



# PLUTONIUM FUTURES —THE SCIENCE CONFERENCE

CONFERENCE  
PROGRAM

TOPICAL CONFERENCE  
ON PLUTONIUM AND THE ACTINIDES

ALBUQUERQUE, NEW MEXICO, USA  
JULY 6-10, 2003

LALP-03-084

## **PLUTONIUM FUTURES—THE SCIENCE CONFERENCE**

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Siegfried S. Hecker

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Conference Web Site: <http://www.lanl.gov/pu2003>

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Coordinator: Kathy DeLucas, Designer: Susan Carlson

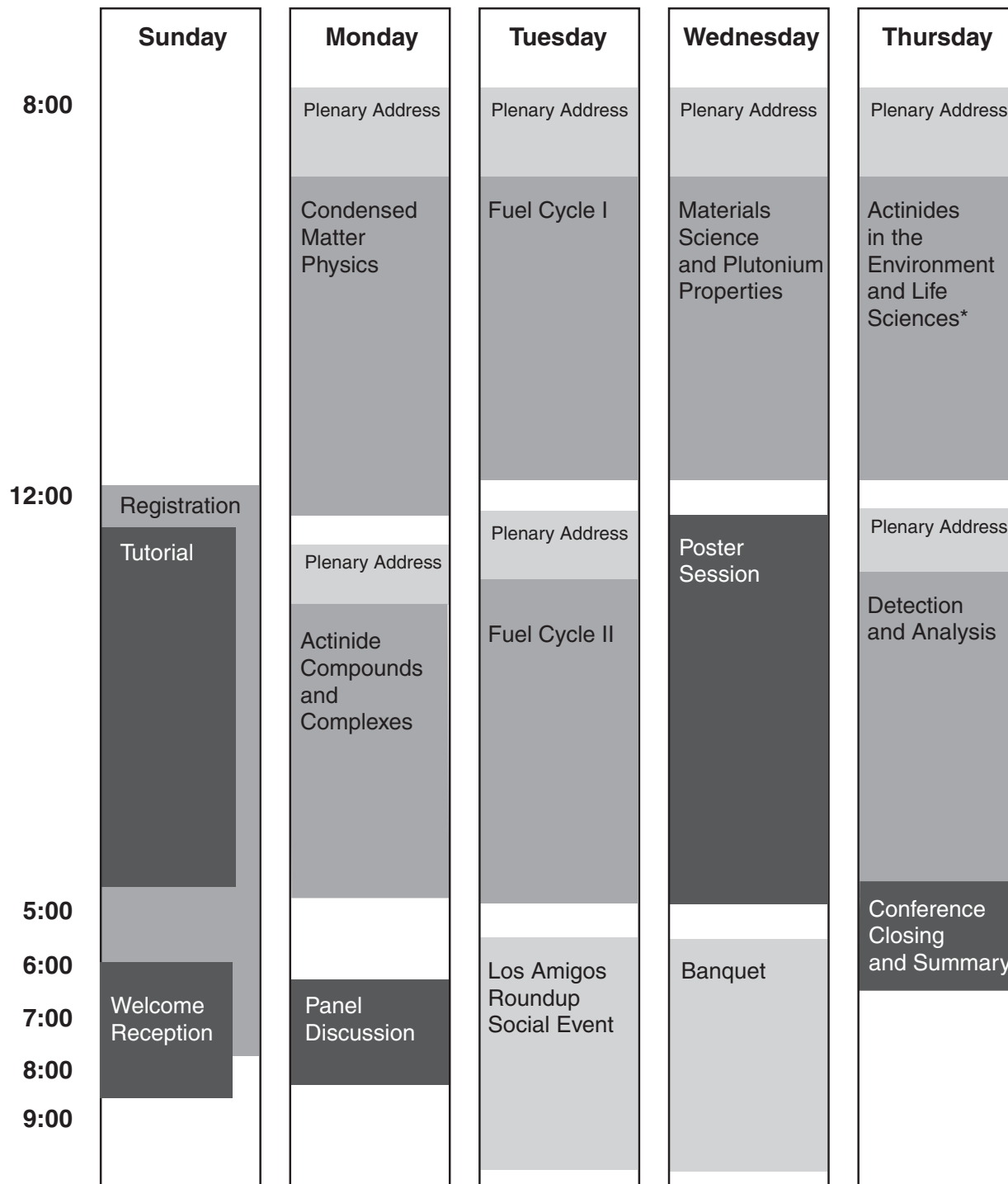
*This Conference is sponsored by Los Alamos National Laboratory in cooperation with the American Nuclear Society.*

*Additional Support is provided by KSL Services.*

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## DAILY MEETING SCHEDULE THE PLUTONIUM FUTURES—THE SCIENCE CONFERENCE



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## **WELCOME TO THE PLUTONIUM FUTURES—THE SCIENCE CONFERENCE.**

We hope you will enjoy this year's conference and participate in the social events as well as the technical sessions.

The Plutonium Futures—The Science Conference was established to increase awareness of the importance of the scientific underpinnings of plutonium research, and facilitate communication among its international practitioners. The 2003 conference is the third in this series, and has attracted more than 180 contributed presentations covering the latest results in plutonium condensed matter physics, materials science, compounds and complexes, environmental behavior, detection and analysis, separations and purification, nuclear fuel cycles, and waste isolation and disposal.

This year's final program highlights the exciting research that has progressed since the 2000 conference.

On Sunday, July 6, the conference kicks off with a plutonium tutorial. The half-day tutorial on topics in plutonium science is designed to provide a tutorial and background for newcomers and students to the field of plutonium science and to educate and inform current practitioners about areas outside their current expertise. Topics in the tutorial include guest lectures on plutonium physics and chemistry, International Atomic Energy Agency activities in nonproliferation and security of plutonium, and the nuclear fuel cycle.

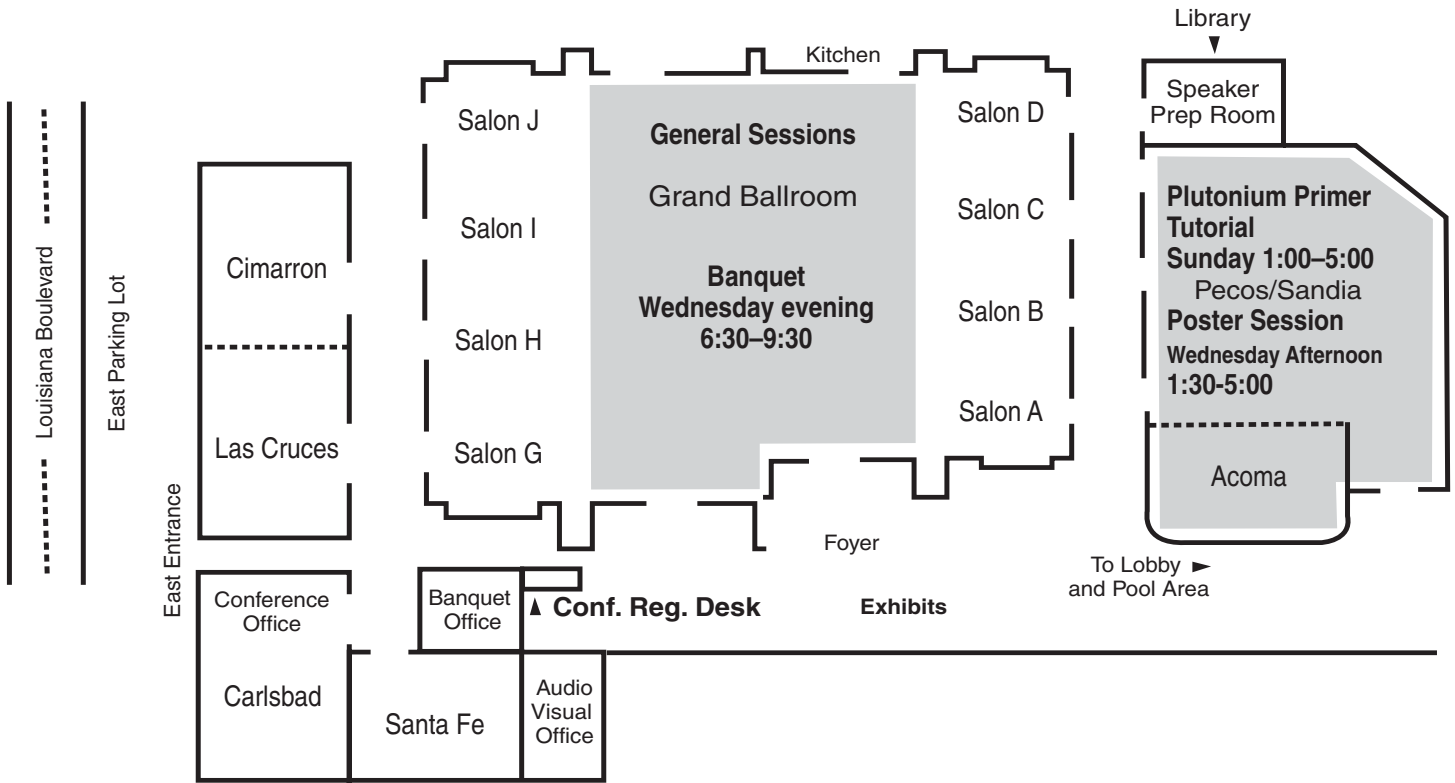
In 2003, many exciting new developments in plutonium science and technology will be presented. For example, the latest results on plutonium-based superconductivity; new advances in actinide separations and nuclear fuel fabrication; the local and long-range structure of key alloys, compounds, and molecular systems; the multiphase behavior of pure 238-plutonium metal; new insights on the problem of delta-phase metastability of Pu-Ga and Pu-Al systems; the latest insights on the role of natural and intrinsic colloids in the environmental transport of actinides; and the pervasive effects of alpha-particle self-irradiation in solids and solutions will be described.

Conference social events include the Sunday night, pool-side reception; a Monday luncheon; the Tuesday night off-site Los Amigos western Roundup; and the Wednesday night banquet, with guest speaker Charles Loeber, who will talk about the history of the Manhattan Project, including aspects of the German WWII bomb effort and WWII espionage and intrigue.

The Los Amigos Roundup will be on Tuesday night and is at a wonderful indoor/outdoor facility along the banks of the Rio Grande under giant cottonwood trees. Guests will enjoy southwestern-style music and entertainment, round-trip bus transportation to and from the hotel, and a southwestern banquet with beer, wine, and margaritas.

**Enjoy the conference!**

# ALBUQUERQUE MARRIOTT HOTEL



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## TUTORIAL SESSION

### Current Topics in Plutonium Science Sponsored by the G.T. Seaborg Institute

**Sunday, July 6, 1:00 PM-4:30 PM**  
**Pecos/Sandia Rooms**

**Background.** The “Plutonium Futures –The Science” conference was established to increase awareness of the importance of the scientific underpinnings of plutonium research, and facilitate communication among its international practitioners. Most importantly, we hope that this conference will stimulate the next generation of scientists and students to study the fundamental properties of plutonium and other actinides. To help prepare students, non-specialists, and other interested parties, we have organized a half-day tutorial based on current topics of this conference.

## AGENDA

- 1:00 PM**      **Challenges in plutonium physics and chemistry** – David L. Clark, Director, G.T. Seaborg Institute, Los Alamos National Laboratory
- 1:45 PM**      **Plutonium Futures - Work of the IAEA** - Graham Andrew, Special Assistant to the Director General for Scientific and Technical Affairs, IAEA
- 2:45 PM**      **Break**
- 3:00 PM**      **Overview of the nuclear fuel cycle and new fuel cycle initiatives** – Edward D. Arthur, Los Alamos National Laboratory
- 3:45 PM**      **Overview of colloid facilitated transport of plutonium** – Annie B. Kersting, Lawrence Livermore National Laboratory
- 4:30 PM**      Adjourn

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## PLUTONIUM FUTURES CONFERENCE SOCIAL EVENT



### Los Amigos Roundup

*Tuesday, July 8, 2003  
6:30 p.m. —9:30 p.m.  
\$35-tickets available at Registration*

*Dinner and Entertainment  
at the Los Amigos Ranch and Sandía Indian Pueblo*

*Dinner served at 7:00 p.m.*

#### Menu

*Hickory Grilled Prime Sirloin Steaks & Grilled Chicken Fajitas  
served with fresh tortillas, chips, guacamole, and salsa  
Green Chili Stew  
Ranch Beans  
Grilled Vegetables  
Mexican Rice  
Fudge Brownies and Biscochitos  
Assorted Sodas and Coffee*



#### Entertainment

*Mexican and Indian Dance troupes  
Southwestern Variety Band*

#### Including

*Beer, Wine, and Margaritas  
Gift Indian Bandana  
Round-trip bus transportation from the Marriott  
all for one low price  
\$35 per person  
Tickets Available at Registration*

*Buses depart the Marriott at 6:00 p.m.*

*Have some fun New Mexico Style*

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## SUNDAY, JULY 6, 2003

1:00 - 4:30 Plutonium Tutorial (Pecos/Sandia Rooms)

6:00 - 8:00 Reception (Poolside)

## MONDAY, JULY 7, 2003

### Session One — Condensed Matter Physics

#### Grand Ballroom

Session Chairs: Siegfried S. Hecker and Jason C. Lashley

- 8:00 AM**      **Opening Remarks**, Conference Chair Gordon D. Jarvinen and Los Alamos Senior Fellow Siegfried S. Hecker
- 8:30 AM**      **Recent Highlights in Actinide Research at ITU**, R. Schenkel and G. H. Lander (European Commission, JRC, Institute of Transuranium Elements, Karlsruhe, Germany)
- 8:55 AM**      **Complete Phonon Dispersion Curves Determination in fcc Delta Pu-Ga Alloy**, Joe Wong, M. Krisch, D. Farber, F. Occelli, A. J. Schwartz, M. Wall, R. Xu, and T.-C. Chiang (Lawrence Livermore National Laboratory; ESRF, Grenoble; Univ. of Illinois at Urbana)
- 9:20 AM**      **Local Structure in Plutonium Alloys Stabilized in  $\delta$ -Phase**, B. Ravat, L. Jolly, C. Valot, and N. Baclet (CEA, Is-sur-Tille, France)
- 9:45 AM**      **Plutonium-238 Metal as a Multiphase System**, S. I. Gorbunov (FSUE "SSC RF RIAR," Russia)
- 10:10 AM**      Break
- 10:25 AM**      **Investigating the  $\delta/\alpha'$  Martensitic Phase Transformation in Pu-Ga Alloys**, Kerri Blobaum, Jeff Haslam, April Brough, Mark Wall, and Adam Schwartz (Lawrence Livermore National Laboratory and Brigham Young University)
- 10:50 AM**      **Plutonium-Based Superconductivity: The Audacity of the 5f Electrons?** J. L. Sarrao, L. A. Morales, J. D. Thompson, B. L. Scott, G. R. Stewart, F. Wastin, J. Rebizan, P. Boulet, E. Colineau, and G. H. Lander (Los Alamos National Laboratory; University of Florida; and European Commission, JRC, Institute for Transuranium Elements, Karlsruhe, Germany)
- 11:15 AM**      **Phonon Dispersion in Actinides Measured with Inelastic X-Ray Scattering: New Opportunities to Solve Some Old Problems**, M. E. Manley, G. H. Lander, H. Sinn, A. Alatas, W. L. Hults, R. J. McQueeney, J. C. Lashley, J. L. Smith, and J. Willit (Los Alamos National Laboratory; European Commission, JRC, Institute for Transuranium Elements, Karlsruhe, Germany; and Argonne National Laboratory)
- 11:50 AM**      **A New Paradigm for the Determination of the 5f Electronic Structure of Pu and the Actinides**, James G. Tobin. (Lawrence Livermore National Laboratory)
- 12:15**      Luncheon (Poolside)
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## Session Two — Actinide Compounds and Complexes

### Grand Ballroom

Session Chairs: David L. Clark and Ivan G. Tananaev

- 2:15 PM**      **Insight into the Coordination Chemistry of Plutonium Compounds: Synthesis and Structural Characteristics of Pu(III) Oxalate and Pu(VI) Hydrrous Oxides**, Wolfgang Runde, Amanda Bean, and Brian L. Scott (Los Alamos National Laboratory)
- 2:45 PM**      **A Study of Colloid Generation and Disproportionation of Pu(IV) in Aquatic Solution by LIBD and LPAS**, C. Bitea, C. Walther, J.I. Yun, Ch. Marquardt, A. Seibert, V. Neck, Th. Fanghänel, and J. I. Kim (Institut für Nukleare Entsorgung, Forschungszentrum Karlsruhe, Germany)
- 3:15 PM**      **Equilibrium and Kinetic Studies of Heterogeneous Reactions of Actinide Hydroxide Compounds in Alkaline Media**, G. Tananaev, B. F. Myasoedov, D. L. Clark (Vernadsky Institute of Geochemistry and Analytical Chemistry and Los Alamos National Laboratory)
- 3:45 PM**      Break
- 4:00 PM**      **Investigation of Uranium in Bis(trifluoromethylsulfonyl)imide-Based Ionic Liquids**, David A. Costa, Warren J. Oldham, Rene Chavarria, and Brad Schake (Los Alamos National Laboratory)
- 4:30 PM**      **Thermochemistry of Transuranium Actinide Oxide Molecules Investigated by FTICR-MS**, John K. Gibson, Richard G. Haire, Marta Santos, Joaquim Marçalo, and António Pires de Matos (Oak Ridge National Laboratory and Instituto Tecnológico e Nuclear, Portugal)
- 5:00 PM**      Adjourn
- 7:00 PM**      Panel Discussion (Grand Ballroom) Moderator: Edward D. Arthur

## TUESDAY, JULY 8, 2003

### Session Three — The Nuclear Fuel Cycle I

#### Grand Ballroom

Session Chairs: Deborah R. Bennett and Gordon D. Jarvinen

- 8:00 AM**      **Plutonium, Politics, and Policy: A New “Atoms for Peace,”** Vic Reis (SAIC)
- 8:30 AM**      **Bicyclic and Acyclic Diamides: Comparison of their Aqueous Phase Binding Constants with Tetra- and Hexavalent Actinides**, Sergei I. Sinkov, Brian M. Rapko, Gregg J. Lumetta, James E. Hutchison, and Bevin W. Parks (Pacific Northwest National Laboratory and the University of Oregon)
- 9:00 AM**      **The Interactions of Iron and Plutonium Ions in Nitric Acid/Tri-Butyl Phosphate Systems and Process Flowsheets**, Robin J. Taylor, David A. Woodhead, Caroline Biourge, Chris Mason, O. Danny Fox, Bill Carr, and Steve D. Cope (BNFL, United Kingdom)

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- 9:30 AM**      **Development of Reprocessing Process by Plutonium Co-Crystallization**, Toshiaki Kikuchi, Tomozo Koyama, and Shunji Homma (Mitsubishi Materials Corporation, Japan Nuclear Cycle Development Institute, Saitama University, Japan)
- 10:00 AM**      Break
- 10:15 AM**      **Investigation of Plutonium in Uranium Products During Spent Fuel Treatment**, B.R. Westphal, D. Vaden, L.W. Scott, S.R. Sherman, T.Q. Hua, and J.R. Krsul (Argonne National Laboratory)
- 10:45 AM**      **Application of Fibrous “Filled” Sorbent Polyorgs for Concentration of Plutonium and Other Radionuclides from Solutions**, I. G. Tananaev, G.V. Myasoedova, and B. F. Myasoedov (Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Russia)
- 11:15 AM**      **The Separation of Americium and Plutonium Achieved by Facilitated Transport through Fixed Site Carrier Membranes Utilizing CMPO Ligands**, Scott Sportsman, Elizabeth Bluhm, and Kent Abney (Los Alamos National Laboratory)
- 11:45 AM**      Lunch (on your own)

## **Session Four — The Nuclear Fuel Cycle II**

### **Grand Ballroom**

**Session Chairs: Paul T. Cunningham and Robin J. Taylor**

- 1:30 PM**      **Advances in Code Validation for MOX-Use in LWRs through Benchmark Experiments in the VENUS Critical Facility**, P. D’hondt (SCK•CEN, Belgium)
- 2:00 PM**      **Overview of Nuclear Fuel Fabrication Efforts at Los Alamos for the Advanced Fuel Cycle Initiative**, Robert W. Margevicius (Los Alamos National Laboratory)
- 2:30 PM**      **Survey of BELGONUCLEAIRE Experience in the Field of MOX Fuel Fabrication and Irradiation, and Application to New Fuel Developments**, M. Lippens, A. Vandergheynst, and D. Boulanger (Belgonucleaire, Dessel)
- 3:00 PM**      Break
- 3:15 PM**      **Plutonium and Minor Actinide Fuels—the Good, the Bad, and the Future?** Kenneth Chidester and Wolfgang Stoll (Los Alamos National Laboratory)
- 3:45 PM**      **Self-Radiation Effects in Plutonium-Bearing Glasses**, W. J. Weber, J. P. Icenhower, and N. J. Hess (Pacific Northwest National Laboratory)
- 4:15 PM**      **Solubility Of Plutonium and Surrogates in Nuclear Glass Matrices**, X. Deschanel, C. Lopez, C. Denauwer, and J. M. Bart (CEA / VALRHO / MARCOULE)
- 4:45 PM**      **Plutonium Partitioning in Zirconolite and Pyrochlore Containing Multiphase Ceramics**, S.V. Stefanovsky, A. G. Ptashkin, S.V. Yudinsev, Y. M. Kulyako, and S. A. Perevalov (SIA Radon, Institute of Geology of Ore Deposits, Institute of Geochemistry and Analytical Chemistry, Russia)
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5:15 PM Adjourn

6:30 PM Los Amigos Social Event — Los Amigos Ranch-buses depart Marriott at 6:00 pm

### WEDNESDAY, JULY 9, 2003

#### Session Five — Materials Science and Plutonium Properties

#### Grand Ballroom

Session Chairs: Robert J. Hanrahan and Heather T. Hawkins

- 8:00 AM **An Overview of Plutonium Aging**, Joseph C. Martz, Luis A. Morales, and Kathleen B. Alexander (Los Alamos National Laboratory)
- 8:30 AM **Advanced Transmission Electron Microscopy of Pu Alloys**, Adam J. Schwartz, Mark A. Wall, Wilhelm G. Wolfer, and Kevin T. Moore (Lawrence Livermore National Laboratory)
- 8:55 AM **On the Problem of  $\delta$ -Phase Metastability in Pu-Ga and Pu-Al Systems**, Victor V. Inozemtsev (A.A.Bochvar Institute of Inorganic Materials, VNIINM, Russia)
- 9:20 AM **Pu Has No Future: A Real-Time Measurement of Pu Aging**, A. Migliori, D.A. Miller, J. C. Lashley, F. Freibert, J. B. Betts, and M. Ramos (Los Alamos National Laboratory)
- 9:45 AM **Self-Irradiation Effects in PuGa Alloys as Revealed by Positron Annihilation Spectroscopy**, Benoît Oudot, Nathalie Baclet, Lionel Jolly, Brice Ravat, Carole Valot, Pascale Julia, and Manuel Grivet
- 10:10 AM Break
- 10:25 AM **Phase Transformations in Delta Stabilized Plutonium**, Steven Kitching, Patrick G. Planterose, and David C. Gill (AWE, Aldermaston, Reading, United Kingdom)
- 10:50 AM **Invar Effect, Thermal Expansion and Elastic Softening of  $\delta$ -Phase Pu**, A. C. Lawson, J.A. Roberts, B. Martinez, and R. McQueeney (Los Alamos National Laboratory)
- 11:15 AM **Investigations of Protactinium Metal under Pressure Provide Important Insights into Actinide Bonding Concepts**, R. G. Haire, S. Heathman, M. Idiri, T. Le Bihan, A. Lindbaum, and J. Rebizant (Oak Ridge National Laboratory; European Commission, JRC, Institute for Transuranium Elements, Karlsruhe, Germany; European Synchrotron Radiation Facility, Grenoble Cedex, France; and Vienna University of Technology, Institute for Solid State Physics, Austria)
- 11:40 AM **Effects of Local Solute Ordering and Plasticity on the Delta to Alpha Transformation in Gallium-Stabilized Plutonium Alloys**, B. Sadigh, C. R. Krenn, A. J. Schwartz, and W. G. Wolfer (Lawrence Livermore National Laboratory)
- 12:05 PM **Change in the Isothermal Kinetics of the  $\alpha \rightarrow \beta$  Transition of Unalloyed Plutonium after Different Lengths of Time of Self-Irradiation of Samples**, A. M. Lyasota, A.V. Troshev, S. I. Abramenko, V. N. Kordyukov, Yu. N. Zuyev, B.V. Litvinov, and E. P. Magda (Russian Federal Nuclear Center—All-Russia Scientific Research Institute of Applied Physics)
- 12:30 PM Lunch (on your own)
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## POSTER SESSION

**Session Chairs: Sandra L. Mecklenburg and David E. Hobart**

- 1:30 PM** Poster Session Start (Pecos/Sandia/Acoma Rooms)
- 5:00 PM** Poster Session Adjourn
- 6:30 PM** Banquet (Grand Ballroom)  
Banquet Speaker: **Charles Loeber**  
*Building the Bomb: A History of the Nuclear Weapons Complex*

### THURSDAY, JULY 10, 2003

**Session Six — Actinides in the Environment and Life Sciences**

**Grand Ballroom**

**Session Chairs: Mary P. Neu and Christy E. Ruggiero**

- 8:00 AM** **Medical Implications of Plutonium**, Helen Caldicott (Founder of Physicians for Social Responsibility, Australia)
- 8:30 AM** **Actinides in the Environment**, Teresa Fryberger (U.S. Department of Energy)
- 9:00 AM** **Aquatic Colloids of Actinides: How are they Generated under Natural Aquifer Conditions?**  
M.A. Kim, P.J. Panak, J. I. Yun, and J. I. Kim (Institut für Nukleare Entsorgung, Forschungszentrum Karlsruhe, Germany; and Institut für Radiochemie, Technische Universität München, Germany)
- 9:30 AM** **Plutonium Interactions with Naturally Occurring Microorganisms**  
M. P. Neu (Los Alamos National Laboratory)
- 10:00 AM** Break
- 10:15 AM** **Biosorption of U(VI) and Pu(VI) by Bacillus Subtilis and a Mixture of B. subtilis with Clay Mineral**, T. Ohnuki, M. Samadfam, T. Yoshida, T. Ozaki, Z. Yoshida, and A. J. Francis (Advanced Science Research Center, Japan Atomic Energy Research Institute, Tokai-Mura, Japan, and Brookhaven National Laboratory)
- 10:45 AM** **Plutonium Isotope Remobilization from Natural Sediments (Gulf of Lions, Northwestern Mediterranean Sea): Estimation based on flume experiments**, Bruno Lansard, Sabine Charmasson, Frédérique Eyrolle, Mireille Arnaud, and Christian Grenz (Centre d'Océanologie de Marseille, Université de la Méditerranée /CNRS, rue de la batterie des lions, Marseille, France)

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**11:15 AM**     **Plutonium Colloid-Facilitated Transport in the Environment—Experimental and Transport Modeling Evidence for Plutonium Migration Mechanisms**, M. Zavarin, R. M. Maxwell, A. B. Kersting, P. Zhao, E. R. Sylwester, P. G. Allen, and R. W. Williams (Lawrence Livermore National Laboratory)

**11:45 AM**     Lunch (on your own)

## **Session Seven — Detection and Analysis**

### **Grand Ballroom**

**Session Chairs: David E. Hobart and Boris F. Myasoedov**

**1:30 PM**     **The Application of Vibrational Spectroscopy to Actinide Analysis**, T. J. Piper and C. D. Puxley (Atomic Weapons Establishment, Aldermaston, United Kingdom)

**2:00 PM**     **Optical Fiber Bragg Grating Sensors Applied to the Study of Plutonium Alloy Aging**, Pascale Julia (CEA—Centre de Valduc, Is-sur-Tille, France)

**2:30 PM**     **Low-Level Detection and Quantification of Plutonium(III, IV, V, and VI) using a Liquid Core Waveguide**, Richard E. Wilson, Yung-Jin Hu, and Heino Nitsche (University of California, Berkeley, and Lawrence Berkeley National Laboratory)

**3:00 PM**     Break

**3:15 PM**     **Structural Investigations of Plutonium Zirconia-Based Materials using the Rietveld Method with X-Ray Diffraction**, R. C. Belin, P. E. Raison, and R. G. Haire (Commissariat à l'Énergie Atomique, CEA—Cadarache; European Commission Joint Research Center—Institute for Energy, The Netherlands; and Oak Ridge National Laboratory)

**3:45 PM**     **Facilitation of Trace Elemental Determination in Plutonium Oxide By Inductively Coupled Plasma Mass Spectrometry (ICP-MS)**, Jeffrey Giglio, Daniel Cummings, and John Krsul (Argonne National Laboratory-West)

**4:15 PM**     **Conference Closing and Summary**, Gerd M. Rosenblatt (Lawrence Berkeley National Laboratory)

**4:45 PM**     Conference Adjourns

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**POSTER SESSION**  
**( Pecos/Sandia Rooms)**  
**Refreshments provided courtesy of KSL Services**

**Materials Science/Condensed Matter Physics**

Listed alphabetically by first author

1. **Evolution of Defects in Pu During Isochronal Annealing and Self-Irradiation**  
P. Asoka-Kumar, S. Glade, P.A. Sterne, and R. Howell
2. **Understanding and Predicting Plutonium Alloys Aging: A Coupled Experimental and Theoretical Approach**  
N. Baclet, P. Pochet, Ph. Faure, C. Valot, L. Gosmain, Ch.Valot, J. L. Flament, and C. Berthier
3. **Computational Modeling of Uranium Hydriding and Complexes**  
K. Balasubramanian, W. J. Siekhaus, and W. McLean II
4. **Phase Stability of Pu and Pu-Ga Alloys from Atomistic Calculations**  
M. I. Baskes, M. Stan, and K. Muralidharan
5. **Effect of Pu Valence on Acid-Dissolution of Perovskite (CaTiO<sub>3</sub>)**  
B. D. Begg, Y. Zhang, E. R. Vance, S. D. Conradson, and A. J. Brownscombe
6. **The An-T-Ga Ternary System Near the 1:15 Composition**  
P. Boulet, D. Bouexière, J. Rebizant, E. Colineau, and F. Wastin
7. **New Pseudo-Phase Structure for  $\alpha$ -Pu**  
J. Bouchet and R. C. Albers
8. **Photoemission and Electronic Structure of UCoGa<sub>5</sub> and PuCoGa<sub>5</sub>**  
M. T. Butterfield, T. Durakiewicz, E. Guziewicz, J. J. Joyce, D. P. Moore, A. J. Arko, L. A. Morales, J. M. Wills, J. L. Sarrao, P. G. Pagliuso, N. M. Moreno, and C. G. Olson
9. **Synchrotron-Radiation-Based Photoelectron and X-Ray Absorption Spectroscopy of Cerium and Plutonium**  
B. W. Chung, K. T. Moore, S. A. Morton, J. G. Tobin, and D. K. Shuh
10. **Thermal Modeling Experiment for Pit Storage Areas**  
F. J. Davis, E. Jensen, J. Ethridge, T. French, K. C. Bell, and K. Schwartz
11. **Magnetism and Localization in 5f Monopnictides and Monochalcogenides Using PES**  
T. Durakiewicz, M. T. Butterfield, E. Guziewicz, J. J. Joyce, L. Morales, and A. J. Arko
12. **Defect Based Spin Mediation in  $\delta$ -Phase Plutonium**  
M. J. Fluss
13. **The Properties of Actinide Nanostructures**  
S. C. Glade, T. W. Trelenberg, J. G. Tobin, P. A. Sterne, and A. V. Hamza

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14. **USb<sub>2</sub> and PuSb<sub>2</sub> Electronic Structure—A Photoemission Study**  
E. Guzewicz, T. Durakiewicz, J. J. Joyce, M. T. Butterfield, L. Morales, A. J. Arko, J. L. Sarrao, and J. M. Wills
  15. **The Localized and Itinerant Nature of 5f Electrons in Pu and Pu Compounds**  
J. J. Joyce, J. M. Wills, T. Durakiewicz, M. T. Butterfield, E. Guzewicz, J. L. Sarrao, L. A. Morales, D. P. Moore, and A. J. Arko
  16. **Characterization of As-Cast Transmutation Alloys Containing Pu, Zr, Am, and Np**  
D. D. Keiser, Jr. and J. R. Kennedy
  17. **Investigation of the Thermal Characteristics of an Americium Bearing Pu-40Zr Based Alloy**  
J. R. Kennedy
  18. **Theory for  $\delta$ -Pu and  $\delta$ -Pu Based Alloys**  
A. Landa, P. Söderlind, and A. Ruban
  19. **Aging and Phase Stability in  $\delta$ -Stabilized Pu**  
L. A. Morales, A. C. Lawson, S. Conradson, E. N. Butler, D. P. Moore, M. Ramos, J. A. Roberts, and B. Martinez
  20. **A Comparison of the Design of Russian and U.S. Containers for Plutonium Oxide Storage**  
C. F. V. Mason, S. J. Zygmunt, D. E. Wedman, P. G. Eller, R. M. Erickson, W. J. Hansen, and G. D. Roberson
  21. **Plutonium Hydriding Research Facility**  
G. W. McGillivray, I. M. Findlay, R. M. Harker, and I. D. Trask
  22. **Thermodynamic and Spectral Properties of Compressed Ce Calculated by the Combination of the Local Density Approximation and Dynamical Mean Field Theory**  
A. K. McMahan, K. Held, and R. T. Scalettar
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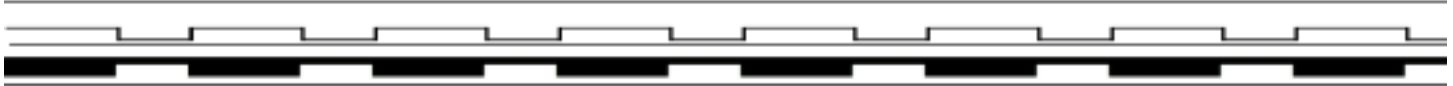
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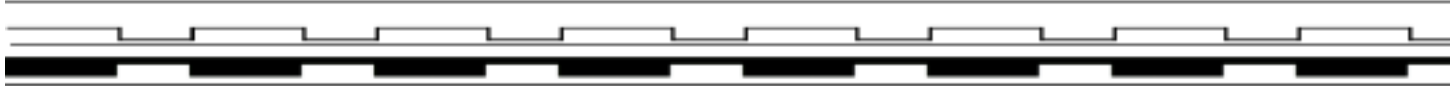
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## NOTES

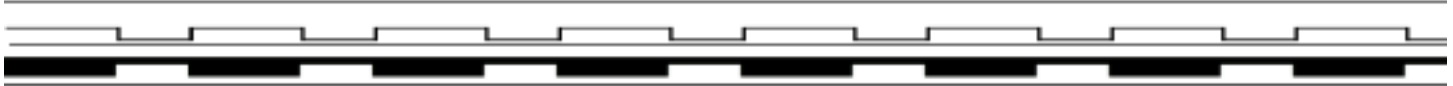




## NOTES

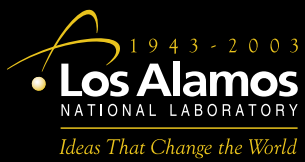






## NOTES





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