

# Development of a Front-End Electronics for Pico-second Resolution TOF Detectors

Thursday, 6 September 2007 16:45 (0 minutes)

We have proposed using 2" by 2" micro-channel plates (MCP-PMTs) with a novel equal-time anode and with capacitive return path coupling to measure the time-of-flight of relativistic particles, with the goal of being able to construct large-area TOF detectors with a resolution of 1 psec.

The proposed front-end customer chip is a time stretcher with 1ps resolution, building with IBM 0.13um SiGe BiCMOS process. the preliminary designs and simulations for the front-end ASIC chip will be presented in this paper.

## Summary

The proposed readout electronics for each MCP-PMT unit consists of 4 identical front-end ASICs and one DAQ ASIC that digitizes the front-end outputs, distributes the system clock, and handles all digital traffic. The front-end ASIC chip is a 'time stretcher', converting the difference in times between start and stop pulses into a digital pulse with width proportional to the input time interval but stretched by a factor of 200. We are designing in the IBM 0.13um SiGe BiCMOS 8HP process, The circuitry includes a limiting amplifier and a constant-fraction discriminator. The DAQ chip then digitizes the stretched time interval. The preliminary design and detailed simulations of the front-end ASIC chip will be presented.

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**Session Classification:** Poster session