CMU Involvement in CMS

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Outline:

I. CMS Detector and Endcap Muon System
II. Anode Front-End Electronics
III. Chip and PC Board Progress
IV. N. Terentyev – Results from 1998 Tests
V. Other Work and Future Plans

II. Anode Front-End Electronics

A. Purpose of anode wire readout.

1) Tag which beam crossing (every 25 nsec) μ occurred in.
2) Part of μ trigger – look for patterns in at least 4/6 layers which point towards IP.
3) Measure μ polar angle – convert p_t from cathode strips to $\vec{p}_{tot}$.

B. Electronics Requirements.

1) Low threshold $\approx$ 20 fC.
2) Low noise $\approx$ 2 fC at C_{in} = 200 pF.
3) Fast shaping time $\approx$ 30 ns.
4) High efficiency $\approx$ 99%.
5) Time slewing $<$ 2 ns for input from 20 to 1000 fC.
6) Beam Tagging Efficiency $>$ 92% using 4/6 layers.

III. Chip and PC Board Progress

1995 – Build first hybrid circuit to test ideas.

1996 – Submit first 4-ch ASIC's for separate preamp and discriminator chips using 2.0 μ ORBIT technology.

1997 – Combine preamp and discriminator into one chip. Switch to using 1.2 μ AMI process. Also produce first 16-channel PC board.

1998 – Build first 16-ch preamp/discriminator chip. Produce 96-channel PC board. Test both on prototype chamber at Fermilab and CERN.

IV. CERN Testbeams

1996 – T.F., 3 graduate students and 1 post-doc participate. Work on cathode spatial resolution. Leads to NIM paper.

1997 – T.F., and 2 post-docs participate. Work on cathode and anode data analysis.

1998 – T.F., 2 post-docs and 1 engineer participate. Leaders in online data acquisition, pass-1 analysis and offline anode wire analysis.

H2 beam line – 250 GeV muon beam.
GIF facility – Cs gamma ray source with muon beam.

V. Other Work and Future Plans

A. Other Work

1) Designing chip and PC board test system.
2) Designed and built chamber PC protection boards.
3) Collaborating with PNPI on chamber gas and aging studies.

B. Future Plans

1) Complete analysis of 1998 testbeam run.
2) New submission of 16-ch chip in Nov. 1998.
3) Complete new 96-ch PC board by Dec. 1998.
4) Have prototype test station finished by Dec. 1998.
5) Test complete system at CERN testbeam during summer 1999.
6) Have "pre-production" chips and boards by end of 1999.