
Activity Report for the participation at the 5th Geant4 International User Conference, March 27th – 29th, 2024, Osaka, Japan.

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I had the opportunity to attend the 5th *Geant4 International User Conference at the Physics-Medicine-Biology frontier*. The conference took place from 27th – 29th March and brought together developers and users of Geant4 to discuss its applications of Geant4 in medical and radiobiological fields.

The conference covered a wide range of topics, including:

- Imaging techniques
- Various radiotherapy treatments such as X-ray radiotherapy, brachytherapy, and hadrontherapy
- Radiobiology, including discussions on Geant4-DNA
- Radiation protection measures
- Detector development for radiation detection
- Computational aspects of using Geant4 for simulation and data analysis

Presentation Topic: "In Silico Assessment of Radiation-Induced Double-Strand Breaks in Lymphocytes After In Vivo Irradiation: Evaluation of Radionuclides Experimentally Unexplored and Relevant in Routine Monitoring Programs for Occupationally Exposed Workers"

My presentation focused on quantifying DNA damage in lymphocytes following in vivo irradiation with experimentally unexplored radionuclides relevant to routine monitoring programs for occupationally exposed workers. The study utilized a Monte Carlo track-structure (MCTS) simulation model, integrating GATE and Geant4-DNA, to quantify DNA damage at low absorbed doses. The simulation setup replicated ex vivo internal irradiation of whole blood experiments using an 8 ml vial filled with water containing 1000 spheres mimicking lymphocytes. Preliminary results showed variations in S-values, double-strand breaks (DSBs) per cell per mGy, alpha tracks per cell per mGy, and DSBs per micrometer across different radionuclides.

Conclusion

Attending the 5th Geant4 International User Conference provided me with valuable insights into the latest advancements in Geant4 applications in the medical and radiobiological fields. The exchange of information and discussions with fellow participants further enriched my understanding and inspired future research directions.

This partnership has received funding from the European Union's "EURATOM" research and innovation program under the 101061037 grant agreement.