



PHYSICS AND ASTRONOMY COLLOQUIUM

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“Cancer and Linac based Radiotherapy Treatment for Challenging Environments”

Abstract

“A major 21st century global challenge is the rising burden of cancer. The annual global incidence of cancer is expected to increase to 27.5 million cases (16.3 million deaths) by 2040.

70% of these will be from Low-and Middle-Income Countries (LMICs). Radiotherapy is a core modality of cure, control and palliation for cancers yet only 10% of patients in low-income countries who need radiotherapy have access.

In the lowest income countries within Africa only 4% of cancer patients that need radiotherapy receive RTT. Linear accelerators (LINACs) offer state-of-the-art-treatment, but this technology is high cost to acquire, operate and service, especially for LMICs, and often their harsh environment affects machine performance and down time.

In all of Africa with 1.2 billion inhabitants there are 385 radiotherapy machines (compare this to Canada with 284 machines for 37.6M). Both the high cost of these machines and downtime are major issues in Africa. If Linac machines were to be optimised to make them more robust allowing easier maintenance extending the life of a Linac could have a major impact on availability of radiotherapy in developing countries.

A global initiative was launched in 2016 at CERN lead by ICEC (International Cancer Expert Corps) to address the technology and system barriers to providing RT in LMICs through the development of a novel Linac-based RT system designed for challenging environments. Our STELLA Project (Smart Technologies to Extend Lives with Linear Accelerators) has brought together a multidisciplinary collaborative network composed of accelerator physicists, ML and AI specialists, medical physicists, radiobiologists, radiation oncologists, radiotherapists to develop innovative solutions with partners across Africa.

As the prototype design phase started, additional information was needed on the performance of Linac components, variables that may influence performance, and their association, if any, with equipment downtime. A survey was developed, and data was collected from all 28 countries in Africa that have Linac-based RT facilities. The idea is to understand failure rates and problems experienced with current-generation of Linacs and try to define design specifications for a lower cost robust linear accelerator that can limit the requirement for maintenance.

Wednesday, February 10, 2021

9:00 a.m. - LIVE session with Q & A (session will be recorded)

3:30 p.m. - Playback of recorded session

Zoom link (<https://uvic.zoom.us/j/81377096640>).