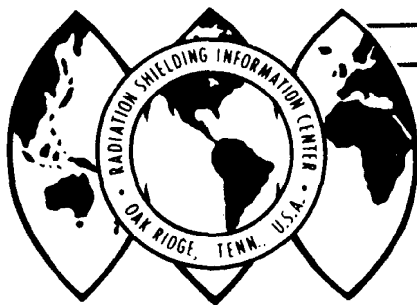


# RSIC Newsletter



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No. 305

April 1990

*A little experience often upsets a lot of theory.—Cadman*

## Kirk Attends Japanese Supercomputing Conference

Bernadette L. Kirk attended the *First International Conference on Supercomputing in Nuclear Applications, SNA '90*, in Mito City, Japan, March 12-16, 1990, to present a paper on "Optimized Algorithm for Solving the Nodal Diffusion Method on Shared Memory Multiprocessors," co-authored by Y. Y. Azmy. The conference proceedings will be published by the Nuclear Energy Data Center (NEDAC) in July 1990.

The conference covered a wide variety of supercomputing applications in nuclear energy such as parallel and vector processing, artificial intelligence, computational fluid dynamics, nuclear fusion and plasma physics, reactor physics, and computer aided design.

B. L. Kirk also made an RSIC orientation visit to the Japanese Atomic Energy Research Institute (JAERI) and NEDAC, where she met NEDAC President, Dr. H. Ishikawa, Dr. Masao Nozawa, Executive Director, Dr. Toichiro Fujimura and Dr. Tadakazu Suzuki, deputy heads of NEDAC, and other local staff members.

Following the Japanese visit, she went to the Philippines to visit the Nuclear Research Institute, where Dr. Carlito Aleta is currently Deputy Director. She discussed RSIC activities and services with the staff. Local contacts include Dr. Edilberto Cabalfin, Chief Science Research Specialist, Dr. Antonio Refre, Head of the Computing Group, Dr. Pilar Rocoles, Supervising Science Research Specialist, and Dr. Nydia Medina, Senior Science Research Specialist.

## Atomic Energy Society of Japan Honors Shielding Standards Work

The Atomic Energy Society of Japan continues to include in its Awards program recognition of members who have been judged for outstanding papers, techniques, or research in the atomic energy community. These awards

began as a memorial on the tenth anniversary of the Society in 1968. Cited at the April 1990 Annual Meeting in Tokyo, will be Yoshiko Harima, Tokyo Institute of Technology, Shun-ichi Tanaka and Yukio Sakamoto, Japan Atomic

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Energy Research Institute, and Hideo Hirayama, National Laboratory for High Energy Physics. They will accept the 1990 award for a new technique of great utility, will be presented a shield of commendation from President Mishima of the Atomic Energy Society, and they will accept a commemorative zirconium medal.

The basis for the award is for "Development of a New Buildup Factor and Application to Shield Calculations," described as follows:

- The PALLAS (discrete ordinates-integral transport) code was improved by including secondary sources, such as bremsstrahlung and fluorescence, to help assure accurate and reliable results. The point buildup factors for high-Z materials were calculated with this code in the energy range of 0.015 to 15 MeV up to 40 mean free paths. The buildup factors in low-Z materials for low energies, the range most difficult to calculate, were calculated with PALLAS and were validated by comparison with the EGS4 (point Monte Carlo) code, and ANISN.
- A fitting formula, the geometric progression (G-P) form, was developed to reproduce the data in codes used for shield design. This

formula can reproduce the data over the full range of distance, energy, and atomic number within a few percent.

The above cited buildup factor data and the G-P formula have been adopted for ANSI/ANS 6.4.3 standard reference data. The G-P fitting function has been implemented in the CCC-493/QAD-CGGP and CCC-494/G33GP codes available from RSIC at Oak Ridge National Laboratory (ORNL). These are used for gamma-ray shielding calculations throughout the world.

Also, the data and the method of evaluation for 1-cm dose equivalent, introduced into the Japanese law according to ICRP recommendations, have been offered by this team.

We at RSIC are pleased to note the recognition this team has received in Japan for their dedicated and competent support of the ANSI-6.4.3 Working Group in its efforts to develop an American National Standard on gamma-ray transport data. Considerable research and development efforts were required to develop the highly-reliable, accurate data that will be incorporated into the standard. The 1988 draft standard was published as ORNL/RSIC-49 and made available by RSIC in computer-readable form as DLC-129/ANS643.

*D. K. Trubey*

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## CHANGE TO THE COMPUTER CODE COLLECTION

One new code system was packaged and added to the computer code collection during the month.

### PSR-277/LEPRICON

This code system for PWR pressure vessel surveillance dosimetry analysis was contributed by Oak Ridge National Laboratory (ORNL). The LEPRICON system provides state-of-the-art routines to prepare input to and process results from the discrete ordinates codes CCC-484/DORT and CCC-254/ANISN to determine best estimates with uncertainties of group fluences in pressure vessels of pressurized water reactors. The system anticipates availability of results of dosimetry measurements performed in

the reactor as well as sources operating during the time of exposure. Effects of time-dependent core source spatial distributions, when necessary, are treated by the use of an adjoint function coupled with a scaling technique. Sources are generated by combining the results of the diffusion theory code PDQ-7 pin-wise calculations with in-core assembly-wise instrumentation and are converted from X-Y to R-theta geometry. Fluxes calculated by the discrete ordinates codes are then synthesized to form 3-D distributions, and the resulting calculated dosimeter responses compared with the measurements, and adjust-

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ments performed in a generalized linear least-squares combination procedure. Through correlations generated from the input, adjustments to the originally calculated group fluxes at a selected point in the pressure vessel are then made, and the best estimates of the fluences accumulated during the time period analyzed are output along with their reduced uncertainties. The

diffusion theory and discrete ordinates codes are not provided as part of LEPRICON. The sample cases were executed on the IBM 3033 under OS/VS2 using the IBM VS FORTRAN compiler (Level 2.2.0). The language level flag must be set to 66. Reference: Unpublished EPRI Interim Reports (1985) and EPRI NP-3654 (Sept. 1984). FORTRAN IV; IBM 3033.

### Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Ken Namatame*, JAERI, Tokyo; *P. K. Job*, Argonne National Laboratory, Illinois; and *Carl H. Distenfeld*, Bechtel National Laboratory, Harrisburg, Pennsylvania.

19103-1187 (phone 215-299-5585; FAX 215-977-9679).

The following standards are available from ANSI, Sales Department, 1430 Broadway, New York, NY 10018 (phone 212-642-4900).

### Standards Notes

The following standards have recently been published or submitted for reapproval.

**C 638-84**, *Descriptive Nomenclature of Constituents of Aggregates for Radiation-Shielding Concrete* (reaffirmation), available from ASTM, 1916 Race St., Philadelphia, PA

**IEC 951-3**, *Radiation Monitoring Equipment for Accident and Post-Accident Conditions in Nuclear Power Plants—Part 3: High Range Area Gamma Radiation Dose Rate Monitoring Equipment* (newly published)

**IEC 982: 1989**, *Level Measuring Systems Utilizing Ionizing Radiation With Continuous or Switching Output* (newly published)

**IEC 987: 1989**, *Programmed Digital Computers Important to Safety for Nuclear Power Stations* (newly published)

## CONFERENCES, COURSES, SYMPOSIA

RSIC attempts to keep its users/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 to RSIC.

### Radiation Shielding Course Correction

The February 1990 issue of the Newsletter carried an announcement for two short courses being offered at the University of Texas at Austin (page 4, 2nd column). It has come to our attention that the phone number listed was incorrect. The correct number is 512-471-3506.

### 1991 HEART

The 9th *Hardened Electronics and Radiation Technology (HEART)* conference will be held February 25–March 1, 1991, at the National Institute of Standards and Technology, Gaithersburg, Maryland. The HEART conference provides a forum specifically for research of a classified or sensitive nature. Technical papers,

either classified up to Secret Restricted Data or unclassified but restricted by export control (ITAR), are invited for consideration in the following proposed technical sessions.

**Nuclear and Electromagnetic Radiation Effects** including basic phenomena, coupling, and response in electronic devices, pieceparts, integrated circuits, subsystems, and systems from nuclear weapon radiation; space radiation and weapon-enhanced space radiation; direct energy, including NPB and HPM; nuclear electromagnetic pulse: HEMP, IEMP, SGEMP, SREMP; nuclear power systems: ground and space; lightning; spacecraft charging.

**Radiation Hardening Techniques: Design and Processing**—integrated circuits; semiconductor devices; sensors; discrete circuits; optoelectronics; EMP protection; circumvention.

**EMP Effects in Systems**—aircraft; ships; tactical weapons; C<sup>3</sup>I; civilian systems; standards.

**Hardness Assurance and Hardness Maintenance**—test chip design and correlation; systems optimization and implementation; piecepart implementation; program experiences; minimum cost/maximum effectiveness methodology for systems.

**Underground Nuclear Testing**—SREMP coupling; soil and air conductivity; optical materials; components and subsystems; systems; SGREMP and IEMP; cost-effective testing methods.

**Hardness Verification**—energy deposition measurements; energy transport analysis; simulation fidelity; data acquisition and analysis; testing methods, laboratory facilities.

**Simulation Technology**—pulsed power development; laboratory sources: radiation, HPM, DEW; radiation and EMP simulator advancements.

**New and Emerging Technologies**—optoelectronic devices; sensor systems; superconductivity.

Contributing authors must submit an informative summary by **September 5, 1990**, to DoD Nuclear Information Analysis Center (DASIAC) ATTN: 1991 HEART Conference, 2560 Huntington, Ave., Suite 500, Alexandria, VA 22303.

## Calendar

Your attention is directed to the following events of interest.

### May 1990

*Radiation Control in the 90s—7th Annual Meeting of the Regional Health Physics Society*, May 3–5, 1990, Charleston, South Carolina. Contact: Matt McFee, Savannah River Chapter of the Health Physics Society, P.O. Box 339, New Ellenton, SC 29809 (phone 803-557-1882).

*Radioactive Material Transportation Basic Workshop*, May 7–10, 1990, Chicago, Ill., sponsored by the U.S. Dept. of Energy. Contact: Teresa Yearwood, Science Applications International Corp., P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031).

*International Symposium on Radiation Protection Infrastructure*, May 7–11, 1990, Munich, Fed. Rep. of Germany, sponsored by the IAEA. Contact: Conference Service Section, IAEA, P. O. Box 100, A-1400, Vienna, Austria.

*Anniversary Specialist Conference for Nuclear Power Engineering in Space*, May 15–18, 1990, Obninsk, USSR, sponsored by the USSR Ministry of Nuclear Power and Industry. Contact: M. F. Troyanov, USSR (phone 084 399-8813, FAX 943-0074); or Mohamed S. El-Genk, Inst. of Space Nuclear Studies, Chemical and Nuclear Engineering Dept., University of New Mexico, Albuquerque, NM 87131 (phone 505-277-2813).

*7th Symposium on Radiation Measurements and Applications*, May 21–24, 1990, the University of Michigan, Ann Arbor. Contact: Helen Lum, Symposium Secretary, 3034 Phoenix Memorial Laboratory, The University of Michigan, Ann Arbor, MI 48109-2100 (phone 313-764-6214; Fax 313-763-4540).

*Second International Symposium on Stabilization/Solidification of Hazardous, Radioactive, and Mixed Wastes*, May 29–June 1, 1990, Williamsburg,

Virginia, sponsored the ASTM. Contact: T. Michael Gilliam, ORNL, P.O. Box 2003, Oak Ridge, TN 37831-7273 (phone 615-574-6820).

#### June 1990

*30th Annual Conference of the Canadian Nuclear Association and the 11th Annual Conference of the Canadian Nuclear Society*, June 3-7, 1990, Toronto, Ont., Canada. Contact: CNA (phone 416-977-6152).

*Emerging Technologies for Hazardous Waste Treatment*, June 4-7, 1990, Atlantic City, New Jersey, sponsored by the American Chemical Society. Contact: D. William Tedder, Symposium Chair, School of Chemical Engg., Georgia Inst. of Technology, Atlanta, GA 30332-0100 (phone 404-894-2856 or 404-973-3826).

*American Nuclear Society Annual Meeting*, June 10-15, 1990, Nashville, Tennessee. Contact: Mary Keenan, Meetings Manager, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

*15th Symposium on Effects of Radiation on Materials*, June 17-21, 1990, Nashville, Tennessee, sponsored by the American Society for Testing and Materials. Contact: Conferences, ASTM, 1916 Race St., Philadelphia, PA 19103 (phone 215-299-5400).

*17th European Conference on Controlled Fusion and Plasma Heating*, June 25-29, 1990, Amsterdam, The Netherlands. Contact: F. C. Schuller, FOM-Institut voor Plasmafysica "Rijhuizen," Postbus 1207, NL-3430 BE Nieuwegein.

#### July 1990

*3rd International Workshop on Respiratory Tract Dosimetry*, July 1-3, 1990, Albuquerque, N. M., sponsored by the U.S. Dept. of Energy, CEC, and the Inhalation Toxicology Research Institute. Contact: Raymond A. Guilmette, Workshop Co-chairman, Inhalation Toxicology Research Inst., P.O. Box 5890, Albuquerque, NM 87185 (phone 505-844-5835).

*Sièmes Journées d'Etudes sur la Chimie sous Rayonnement*, July 1-6, 1990, Sherbrooke, Québec. Contact: Jean-Paul Jay-Gerin, JECR-90, Département de médecine nucléaire et de radiobiologie, Faculté de médecine, Univ. de Sherbrooke,

Sherbrooke, Québec, Canada J1H 5N4 (phone 819-563-5555, ext. 4682, Fax 819-564-5445; Bitnet S015@UDESVM). The conference language is French.

*27th Annual International Nuclear and Space Radiation Effects Conference and Short Course*, July 16-20, 1990, Reno, Nevada, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: Joseph R. Srouf, Northrop Corp., M.S. X400/N5, 2301 West 120th St., P.O. Box 5032, Hawthorne, CA 90251-5032 (phone 213-600-4151).

*12th International CODATA Conference: Data for Discovery*, July 17-19, 1990, Columbus, Ohio, sponsored by the National Academy of Sciences. Contact: Columbus Local Organizing Committee, P.O. Box 23, Amlin, OH 43002.

#### August 1990

*International Topical Meeting on Fast Reactor Safety*, Aug. 12-16, 1990, Snowbird, Utah, sponsored by the ANS. Contact: Wayne K. Letho, Argonne National Laboratory, P.O. Box 2528, Idaho Falls, ID 83403-2528 (phone 208-526-7369).

*Operational Radiation Protection*, Aug. 20-22, 1990, Idaho Falls, Idaho, sponsored by the ANS. Contact: Jack Liebenthal, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415-3515 (phone 208-526-1252).

*7th ASTM-EURATOM Symposium on Reactor Dosimetry*, Aug. 27-31, 1990, Strasbourg, France. Contact: G. Tsotridis, Joint Research Centre, Petten Establishment, HFR Div., Postbus 2, NL-1755 ZG, Petten, The Netherlands (phone 02246 5122, Telex REACP NL 57211, Fax 02246 1449) or G. P. Lamaze, National Inst. of Standards and Technology, Bldg. 235, Gaithersburg, MD 20899 USA (phone 301-975-6202, Telex 197 674 NBS UT, Fax 301-921-9847).

#### September 1990

*16th Symposium on Fusion Technology*, Sept. 3-7, 1990, London. Contact: JET Joint Undertaking, Conference Office, Abingdon, Oxon, OX14 3EA, United Kingdom.

*ENC '90, The World Conference and Exhibition, Looking Into Nuclear's Future in the 21st Century*, Sept. 23-28, 1990, Geneva, Switzerland, orga-

nized by the European Nuclear Society in collaboration with the American Nuclear Society and the European Atomic Forum, Foratom. Contact: ENC '90 Secretariat, c/o ENS, P.O. Box 5032, CH-3001 Berne, Switzerland.

*Symposium on Recent Advances in Multidisciplinary Analysis and Optimization*, Sept. 24-26, 1990, San Francisco, sponsored by the U.S. Air Force and NASA. Contact: V. B. Venkayya, WRDC/FIBRA, WPAFB, OH 45433-6553 (phone 513-255-7191 or 513-255-6992).

*Radiation Transport Calculations Using EGS4: A Four-Day Hands-on Course*, Sept. 24-27, 1990, Ottawa, Canada. Contact: Dr. A. F. Bielajew, Div. of Physics, National Research Council of Canada, Ottawa, Canada, K1A 0R6 (phone 613-993-2715, Bitnet BLF@NRCVM01).

*International Conference on Monte Carlo Methods for Neutron and Photon Transport Calculations*, Sept. 25-28, 1990, Budapest, Hungary. Contact: Dr. Lázló Koblinger, Central Research Inst. for Physics, P.O. Box 49, H-1525 Budapest, Hungary (Fax 36-1-15552530).

*The Safety, Status and Future of Non-Commercial Reactors and Irradiation Facilities*, Sept. 30-Oct. 4, 1990, Boise, Idaho, ANS Topical Meeting, sponsored by the Idaho Section and co-sponsored by The Commission of the European Communities (CEC), Atomic Energy Society of Japan, and the Nuclear Reactor Safety Division of the ANS. Contact: Dr. Romney B. Duffey, General Chairman, The Safety, Status and Future of Non-Commercial Reactors and Irradiation Facilities, P.O. Box 51218, Idaho Falls, ID 83405-1218 (phone 208-526-9804).

#### October 1990

*Spectrum '90: Radioactive Waste Technologies, Decontamination, Decommissioning and Hazardous*

*Wastes*, Oct. 3-5, 1990, Knoxville, Tennessee, sponsored by ANS. Contact: Thomas H. Row, ORNL, P.O. Box 2008, 4500N MS6198, Oak Ridge, TN 37831-6198 (phone 615-574-5974 or FTS 624-5974).

*9th Topical Meeting on Technology of Fusion Energy*, Oct. 8-12, 1990, Chicago, sponsored by the American Nuclear Society. Contact: Dr. Charles Baker, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439 (phone 312-972-4836, FTS 972-4836).

#### November 1990

*Nuclear Energy Forum*, Nov. 11-14, 1990, Washington, D. C., sponsored by the U.S. Council for Energy Awareness. Contact: Conference Office, U.S. Council for Energy Awareness, 1776 I Street NW, Suite 400, Washington, DC 20006-2495 (phone 202-293-0770).

*American Nuclear Society Winter Meeting*, Nov. 11-16, 1990, Washington, D.C. Contact: Mary Keenan, Meetings Manager, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525.

*International Symposium on High-Dose Dosimetry for Radiation Processing*, Nov. 12-16, 1990, Vienna, sponsored by IAEA. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

#### September 1991

*ICNC '91, International Conference on Nuclear Criticality Safety*, September 1991, Oxford, United Kingdom. Contact: ICNC '91 Secretariat, Publicity Office, AEA Technology, Winfrith, Dorchester, Dorset DT2 8DH, United Kingdom (phone 0305 251888 ext 2739, Fax 0305 202122, Telex 41231).

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## 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 22161.

*RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of out-of-print*

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reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

This literature is on order. It is not in our system. Please order from NTIS or other available source as indicated.

## RADIATION SHIELDING LITERATURE

**BOOK; Systems Company, Graham, WA 98338-0876, V1 184p., V2 155p.** . *Engineering Properties of Teflon, V. 1&2.* . Bouquet, F.L. . 1989. . Vol 1: Terrestrial, Mechanical, Electrical, Chemical, Radiation Response; Vol 2: Design Data

**CONF-8910222-3.** . *Power Reactor Embrittlement Data Base.* . Kam, F.B.K.; Stallman, F.W.; Wang, J.A. . 1989. . Water reactor safety information meeting; Rockville, MD., 23-25 Oct. 1989

**IRPA 7, 142-145.** . *Neutron Yield of Medical Electron Accelerators.* . McCall, R.C. . 1988. . Pergamon Press, 3 V. . 7. Int. Congress of the Int. Rad. Protection Assoc., Sydney, Australia, 10-17 Apr. 1988

**IRPA 7, 149-152.** . *Effect of Hydrogenous Shields on the Average Energy of Neutron Spectra.* . McCall, R.C.; Jenkins, T.M. . 1988. . Pergamon Press, 3 V. . 7. Int. Congress of the Int. Rad. Protection Assoc., Sydney, Australia, 10-17 Apr. 1988

**IRPA 7, 153-156.** . *Broad Beam Attenuation and Half Value Layer Determination in Baryt Concrete for 150-400 KV X-Rays.* . Ristic, D.; Vukovic, S. . 1988. . Pergamon Press, 3 V. . 7. Int. Congress of the Int. Rad. Protection Assoc., Sydney, Australia, 10-17 Apr. 1988

**Nucl. Data Sci. Technol.; CONF-880546.** . *Proceedings of the International Conference Nuclear Data for Science and Technology.* . Igarashi, S. (Ed.). . 1988. . JAERI. . Int. Conf., May 30 - June 3, 1988, Mito, Japan

**Nucl. Data Sci. Technol., p. 1013-1015, CONF-880546.** . *Status of Dosimetry and Activation Data.* . Mann, F.M. . 1988. . JAERI. . Igarashi, S. (Ed.), Int. Conf., Mito, Ibaraki, Japan, 30 May - 3 Jun 1988

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**Nucl. Data Sci. Technol., p. 1199-1203; CONF-880546.** . *Calculated Neutron-Activation Cross Sections for  $E_n \leq 100$  MeV for a Range of Accelerator Materials.* . Bozoian, M.; Arthur, E.D.; Perry, R.T.; Wilson, V.B.; Young, P.G. . 1988. . Igarashi, S. (Ed.), Int. Conf. Mito, Ibaraki Japan, 30 May - 3 Jun 1988

**Nucl. Data Sci. Technol., p. 237-240; CONF-880546.** . *Experiment and Analysis of Neutron Spectra in a Concrete Assembly Bombarded by 14 MeV Neutrons.* . Oishi, K.; Tomioka, K.; Ikeda, Y.; Nakamura, T. . 1988. . Saikon Pub. Co., LTD., Tokyo, Japan. . Igarashi, S. (Ed.), Int. Conf. Mito, Ibaraki, Japan 30 May - 3 Jun 1988

**Nucl. Data Sci. Technol., p. 271-274; CONF-880546.** . *Angular Neutron Flux Measurements and Nuclear Data Test on Slabs of Fusion Blanket Materials.* . Oyama, Y.; Kosako, K.; Yamaguchi, S.; Maekawa, H. . 1988. . Saikon Pub. Co., LTD., Tokyo, Japan. . Igarashi, S. (Ed.), Int. Conf. Mito, Ibaraki, Japan, 30 May - 3 Jun 1988

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**Nucl. Data Sci. Technol., p. 811-815; CONF-880546.** . *An United Method Calculating Neutron Fluence Attenuation and Gamma-Ray Self-Absorption in a Large Cylindrical Sample for ( $n,\gamma$ ) Experiment.* . Zhou, H.; Wang, W.; Yan, Y.; Fan, G.; Wen, C.; Tang, L. . 1988. . Igarashi, S. (Ed.), Int. Conf. Mito, Ibaraki, Japan, 30 May - 3 Jun 1988

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