



International Workshop on Utilization of Research Reactors, São Paulo, Brazil

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International Workshop on Utilization of Research Reactors, São Paulo, Brazil



Figure 1. Organizers and speakers for the International Workshop of Utilization of Research Reactor, Sao Paulo, Brazil. Photo courtesy of Da Fonseca (IPEN).

The Nuclear and Energy Research Institute—IPEN in São Paulo, Brazil—held the International Workshop on Utilization of Research Reactors from November 28–December 1, 2017, celebrating the 60th anniversary of the IEA-R1 Research Reactor’s first criticality. This event was sponsored by two Brazilian funding agencies (FAPESP and CNPq) among other institutions, and supported by the Carnegie Endowment for International Peace. Numerous experts of neutron utilization attended the meeting, covering research reactor applications with expert talks. About 200 participants were registered, around 80 posters were presented, and 30 speakers

presented talks related to research reactors and associated scientific research.

In the opening session, local authorities and the IAEA representative officer took part in a panel in which the importance of the IEA-R1 reactor was emphasized, followed by the inauguration of an exhibition space equipped with multimedia devices displaying the uses of neutrons for the benefit of society. On the afternoon of the first day, the technical session started with Danas Ridkas (IAEA) who talked about “Research reactors: purpose and future”, followed by a panel in which pioneering people who worked with neutron scattering, angular correla-

tion and O&M in the IEA-R1 facility gave their views. In addition, Shiguo Watanabe (IFUSP) talked about the beginning of IEA-R1, which included the agreement with the University of São Paulo (USP) to host the reactor and the “Atoms for Peace” program sponsored by the U.S. government. The section finished with a future perspective of research reactors in Brazil by José A. Perrotta (CNEN), who presented the Brazilian Multipurpose Reactor Project, a proposed new 30 MW research reactor.

On the second day of the conference, topics related to nuclear security were discussed by Craig Mariano from Texas A&M, Craig Moss and Patrick Lynch from Oak Ridge National Laboratory, and Togzhan Kassenova from the Carnegie Endowment for International Peace. The Brazilian nuclear security officer, Renato Tavares (CNEN), and the Secretary of Planning for the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), Luis Carlos da Silva, presented their activities and policies. Peter Vermaker presented a talk about the Integrated Management System of the research reactor at SCK-CEN and its implications for safety operation.

The following day emphasized users of research reactors. Neutron activation analysis applied to archeology studies was presented by Eduardo Goes (Museum of Archeology and Ethnology of USP) and Sonia Tatumi (Federal University of São Paulo). Production of reference materials for neutron activation analysis

was also presented by Elizabeth Fernandes (Center of Nuclear Energy in Agriculture). Applications like geochronology by neutron activation (Andrea Ritter, Federal University of Rio Grande do Sul) and perturbed angular correlation (Gabriel Pasca, Federal University of Para) were also presented. The final section of the third day was a round table about the Research Reactor Center activities with the managers of the facility: Frederico Genezini, manager of the center, Edson Moreira, manager of R&D of the center, and Renata Mory, graduate student (CRPq).

On the last day of conference, users continued to present interesting talks regarding the use of neutrons for the study of materials, including Jeffrey Lynn (NIST Center for Neutron Research) who talked about the investigation of magnetism and superconductivity using neutron scattering and Hugo N. Luz (High Energy Physics and Instrumentation Center of São Paulo University) who presented work on a position sensitive thermal neutron detector based on multilayer ^{10}B converters. Then Heinz Haas (ISOLDE, CERN) talked about the facilities at ISOLDE that can be used for nuclear physics studies and Juliana Schell (ISOLDE, CERN) presented an overview of the facilities and experimental methods at ISOLDE that complement materials physics investigations using research reactors. The website of the workshop is <https://sites.google.com/view/iear1-60y>.

The history of the reactor started in 1956 when the University of São Paulo and the Brazilian National

Council for Scientific and Technological Development—CNPq—established a cooperative agreement to install the research nuclear reactor purchased from the American company Babcock & Wilcox in the context of President Dwight Eisenhower’s “Atoms for Peace” Program. The first operation was on September 16, 1957, and was the first criticality achieved in the Southern hemisphere. IEA-R1 is a pool type, light water cooled and moderated, graphite reflected research reactor. Although designed to operate continuously up to 5 MW, it operated at 2 MW for the first 40 years before commencing 5 MW operations. The IEA-R1 research reactor has several uses, such as radioactive isotope production by thermal neutron flux irradiations up to $10^{14} \text{ cm}^{-2}\cdot\text{s}^{-1}$ for health and industry applications, research and development using radioactive samples, and neutron science using its beam ports (8 radial and 2 tangential beam ports). In 2017, the IEA-R1 celebrated the 60th anniversary of the first criticality of the IEA-R1 research reactor. With its continuous modernization program, it is expected to operate for many years to come.

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