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Topological Calorimeter Clustering on GP-GPU at ATLAS using CUDA

Abstract—ATLAS [1] calorimeter is formed by individual detector cells placed in a cylindrical geometry.

Each individual cell will record information when particle collisions happen and this data is stored to be later processed by algorithms provided by ATHENA Framework.

One of the main goals of those algorithms is to analyze the collision events happening inside the calorimeter and build topological clusters based on the energy recorded by cells. Topological clustering [2] has a growing stage when neighbour cells are grouped together into clusters based on their recorded energy. The second stage is splitting the clusters generated in the growing part if they contain more than one cell having local maximum energy.

One might notice that general-purpose computing on graphics processing units has become more popular in recent years and a considerable amount of algorithms are ported to GPU using programming languages and frameworks such as CUDA and OpenCL. We will analyze the porting of cluster splitter algorithm on GPU using CUDA as well as data transformations required to make it work.

Index Terms—ATLAS, ATHENA Framework, CUDA, Topological Cluster

Minioral

Yes

IEEE Member

No

Are you a student?

Yes

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