UNIVERSIDADE DE SÃO PAULO
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Short Course on: Monte Carlo method and its Applications: From Biomedical Optics to Machine Learning and Graphics/Gaming

27 June – 02 July 2024

Prof. Alexander Doronin
School of Engineering and Computer Science,
Victoria University of Wellington,
Wellington, New Zealand

The main topics to be covered in this course are:

1.Fundamentals and Biomedical Optics
- Introduction to MC simulations and their historical context
- Radiative Transfer theory and its application in Biomedical Optics
- Hands-on session: Building MC models for tissue optics

2.Practical Applications in Biomedical Optics
- MC simulations for dose calculation in photodynamic therapy
- Modeling human skin reflectance spectra
- Polarized light transport in biomedical imaging
- Optimization of biomedical optical systems

3.Graphics and Gaming
- MC-based 3D rendering techniques and real-time ray tracing
- Energy-efficient architectures in modern computer chips
- Hands-on session: Creating photorealistic images using MC-based CGI

4.MC and Machine Learning
- Integration of MC and Machine Learning
- Forward and inverse light transport simulations problems solved by AI
- Challenges and solutions in reverse engineering optical properties

Thursday	**Friday**	**Monday**	**Tuesday**
Jun 27 2PM-6PM	Jun 28 2PM-6PM	Jul 01 2PM-6PM	Jul 02 2PM-6PM

The course will be offered by our Post-Graduate Program as “SFI5898 Seminários de Pós-Graduação II” and registered students can get 2 credits for it.

Prof. Alexander Doronin will be visiting IFSC from June 26 till July 05, 2024

Lectures will be in rooms “Sala de Seminários do Grupo de Óptica” and “205”.