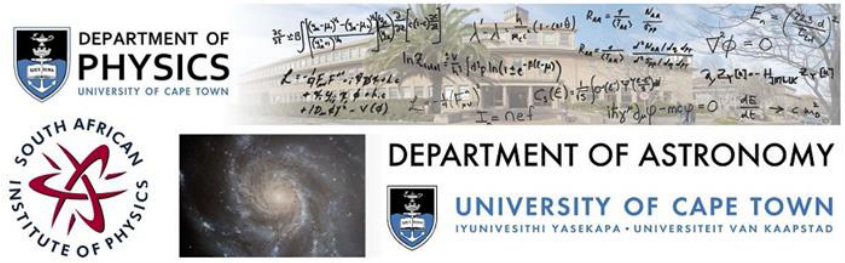


Contribution ID: **173** Type: **Oral Presentation**

# The search for crystal undulator radiation

*Thursday, 7 July 2016 10:00 (20 minutes)*

## Abstract content <br>   (Max 300 words)<br><a href="http://events.saip.org.za/getFile.py/a target="_blank">Formatting &<br>Special chars</a>

The channelling phenomenon applies to the correlated motion of charged particles within a crystal lattice in a direction closely aligned with atomic rows (strings) or crystal planes. When the incident charge particle is highly relativistic, the emitted channeling radiation is boosted by a factor of γ2, where γ is the Lorentz factor. Bremsstrahlung may also be coherent for these conditions, and coherent enhancement leads to both quasi monoenergetic peaks and also significant increases in intensity as compared to the normal process. In the special condition that the crystal is periodically bent, such as in a periodic superlattice, one may also have undulator radiation. All of these phenomena are potential sources of MeV and GeV range intense gamma radiation. The latter phenomenon is proposed as potentially the most important source of monochromatic high energy photons. In principal it can also lead to coherent radiation based on the Free Electron Laser (FEL) principal with intensities similar to an extrapolation of what may be obtained at modern light sources. In this contribution we describe a search for crystal undulator radiation using 2.5 – 6.0 GeV positrons incident on a diamond crystal undulator. The experiments were performed at the T9 Beamline of the Proton Synchrotron at CERN. The experiment was the result of a winning proposal for the 2015 CERN Beamline for Schools Competition.

## Apply to be<br> considered for a student <br>   award (Yes / No)?

No

## Level for award<br> (Hons, MSc, <br>   PhD, N/A)?

N/A

## Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

## Please indicate whether<br>this abstract may be<br>published online<br>(Yes / No)

Yes

**Primary author:** Dr HENNING, Colleen (St John's College, Houghton)

**Co-authors:** Mr OSATO, Antonio (St John's college); Mr MACKENZIE, Brandon (St John's College); Mr MERCER, Connor (St John's College); Mr WILLIAMSON, Connor (St John's College); Mr BOSHOFF, Dutliff (St John's College); Mr HAFFEJEE, Fayad (St John's College); Mr MOTSOAI, Malaika (Barnato Park High School); Mr COPELAND, Michael (St John's College); Mr SIHOYIYA, Professor (Barnato Park High School); Mr KILBOURN, Quintus (St John's College); Prof. CONNELL, Simon (University of Johannesburg)

**Presenter:** Dr HENNING, Colleen (St John's College, Houghton)

**Session Classification:** Nuclear, Particle and Radiation Physics (1)

**Track Classification:** Track B - Nuclear, Particle and Radiation Physics