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COLLOQUIUM

Development of a new medical imaging modality for Proton Radiation Therapy: Prompt Gamma Imaging

Prof Steve Peterson (University of Cape Town)

DATE: Monday, 25 November 2024 | 16h00–17h00 SAST

VENUES:

- Neelsie Cinema, Stellenbosch University
- Online

--- A recording of the talk will be published on the NITheCS YouTube channel afterwards ---

ABSTRACT

Proton Radiation Therapy provides exceptional benefits over traditional photon therapy for the treatment of cancer, resulting in lower doses to the patient and less treatment side-effects. This benefit is achieved because the protons deposit most of their energy (dose) directly into the tumour volume. Unfortunately, this concentrated energy deposition makes it difficult to produce accurate pictures of the treatment dose within a patient.

This talk will introduce a promising imaging technique for producing in-vivo images of dose delivery during proton radiotherapy, called Prompt Gamma Imaging (PGI). PGI uses solid-state gamma-ray detectors to reconstruct images of the scattered secondary prompt gammas produced during a proton therapy treatment.

In the last 15 years, there has been enormous growth in the number of clinical proton therapy centres globally, driven by technological advancements that justify the cost of building proton accelerators. By June 2024, there were 136 centres worldwide, but none in the Southern Hemisphere. This talk will also discuss the UCT Proton Therapy Initiative that is working to establish Africa's first clinical proton therapy centre in Cape Town.

BIOGRAPHY

Prof Steve Peterson holds a PhD in Physics from the University of Wisconsin-Madison. After four years as a postdoctoral researcher at the University of Texas MD Anderson Cancer Center in the USA, he relocated to Cape Town in 2010 to join the University of Cape Town (UCT). He is currently an Associate Professor and the Head of the Department of Physics at UCT.

Prof Peterson's research is in Applied Nuclear Physics. For almost two decades he has focused specifically on proton radiation therapy research, exploring this domain using both computational and experimental tools. He is also a member of the MeASURe (Metrological and Applied Sciences University Research) Unit at UCT, which focuses on metrology and measurement in Physics. He has worked extensively with the Geant4 radiation transport code for both medical and general physics applications. He is currently collaborating with researchers to develop the first clinical imaging system capable of producing three-dimensional, in-vivo images of the dose deposited during proton therapy treatment.

Prof Peterson is a member of the UCT Proton Therapy Initiative, a multi-disciplinary project aiming to establish Sub-Saharan Africa's first proton therapy centre. UCT is well-placed to advance proton therapy and research for maximum impact on cancer treatment across the continent.



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