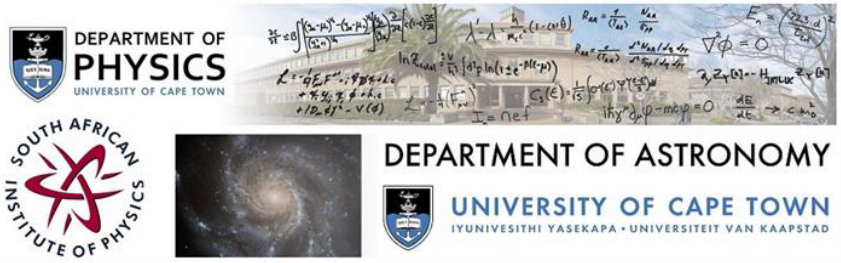

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Implementation of the preamplifier response function for the iThemba LABS segmented clover detector

Friday, 8 July 2016 15:00 (20 minutes)

Abstract content
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In June 2013, iThemba LABS acquired the ADL [1] software to simulate the response of the segmented clover detector for an arbitrary gamma-ray interaction within a germanium crystal. In order to generate realistic pulse shapes that match the measured pulses for a specific position in (x,y,z), the detector characteristics, such as geometry, impurity profile, charge sensitive preamplifier response to a input of a step function, cross-talk parameters and crystal orientation (which is the topic of another SAIP 2016 presentation [2]), must be measured and implemented into the software in high precision. The implementation of those detector characteristics into the ADL software is progressing well.

The charge sensitive preamplifier serves as the interface between the detector's (which output the charge pulse), and the data acquisition electronics. It amplifies the signal and due to its limited bandwidth [3] it effectively slows down and smoothies the shape of the pulses. Hence, in order to compare the simulated pulse shapes with the measured ones, the simulated charge pulses have to be convoluted with the function, f(x), which represents the response of the charge sensitive preamplifier of that particular detector.

The charge sensitive preamplifier response of the iThemba LABS segmented clover detector was measured [4]. In this contribution, its implementation into the ADL software will be discussed. Results showing the excellent performance of the ADL software in convoluting the simulated step function with the preamplifier response will be presented.

1. ADL, http://www.ikp.uni-koeln.de/research/agata/index.php?show=download

2. S. Mthembu, et.al, Crystal Orientation Measurements of the iThemba LABS segmented clover detector, SAIP 2017.

3. M. R. Dimmock, Characterisation of AGTA Symmetric Prototype Detectors, PhD thesis, University of Liverpool, 2008.

4. O. Shirinda, et.al, SAIP2013 Proceedings, ISBN: 978-0-620-62819-8, (2014), measuring the performance of the iThemba LABS segmented clover detector.

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