Running GEANT4 Functions on a GPU Discussion of Results

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Brief Project Overview

Take an existing particle simulation toolkit - GEANT4 - and have some functions run on a GPU device to improve performance.

Definition: GEANT4

GEANT4 is

Brief Project Overview Explanation of Terms Scope Purpose

Stakeholders

What is GEANT4

What is GP-GPU

Brief Project Overview Explanation of Terms Scope Purpose

Scope

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Purpose

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Why G4ParticleHPVector

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Two Implementations

Entire G4ParticleHPVector Object on GPU

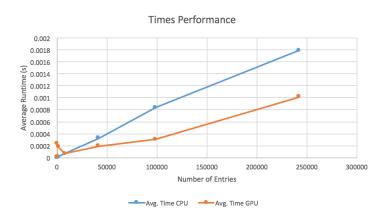
Add New Function on GPU

Performance Summary

- Most functions slower on GPU until ~10,000 entries
- Most commonly-used functions significantly slower on GPU
 - Lots of data accesses
- Many problems in vector class not well-suited to parallelism

Performance Results - Times

Multiplies each point in vector by factor



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Performance Discussion

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Accuracy

Entire G4ParticleHPVector Object on GPU Add New Function on GPU Performance Accuracy Testing

Testing

Summary of Results

Recommendations