

Muon Detector and Electronics R&D

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Since 1996 the Bonner Nuclear Laboratory of Rice University (Houston, TX) has been actively involved in design and construction of the Muon System for the Compact Muon Solenoid (CMS) Experiment at the Large Hadron Collider (LHC) at CERN. There are three basic tasks to be fulfilled by the muon system: muon identification, triggering and momentum measurement. We have major responsibilities in both the Endcap Muon (EMU) and Trigger subsystems, including clock and control signal distribution, data compression, sorting and high speed optical transmission. Most electronic devices were successfully prototyped and the project is advancing into production stage. The detector and electronics are scheduled for commissioning in 2004-2005.

We also have actively participated in R&D on Resistive Plate Chambers (RPC), including prototyping and testing of the detector and front-end electronics. These devices provide a low cost solution to the critical problem of fast, large-area detectors for triggering on charged particles. We have recently made advances in the use of micro-multigap RPC for extraordinary good time of flight measurement. This is expected to find application in STAR detector at RHIC (BNL).

Our expertise in muon detector and electronics design and construction, as well as in collider physics in general would be a valuable contribution to R&D on muon and trigger systems for the future experiments at the Linear Collider. Our facility at Rice University allows to build and test a mid-scale detector prototypes and associated electronics. Our two electronics engineers have extensive experience in

- Programmable Logic Design based on most advanced Altera and Xilinx devices
- Schematic and PCB design based on Orcad tools
- Optical data transmission
- Multi-layer PCB fabrication and assembly (including fine pitch surface mount technology and ball grid array packages) using local and national vendors

Graduate students could contribute to the software development, assembly and testing of prototype modules and to simulation studies.

While not currently requesting funds, this letter is to express our interest in contributing to detector and electronics development for a linear collider detector. We anticipate that this will lead to a specific proposal and request for funding in the next year.

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