

# GEANT-4 GPU Port:

## **Design Document**

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# 1 Introduction

## 1.1 Purpose

The purpose of GEANT4-GPU is to reduce the computation times of particle simulations.

## 1.2 Description

The project aims to improve the computation times of GEANT4 particle simulations by running simulations on the GPU. GEANT4-GPU will allow users to build GEANT4 with an enable GPU acceleration option. Our implementation will be available on Mac, Linux and Windows operating systems with NVIDIA graphics cards. GEANT4-GPU must be able to do particle simulations much faster than running the simulations on a GEANT4 build that runs entirely on the CPU.

## 1.3 Scope

The scope of GEANT4-GPU will be limited to Engineering Physics simulations; particularly those that make use of the NeutronHPVector class.

## Revision History

All major edits to this document will be recorded in the table below.

Table 1: Revision History

Description of Changes	Author	Date
Set up sections and filled out Introduction section	Matthew	2015-12-15

## **2 Anticipated and unlikely changes**

### **2.1 Likely Changes**

### **2.2 Unlikely Changes**

## **3 Module Hierarchy**

## **4 Connection between requirements and design**

## **5 Traceability matrices**

## **6 MIS of NeutronHPDataPoint**

### **6.1 Interface Syntax**

### **6.2 Exported Access Programs**

### **6.3 Interface Semantics**

#### **6.3.1 State Variables**

energy : G4Double

xSec : G4Double

#### **6.3.2 Environment Variables**

There are no environment variables for this Module.

### 6.3.3 Assumption

### 6.3.4 Access Program Semantics

## 7 MIS of NeutronHPVector

### 7.1 Interface Syntax

### 7.2 Exported Access Programs

### 7.3 Interface Semantics

#### 7.3.1 State Variables

#### 7.3.2 Environment Variables

There are no environment variables for this Module.

#### 7.3.3 Assumption

#### 7.3.4 Access Program Semantics

## 8 MIS of CMake Files

### 8.1 Interface Syntax

### 8.2 Exported Access Programs

### 8.3 Interface Semantics

#### 8.3.1 State Variables

useCuda : Bool

#### 8.3.2 Environment Variables

NeutronHPVectorGPU.cu : cuda file with GPU code

#### 8.3.3 Assumption

#### 8.3.4 Access Program Semantics