci., NS-16(6), 242-9 (December 1969) ZEBRA
Predicted and Measured Depth Dose Profiles for Pulsed Electron Spectra
by Schallhorn, D.R.; Buxton, L.D.
Harry Diamond Labs., Washington, D.C.