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Poster Abstract

Title: IPbus applied to the CMS Level1 Tracking Trigger Upgrade

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The Sao Paulo Research and Analysis Center (SPRACE) is dedicated to provide resources for high energy physics researchers from the State of Sao Paulo, by offering computing facilities and support to their members working in the physical analysis of the data produced by the Compact Muon Solenoid (CMS) at CERN.

In the instrumentation field, SPRACE is contributing to the Level1 Tracking Trigger (L1TT) system development proposed by Fermilab (the AM+FPGA approach) for the future CMS Phase II upgrade, when the Large Hadron Collider (LHC) will have an increase in its collisions luminosity.

SPRACE instrumentation team has been working particularly in the demonstration and test setup for the Fermilab AM+FPGA proposal. The system is all based on Pulsar IIb modules, a general purpose FPGA carrier board developed by Fermilab for ATCA shelves. Since ATCA offers a network resource to the carrier boards and the final system is supposed to operate in difficult access sites, IPbus was chosen to debug and control the hardware remotely.

The IPbus is an IP-based protocol for controlling hardware devices programmed in FPGA. An open source IPbus suite offers a generic address and data bus inside the FPGA that can be controlled trough an Ethernet connection using UDP protocol. The IPbus suite also offers a Python API that can be used on a personal computer (PC) to perform operations on the FPGA, like to read and write memories and registers, or even to send commands to the hardware by the PC. In order to be used in our project, the network physical layer and the interface with the bus has been developed.