

Week 10 Report

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Introduction

This report is a summary of the work that we have done for the first ten weeks of our master's project. We assume familiarity with G4DS20k software package but require no technical knowledge of machine learning techniques. The aim of this report is to show a basic comparison between simulations out of Geant4 packages and output of a Generative Adversarial Network (GAN). Although this particular run configuration and plots are worth investigating, it is meant to show the potential of GANs in detector analysis and simulation and to show what is and is not feasible by this framework.

1 G4DS20k Configuration

We are using the branch called *sol_niamh_andrzej_g410.1.2* as our starting point. For the exact configuration details please refer to the appendix. To summarize, we have used the full detector configuration (current to the time of writing this report) with an Ar40 recoil at random starting positions in the direction (0,0,-1). This was run for 100,000 events and variables of significance S1 and S2 obtained.

2 Theory

For plane polarised light travelling in the z direction, the electric field vector is given by

2.1 Attenuation Constants

As discussed before, the non-perfect transmission of light through the dichroic polarisers means some of the light intensity will be absorbed by the light as it passes through.

3 Results