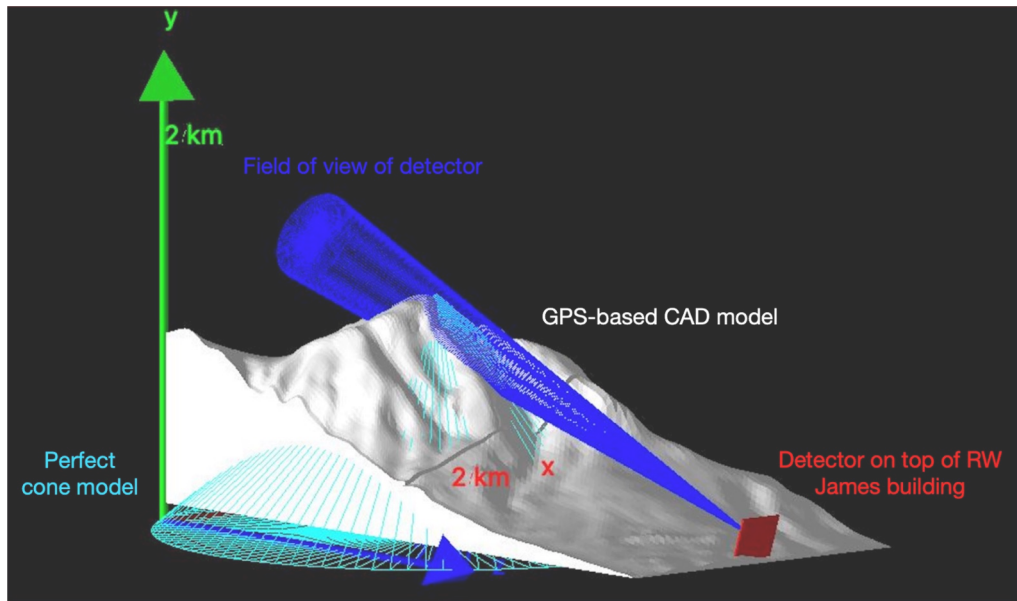


Fully Funded MSc/MEng in Applied Physics: *Muon Tomography Detector Technology*



Project Abstract

Cosmic muons are energetic charged particles that originate in the upper atmosphere and arrive at the Earth's surface with a flux of about 1 muon per cm^2 per minute. Muons are extremely penetrative, often travelling hundreds of metres through rock and are very easy to detect. The detection of cosmic muons forms the basis of the novel technology of ***Muon Tomography*** where measurement of muon fluxes reveals detailed images of the internal structure of enormous objects such as mountains. The applications of Muon Tomography are found in fields as diverse as homeland security, nuclear energy safety, mineral mining exploration, geology, civil engineering, underground water monitoring, and archaeology.

The *muCT* project, led by Dr. James Keaveney and Dr. Jane Wyngaard, aims to develop a prototype muon tomography detector based on layers of planar plastic scintillators tailored towards the South African mineral mining industry. Sophisticated data-acquisition electronics deduces muon arrival time and energy in the scintillators which is in turn used to estimate the muon trajectory via offline data analysis. The MSc. project would focus on finalizing the design and build of the data-acquisition infrastructure and pursuing an experimental campaign to demonstrate the function and precision of the detector system. The detector would then be deployed in the field for a pilot Muon Tomography campaign with Devil's Peak mountain as a test subject.

Funding

The MSc is funded via **130K ZAR** per annum bursary for a maximum of two years with a start date before March 2023 to be based **in-person** at the Physics Department, UCT Upper Campus, Cape Town.

Requirements

- Honours degree in either Physics, Electrical Engineering or a closely related discipline.
- Some experience with Electronics, Hardware, and Experimental design
- Experience using Python & Linux
- Willingness to learn new technologies take initiative and be self-motivated.
- Ability to synthesis complex information into succinct technical reports

Contact

To apply, send an academic CV and cover letter including academic and research interests to james.Keaveney@uct.ac.za and jane@wyngaard.co.za **before the 20th February 2023**.