Monte Carlo 2005
The Monte Carlo Method: Versatility Unbounded in a Dynamic Computing World

Message from the General Chair and Technical Chair

The theme of Monte Carlo 2005, planned for April 17-21, 2005, is "The Monte Carlo Method: Versatility Unbounded in a Dynamic Computing World."

The Monte Carlo method has been used for over forty years to solve almost all problems in radiation transport associated with shielding, nuclear reactors, medical equipment, and other similar applications. The success of the method is based on its broad application field, accuracy in modeling complicated geometries, ability to handle complicated data, and flexibility. For many years, the widespread implementation of the Monte Carlo method was limited because of the computational requirements and because the early Monte Carlo codes required expert knowledge by a specialist in the technique for successful application to a problem.

Computational requirement limitations have now been substantially eliminated through the significant developments of powerful processors and computing architectures available to analysts today. Parallel processors, networked systems, and large-scale implementation of data transfer technologies have broadened the applicability of the Monte Carlo method. The development of more user-friendly interfaces, geometry model generation tools, and pre- and post-analysis visualization techniques have facilitated the use of the Monte Carlo method by non-specialists. Furthermore, the versatility and applicability of the method has benefited from improvements in variance reduction techniques, which speed up the calculations. Radiation transport models are now being activly utilized in radiation therapy approaches to better understand the path of radiation as it traverses the human body during treatment. Exposure to newer and better algorithms has lead to better models of the human body, thus faster solutions to problems in health. The over-riding result of these advancements has been the strengthening of the method in the traditional radiation transport domain and applications, and also the

broadening of the development and application of the Monte Carlo method to other non-nuclear domains.

This meeting will highlight the growth of the Monte Carlo method from both the methods and data development aspect as well as the growth in applications. The conference theme is "The Monte Carlo Method: Versatility Unbounded in a Dynamic Computing World." Within this theme, the wording captures the essence of what this conference is striving to capture. **Versatility** encompasses the flexibility of the method in both application and in computer architecture. **Unbounded** captures the perceived unlimited growth potential. **Dynamic** captures all aspects of the present computing environment (serial and parallel) as well as the rapidly changing future environment. Through the papers, and presentations, this conference will demonstrate these qualities of the Monte Carlo method.

This conference represents the latest in a series of conferences dating back to 1980. The series of Monte Carlo conferences have explored the many advances in Monte Carlo methods, their scientific applications, computational speed and accuracy. The Monte Carlo conferences benefit government agencies who fund research in this area by providing a synopsis of the state-of-the-art in the tools and applications relevant to our society today. These meetings also provide developers and users a glimpse of what development and applications are proceeding in other areas of the world.

The history of the Monte Carlo conferences includes the following:

A Review Of The Theory And Applications Of Monte Carlo Methods, A Seminar-Workshop held in Oak Ridge, Tennessee, April 21–23, 1980, ORNL/RSIC-44.

Advanced Monte Carlo Computer Programs For Radiation Transport, Monte Carlo 1993 held in Saclay, France, April 27–29, 1993, ISBN 92-64-14376-9.

Advanced Monte Carlo On Radiation Physics, Particle Transport Simulations And Applications, Monte Carlo 2000 held in Lisbon, Portugal, October 23–26, 2000.

The Monte Carlo Method: Versatility Unbounded in a Dynamic Computing World, Monte Carlo 2005 held in Chattanooga, Tennessee, April 17–21, 2005, ISBN 0-89448-695-0.

Early on, there was no set structure or timetable for when these conferences would occur. As the method has grown in popularity and application, the international Monte Carlo community agreed to hold these meetings once every 5 years.

The committees of Monte Carlo 2005 would like to express their gratitude to the American Nuclear Society (ANS) Oak Ridge/Knoxville Section, ANS Radiation Protection and Shielding Division (RPSD), ANS Mathematics and Computations Division (MCD), the Department of Energy, Oak Ridge National Laboratory (ORNL), Radiation Safety Information Computational Center (RSICC), the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency Data Bank (NEADB), the Canadian Nuclear Society and the Korean Nuclear Society.

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