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GPU-based Computation of Energy and Time for the Upgrade of the Tile Calorimeter of the ATLAS Detector”

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Abstract content
   (Max 300 words)
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After the 2022 upgrade of the Large Hadron Collider, increased running luminosity will necessitate the re-design of the front-end and back-end detector electronics. The Tile Calorimeter (TileCal) is a hadronic sub-detector, forming part of the larger general-purpose ATLAS detector. TileCal will be generating 40 Tbps of raw data which will be read by super read-out drive (sROD) modules. The sRODs are responsible for some preliminary processing of data with an optimal filtering algorithm. This includes energy computation, time reconstruction (and associated quantities), as well as distributing this data downstream. To increase the processing capabilities of the sROD, to relieve it of certain computational burdens, and to allow for a more accessible coding platform; an ARM-based co-processing unit (PU) is being developed at the University of the Witwatersrand. This project involves identifying how the use of massively parallel computing with GPUs can be integrated into the PU to facilitate its goals with regard to the sROD, for instance implementing the optimal filtering algorithm on a GPU platform. An ARM-GPU based PU could find further application in other high-volume scientific computing environments.

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Yes

Level for award
 (Hons, MSc,
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MSc

Main supervisor (name and email)
and his / her institution

Bruce Mellado, University of the Witwatersrand

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