

AMERICAN NUCLEAR SOCIETY REACTOR PHYSICS DIVISON Summer 2013 – Fall 2013 Newsletter



http://rpd.ans.org

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Message from the Incoming Chair

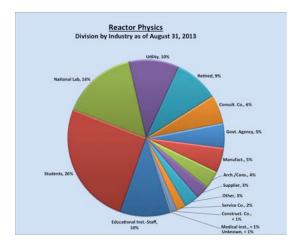
By Mark DeHart Mark.DeHart@inl.gov

On behalf of the entire membership of the Reactor Physics Division (RPD), I would like to thank Prof. Ali Haghighat, my predecessor as Chair of the Division, and outgoing Executive Committee members Prof. Tunc Aldemir, Mr. Robb Borland, Dr. Blair Bromley, and Prof. Akio Yamamoto for their participation and commitment over the last three years. I would also like to acknowledge the newly elected members of the committee: Dr. Melissa Hunter, Dr. Moussa Mahgerefteh, Prof. Bojan Petrovic, Dr. Jaakko Leppännen and Dr. Fausto Franceschini (incoming Division Secretary). Finally, I would like to recognize and thank the staff of the ANS Headquarters in Chicago, whose support, hard work and patience make the work of the Division and of the Society as a whole possible. I look forward to the opportunity to serve you and the membership of RPD this year. I have the privilege to serve with an enthusiastic team of professionals within the RPD Executive Committee - a truly nuclear family. And with the help of the committee. I hope to maintain the high standards of this committee and find new ways to be able to serve our membership.

I want to take this opportunity to highlight some of the activities of the RPD for the coming year. First, the next RPD Physics of Reactors (PHYSOR) topical meeting is scheduled for Sept 28-Oct 3, in Kyoto, Japan. PHYSOR is held every two years, with every third meeting held outside of North America. PHYSOR 2014 will follow very successful meetings held in Interlaken, Switzerland in 2008, Pittsburg, Pennsylvania in 2010, and Knoxville, Tennessee in 2012. Next, led by Blair Bromley, RPD has recently completed an online survey of its membership in an effort to better understand the desires of division members with regard to RPD activities with the ANS. The division is also looking at methods to improve communications using alternate media. RPD has established a presence on Facebook and is evaluating use of Twitter for information dissemination. Ron Ellis will lead an effort to update the ANS website this year, and combined with survey results determine a path to improve the relevancy of the Division's web page. Ben has assumed responsibility Forget for development of a formal plan for realization of a second endowed scholarship to support undergraduate students with a demonstrated interest in reactor physics.

Overall, the Reactor Physics division remains one of the strongest divisions within ANS. As of August 31, 2013, RPD had 1,791 active members - this represents almost 18% of the total membership of the ANS. The largest segment, representing 26% of total membership, is comprised of students (students comprise 16% of total ANS membership). This is encouraging for potential future growth of the division. The figure below shows the distribution of RPD membership by industry segment, and illustrates a broad base of representation by our membership. On the negative side, however, the Division showed a 5% decrease in membership this year - the first decrease we've seen in 13 years. This is a result of an overall decrease in ANS membership over the last two years – a fact that ANS is aware of and is working to address. Nevertheless, it is important to the Division and to the Society as a whole that we as a Division provide needed

services and information to our membership such that we can remain a valuable resource for professional development and dissemination of relevant information. This will be our emphasis this year, and I hope that each of you can help to steer us in this direction.



Treasurer's Report

By Pavel Tsvetkov (<u>Tsvetkov@tamu.edu</u>)

The Reactor Physics Division continued success is showcased by our healthy financial status. Continuing support from our members to ANS and to RPD is key and highly appreciated. Financially successful topical meetings are an hallmark of RPD.

Our end-year balance forward from previous year is 74,273 as of 1/1/13 which corresponds to the 8-months actual fund balance of 71,576 as of 8/31/13. The division total revenues is 5,506 based on 2013 member allocation of 33,926 and 2013 division income of 1,580.

Our significant balance allows Reactor Physics Division to support student conferences annually at \$2,500 as well as to invest in our website development efforts and maintenance at \$1,000. Our overall budgeted student support allocation for 2013 is \$5,200 (\$5,000 actual for 8 months of 2013).

Our sustained growth in the RPD budget allows us to fund the current Henry/Greebler Scholarship and to proceed developing a second RPD endowed scholarship. The RPD budget health assures our ability to continue supporting our growing cadre of incoming young talents. More information on this plan and the scholarships can be obtained from the Reactor Physics Division Scholarship Subcommittee.

Survey Status

By Blair P. Bromley (bromleyb@aecl.ca)

The Reactor Physics Division initiated a survey among its membership in late August, 2013. The purpose of the survey is to gather feedback that can be used to bring national conferences, technical papers and sessions, and the RPD website closer to the membership's expectation.

Survey results with 150 respondents (~8% of the RPD membership) have suggested the following items of importance:

- The cost of attending ANS meetings needs to be significantly reduced (registration, hotel/venue, airline).
- The Sunday Evening President's Reception should be extended to 2.5 hours to allow more time for networking and socializing.
- Technical session presentations should be limited to 20 minutes (including 5 minutes for questions and discussion).
- Technical sessions should be extended to 5:00 pm to accommodate more papers.
- An evening poster session with refreshments and a cash bar should be held to accommodate extra papers.
- Panel discussions with no extended abstract or publication record should be avoided.
- Mid-morning and mid-afternoon coffee breaks should be held.
- Technical papers should be limited to 4 pages (max). Longer papers can be split into two smaller papers.
- Page charges for extended abstracts in the ANS Transactions should be significantly reduced or brought to zero.
- In addition to extended abstracts, members would like to see slide show presentations uploaded and made available on-line.
- RPD members rarely visit the ANS-RPD website, but would be more apt to if additional information was made available,

such as conference slide show presentations, benchmark problems, and links to online courses and associated documentation.

The complete results of the survey, including many interesting, insightful and colorful comments, are being assessed along with preliminary recommendations for consideration by the RPD Executive and Program Committees. It is expected that the results will be made available to the RPD membership and the leadership within the ANS, with the goal of meaningful changes being implemented to increase the interest and participation of ANS members, particularly those who are RPD members.

<u>Website</u>

By Ron Ellis (Vice-Chair, RPD) (ellisrj@ornl.gov)

The Reactor Physics Division Website is being updated. The website is accessible at http://rpd.ans.org Past RPD newsletters and the minutes of Program Committee and Executive Committee meetings are being added. In addition, the current membership roster for the RPD officers and EC and PC members is being added or updated.

The Reactor Physics Division Facebook presence has been established. The Facebook group is called "Reactor Physics Division of the American Nuclear Society". We currently have 387 members in the FaceBook group. Reactor Physics Division members are encouraged to join and participate in the group, with postings and lively discussion. The group is accessible at https://www.facebook.com/groups/ReactorPhysics / You can join easily by following the instructions on the page. As a minimum, all you need to do is establish a very rudimentary FaceBook account.

Student Support

The Reactor Physics Division continues to support student conferences at the levels needed. Excess funds will be used in this context and also in connection to broader student support and potential ways to do so. A student design competition is noted as a possibility.

The Reactor Physics Division awards the Allan F. Henry/Paul A. Greebler scholarship annually to graduate students engaged in research related to nuclear reactor physics or radiation transport. This prestigious scholarship value is \$3,500 and can be awarded to graduate students attending a North American University and pursing a Masters or PhD degree. A committee composed of the Scholarship Committee Chair, Jess C. Gehin, and committee members Dimitrios Cokinos, Mark DeHart, Tom Downar, Farzad Rahnema, and Scott Palmtag performs the selection. The 2013 scholarship was awarded to Timothy Burke, University of Michigan, from a strong pool of potential recipients. Congratulations Timothy!

The Reactor Physics Division is also formalizing an undergraduate scholarship. At the upcoming winter meeting, we will discuss on naming the scholarship, so please attend the executive committee meeting if you have any suggestions.

Additionally, the Scholarship Committee Chair, Jess C. Gehin, is stepping down after many years of service. Please join us in thanking him for his valuable service to the division. Benoit Forget will be taking over his duties going forward.

Details about all ANS scholarships including the Henry/Greebler scholarship can be found on the ANS website at: <u>http://www.ans.org/honors/scholarships</u>. The application deadline for the 2014 scholarship is February 1, 2014.

2013 Annual Meeting in Atlanta, GA

By Alexander Stanculescu (<u>Alexander.Stanculescu@inl.gov</u>)

The Division organized four special sessions and one panel in addition to the three standing sessions - Reactor Physics: General; Reactor Analysis Methods; Reactor Physics Design, Validation, and Operating Experience:

- Fuel Cycle Design Optimization and Analysis, Session Organizer: M. Mahgerefteh (Exelon)
- Advanced Modeling and Simulation in Reactor Physics, Session Organizer: U. Mertyurek (ORNL)
- Physics of Fluid-Fuel Systems, Session Organizer P. Ravetto (Politecnico di Torino-Italy)
- Student Research in Reactor Physics, Session Organizer M. D. DeHart (INL)
- Current Issues in LWR Core Design and Reactor Engineering Support, Panel, Session

Organizer and Chair: M. Mahgerefteh (Exelon)

Sessions and panel had good representations of papers and panelists and were well attended at the meeting.

Thanks to Blair Bromley, photographs were taken of those that attended the Program Meeting and the Executive Meeting in Atlanta. These pictures are presented at the end of the Newsletter, before the tables of the current members of the Reactor Physics Division Program and Executive Committees.

Best Paper Award

By Hany Abdel-Khalik abdelkhalik@ncsu.edu

N. E. Stauff of the Argonne National Laboratory has won the best paper award at the 2013 Annual Meeting for the summary entitled: "Application of an Annular Metallic Fuel with Lower Gas Plenum for Sodium-cooled Fast Reactor", co-authored with T. K. Kim, D. Yun, T. A. Taiwo, and H. S. Khalil (ANL).

Best Paper Awards at PHYSOR 2012 in Knoxville, TN

During the PHYSOR 2012 topical meeting in April 2012 in Knoxville TN, a student best paper competition was held. Based initially on results from the Technical Program Committee in the paper review process, members of the organizing committee (co-General Chairs Jess Gehin and Ivan Maldonado, Honorary Chair Lee Dodds, Publications Chair Germina Ilas, and Technical Program Chair Ron Ellis) put forth a list of best papers written by students (as primary authors).

Following judging during the technical sessions, the top five papers were selected for awards. Thanks to the generosity and support of the DOE Office of Nuclear Energy, prizes in the amount of \$1000, \$800, \$600, \$400, and \$200 were presented to the 1st place to 5th place best student paper winners:

 "A Generalized Adjoint Approach for Quantifying Reflector Assembly Discontinuity Factor Uncertainties", <u>Artem</u> <u>Yankov</u> and Benjamin Collins(1), Matthew A. Jessee (2), ThomasDownar (1) - 1) University of Michigan, Ann Arbor, MI. 2) Oak Ridge National Laboratory, Oak Ridge, TN

- "Preliminary safety calculations to improve the design of Molten Salt Fast Reactor", <u>M.</u> <u>Brovchenko</u>, D. Heuer, E. Merle-Lucotte, M. Allibert, N.Capellan, V. Ghetta, A. Laureau -LPSC, UJF, CNRS/IN2P3, Grenoble INP, Grenoble Cedex, France
- "Stochastic Sampling Method with MCNPX for Nuclear Data Uncertainty Propagation in Criticality Safety Applications", <u>T. Zhu</u>, A. Vasiliev, W. Wieselquist and H. Ferroukhi -Paul Scherrer Institut, Villigen PSI,Switzerland
- "Construction of Accuracy-Preserving Surrogate for the Eigenvalue Radiation Diffusion and/or Transport Problem", <u>Congjian Wang</u> and Hany S. Abdel-Khalik -Department of Nuclear Engineering, North Caroline State University, Raleigh, NC
- 5. "Assessment of Fission Product Yields Data Needs in Nuclear Reactor Applications", <u>Kilian Kern</u>, Maarten Becker, Cornelis Broeders- Institut für Neutronenphysik und Reaktortechnik, KIT Campus Nord, Leopoldshafen, Germany

Below is a picture taken of the Best Student Paper award presentation during the PHYSOR 2012 banquet. The judging process was overseen by UTNE Prof/Head Emeritus Lee Dodds (at left in the picture). The student best paper award recipients are shown left to right (5th place to 1st place) between Prof Emeritus Lee Dodds (L) and UTNE Associate Prof Ivan Maldonado (R).



M&C 2013 Topical Meeting in Sun Valley, ID

By Ron Ellis (<u>ellisrj@ornl.gov</u>)

In continuing cooperation between the Reactor Physics Division and the Mathematics and Computation Division (MCD), RPD members were well represented at M&C 2013, the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering. The Idaho National Laboratory (INL) and the Idaho Section of the American Nuclear Society (IANS) hosted and sponsored M&C 2013. The conference was held at the Sun Valley Resort in Sun Valley, Idaho, May 5-9, 2013. M&C 2013 is the latest in the series organized by the Mathematics and Computation Division of the American Nuclear Society.

The technical program consisted of high-quality and timely plenary sessions, parallel oral presentation sessions, and a poster session. Nearly 300 people participated in the conference. Bill Martin (UM) was the General Chair, Rich Martineau (INL) was the Technical Program Chair, Hans Gougar (INL) was the Assistant Technical Program Chair, Teri Ehresman (INL) was Assistant General Chair, and Ron Ellis (ORNL; Vice-Chair RPD) was the Honorary Chair.

2013 Winter Meeting in Washington, DC

By Alexander Stanculescu (Alexander.Stanculescu@inl.gov)

The RPD was successful in attracting 81 submissions for the ANS 2013 Winter Meeting. Of these, 68 summaries were accepted for publication in the Transactions and assigned to 10 technical sessions. Out of these, there are 3 special "Lattice Physics sessions. viz. Benchmarking" [organized by Matthew Jessee (ORNL)]; "Physics of Compact Reactors for Terrestrial and Space Applications" [joint session with ANSTD, organized by Blair Bromley (AECL Chalk River Laboratories) and John Bess (Idaho National Laboratory]; and "Fuel Cycle Options: A Physics Perspective" [organized by Andrew Worrall (Oak Ridge National Laboratory)].

In addition to the technical sessions, the RPD is sponsoring the special panel "Nuclear Fission: 75-Year Anniversary" [joint panel with MCD, organized by Mark DeHart, Alexander Stanculescu (both Idaho National Laboratory) and Piero Ravetto (Politecnico di Torino)]. The RPD is inviting distinguished speakers to commemorate the discovery made by Otto Hahn and Fritz Strassmann. In December 1938, they reported that they had discovered the element barium after bombarding uranium with neutrons. Simultaneously, they communicated these results to Lise Meitner in Sweden. She and Otto Frisch correctly interpreted Hahn's and Strassmann's discovery to mean that the nucleus of uranium had split roughly in half. Frisch then suggested the process be named "nuclear fission." The panelists and the chairmen of the special panel [Massimo Salvatores (CEA, senior advisor) and Harold McFarlane (Idaho National Laboratory)] will discuss the past, present, and future of fission as an energy source harnessed to serve mankind. The special panel session will also host the 2013 Wigner Lecture titled "Highlights of the Heuristically-based Generalized Perturbation Theory (HGPT) Methodology" delivered by this year's recipient of RPD's Eugene P. Wigner Reactor Physicist Award, professor Augusto Gandini (University of Rome "Sapienza").

Reactor Physics Standards

By Dimitrios Cokinos (cokinos@bnl.gov)

Activities in the Reactor Physics Standards continued on two fronts: ANS standards and international standards (ISO).

In the ANSI/ANS area, work continued on the revision of ANS-19,1, "Nuclear Data Sets for Reactor Design Calculations", and ANS-5.1, "Decay Heat Power for Light Water Reactors". The review of the revised ANS-19.11,"Moderator Temperature Coefficient in PWRs" has been completed and it will shortly be balloted by the members of ANS-19.

Following the annual meeting of the ISO in Atlanta last June, several commitments were made for the adoption by the International Standards Organization of several of our ANSI/ANS-19 Reactor Physics Standards. Thus, ANSI/ANS-19.3, "Steady State Neutronics for Power Reactor Analysis" and "ANSI/ANS-19.6.1, "Reload Startup Tests in Pressurized Water Reactors" are now in the process of becoming international standards. Additional standards are in the works while we assemble international contributors to bring our standards in line with the ISO formatting requirements. It should be pointed out that in the transition from ANSI/ANS to ISO standards, the technical contents of our standards remain the same.

Honors & Awards

By Dimitrios Cokinos (cokinos@bnl.gov)

The Reactor Physics Division members are invited to nominate candidates for:

- ANS Fellow Award,
- Eugene P. Wigner Reactor Physicist Award.

The inaugural Wigner award was presented to Dr. Wigner during a ceremony on the campus of Princeton University on December 5, 1990. A photo from the ceremony with Dr. Wigner, Dr. Robert Long, then ANS president, and Dimitrios Cokinos is given further down in this Newsletter.

Eugene P. Wigner Reactor Physicist Award -2013

By Piero Ravetto (<u>*Piero.Ravetto@polito.it*</u>)

Augusto Gandini is the 2013 winner of the Wigner Award granted by the Reactor Physics Division.

Prof. Gandini started his career in the fifties as a reactor physics researcher at the Nuclear Research Center at Ispra, in Italy. Later, he was at the Argonne National Laboratory and then at the Italian agency for nuclear energy (CNEN and then ENEA). He served also as leader of the fast reactor physics group and director of the reactor physics laboratory. More recently, he has been advisor to the innovative system division of ENEA. Over the years, he has given several courses at the University of Rome "La Sapienza" at the Nuclear Engineering Department.

Prof. Gandini has gained international reputation for his scientific works in several fields of nuclear reactor physics and engineering. Of particular relevance are his well-known contributions in the development and applications of generalized perturbation theory. Our Division is giving a welldeserved recognition to his long and outstanding career as a reactor physicist.

As the winner of the 2013 Wigner Award, Augusto Gandini has been invited to present a lecture at the ANS Winter Meeting in Washington next November 13, during a panel discussion organized to celebrate the 75th anniversary of the fission discovery. The lecture, entitled "Highlights of Heuristically-based Generalized Perturbation Theory (HGPT) Methodology", will consists of three parts. The first part comprehends an introduction in which the steps of the HGPT method development are briefly described together with the various fields of interest to which it has been applied. In the second and third parts two significant applications of the HGPT method are illustrated in some detail: the first one is relevant to the analysis of subcritical systems, the second one is relevant to a hot spot identification method by which it is possible to fully exploit the information available from a selfpowered neutron detection system (SPND) implemented in a nuclear reactor plant.

<u>Special issues of Nuclear Science and</u> <u>Engineering and Nuclear Technology based on</u> <u>PHYSOR 2012 papers</u>

By Germina Ilas (ilasg@ornl.gov)

Selected papers from the International Topical Meeting on Reactor Physics PHYSOR 2012, which was hosted by the Oak Ridge/Knoxville Local Section of the American Nuclear Society (ANS) in Knoxville, in April 2012, has been published in special issues of Nuclear Science and Engineering (NSE) – vol. 175, no. 3, 2013 – and Nuclear Technology (NT) - vol. 183, no. 3, 2013.

These special issues became possible through the concerted effort of the PHYSOR 2012 organizing committee, hundreds of PHYSOR 2012 reviewers, and the NSE and NT Editors and editorial staff. Based solely on the PHYSOR 2012 reviewers' recommendations for journal publication and reviewers' scores for the papers, as available from the full paper review process, the PHYSOR 2012 organizing committee selected a number of papers that were submitted to the NSE and NT Editors for consideration. These papers were then subjected to the regular journal review process. Special thanks are extended to the NSE and NT Editors, Dr. Dan Cacuci and Dr. Nick Tsoulfanidis, who generously provided their support in organizing the issues.

PHYSOR 2014, Sept. 28 – Oct. 3, 2014, Kyoto, Japan

By Akio Yamamoto (a-yamamoto@nucl.nagoya-u.ac.jp)

The international conference on reactor physics, PHYSOR2014 - The Role of Reactor Physics toward a Sustainable Future, will be held from September 28th to October 3rd, 2014 at the Westin Miyako Kyoto Hotel, Kyoto in Japan. Reserve the date in your agenda!

The technical program features the following tracks and special sessions:

Technical Tracks

- 1. Reactor Analysis Method
- 2. Deterministic Transport Theory
- 3. Monte Carlo Methods
- 4. Verification, Validation and Uncertainty Analysis
- 5. Nuclear Criticality Safety
- 6. Reactor Physics Experiments
- 7. Reactor Concepts and Designs
- 8. Reactor Operation and Safety
- 9. Transient and Safety Analysis
- 10. Nuclear Data
- 11. Research Reactors and Spallation Sources
- 12. Fuel Cycle and Actinide Management
- 13. Radiation Applications and Nuclear Safeguards
- 14. Education in Reactor Physics

Molten Salt Reactors

15. Research Related to Fukushima Accident

Special Sessions

1.

- 2. Reactor Physics and Criticality Safety Activities in OECD/NEA Working Party
- 3. Hybrid Particle Transport Methods for Solving Complex Problems in Real-time
- 4. Advanced Geometry Processing in Deterministic and Monte Carlo Methods
- 5. Multiscale, Multiphysics Approaches in Nuclear Science and Engineering Applications
- 6. Nuclear Criticality Safety of Fuel Debris
- 7. Control Rod Withdrawal Tests Performed During the PHENIX End-of-Life Experiments
- 8. Reactor Physics of Non-Traditional LWR Fuel Design

Currently, the website for the submission of full papers is being prepared. The site to submit your paper(s) will be available from the beginning of October 2013. Please inform your colleagues and submit many full papers!

Other important dates are:

December 20, 2013	Deadline for Submission of		
	Full Papers		
April 26, 2014	Notification of Acceptance		
June 28, 2014	Deadline for Final Paper		
	Submission		

If you want to find out more about Kyoto and its many attractions, simply search "Kyoto" or "Kyoto visit" on the internet. Many websites are available with lots of information about tourism, culture, and historical sites in and around Kyoto.

We look forward to meeting you in Kyoto the next year.





A photo from the inaugural Wigner award with Dr. Wigner, Dr. Robert Long, then ANS president, and Dimitrios Cokinos (1990, Princeton)

Executive Committee Meeting Sunday, June 16 4-6 p.m., 2013, Hyatt Regency Atlanta, GA



Program Committee Meeting Sunday, June 16 2-4 p.m., 2013, Hyatt Regency Atlanta, GA



2013-2014 Reactor Physics Division Officers

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