GEM TN-92-249

Central Tracker IPC Test Beam Planning Meeting - Duncanville

December 8, 1992

Abstract:

Agenda, attendees, and presentations of the GEM Central Tracker IPC Test Beam Planning Meeting held at the Holiday Inn in Duncanville, Texas on December 12, 1992.

Central Tracker
IPC Test Beam Planning Meeting, 12/8/92

The following chart summarizes my understanding of the responsibilities we agreed to for the 1993 test beam preparations. If your name is listed for something you did not agree to, please call it to my attention, and if your name is not listed for something that you did wish to undertake, I'd like to know that too. Kate Morgan

The agenda and copies of the transparencies presented at the meeting are also included.

Attendees:
Jim Musser
Chuck Bower
Irwin Sheer
Rick Shypit
Jenny Thomas
Melynda Brooks
Shawn McKee
Basem Barakat
Jim Brau
Dave Lee
Kate Morgan
George Yost

CT Test Beam Responsibilities

	Item	Person Responsible	Date Required	Date Expected	Back up or Assistance
	IPC System	**Basem Barakat**			
	Prototype	Basem			
	Electronics	Jim Musser			
	Mech. support	Basem			Gary Word
	HV and cables	Basem			
	Gas System	(Dick Plano)			Musser/J. Thomas
	Cooling	not req.			
	Silicon Telescope	**Saj Alam**			Dave Lee
	Detectors	Alam			
	Electronics	Alam			
	Mech. Support				
	LV, cables, cooling	Alam			
	Trigger System	**Jenny Thomas**			
	Scint. + PMT's	Jenny			
	Logic				
	HV and cables				
	Mech. supports				
	DAQ	**Rick Shypit**			
	Work Station	Rick			
	Fastbus Interface	Gary			
	On line program	Jenny/Rick			
	On line diagnostics	Rick			
	Off line analysis	Gary			
	Schedule, coord.	**Kate Morgan**			

Test Beam Meeting
Duncanville Holiday Inn
December 8, 1992

Agenda

1)	Potential Test Beam date and location	George Yost
2)	Define IPC tests	Jenny Thomas and all
3)	Define hardware needs	Rick Shypit and all
4)	Assign Responsibilities	All
5)	Discuss Silicon tests	Jim Brau and all

12/11/92-KM

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Presentation by:

George Yost

George Yost 1

TEST BEAMS ISSUES FOR TRACKING

12/92

Brookhaven — F.T. Running for 3 months in '93, beginning June.

But — may be canceled due to costs.

We will apply pressure. SDC will join. (probably)

Will be discussed at Executive Committee meeting.

Beam availability, energies, not clear.

We can specify needs, let BNL squeeze us in.

There will be 1 dedicated test beam ≤ 9 GeV

other beams: Run during heavy ion running?

e.g., Au → tgt → π's 11-12 GeV/nucleon

may occur before June.

FY'94 running: Possibly Sept - Oct '93

OTHER LABS

SLAC – Not in 1993. Only gives e^+ anyway

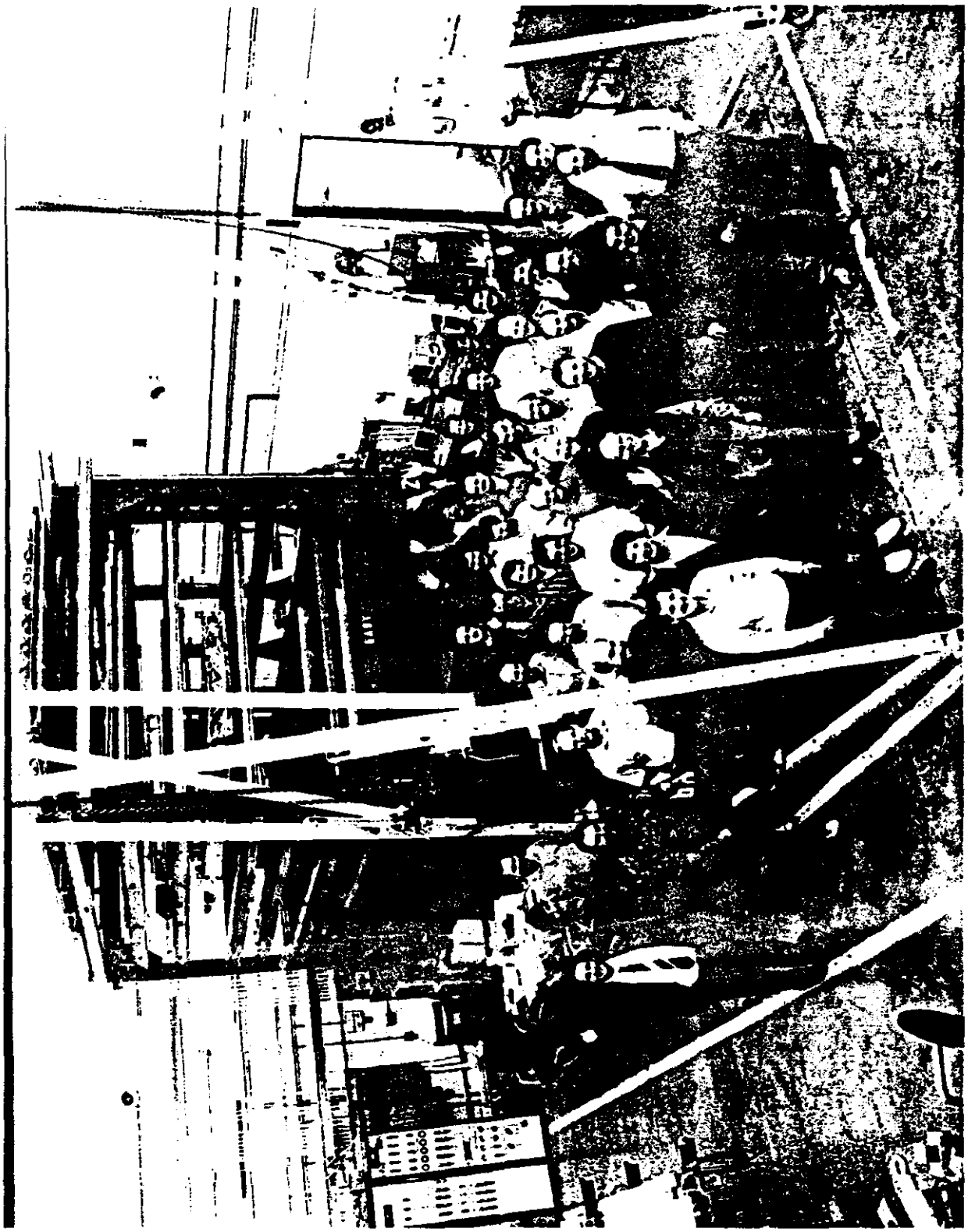
Serpukhov – Possible, but extremely difficult

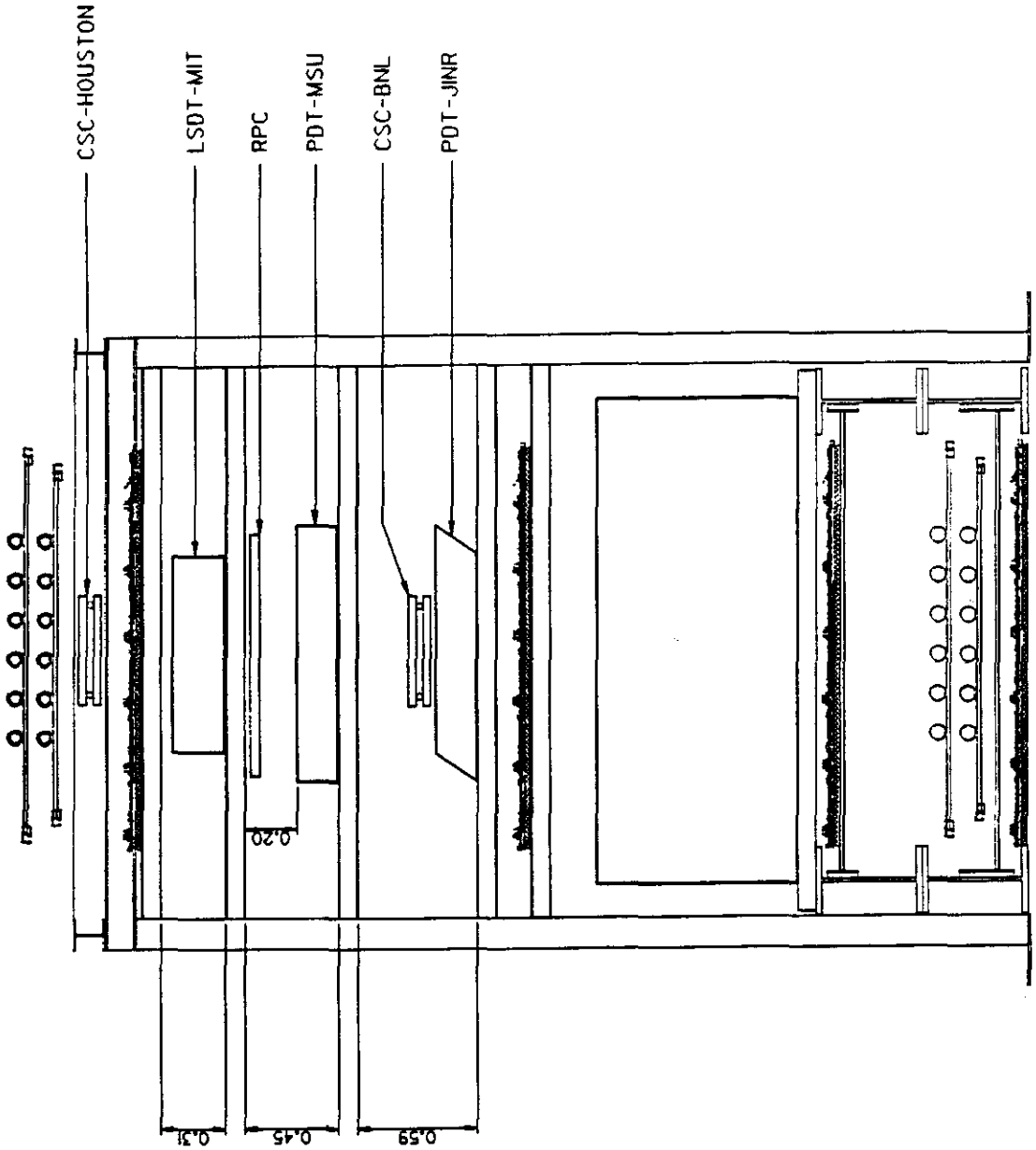
CERN – Possible. Lab wants to wait before opening negotiations.

Tracker needs are not severe (in '93).
Muons will do (I assume).
Should be possible to piggyback on somebody.

However, not as easy as BNL, even if CERN does not charge for beam time.
Extra cost for keeping people there, extra costs for equipment, computer time, whatever.

(2)





INSTALLATION IN TTR - EAST FACE

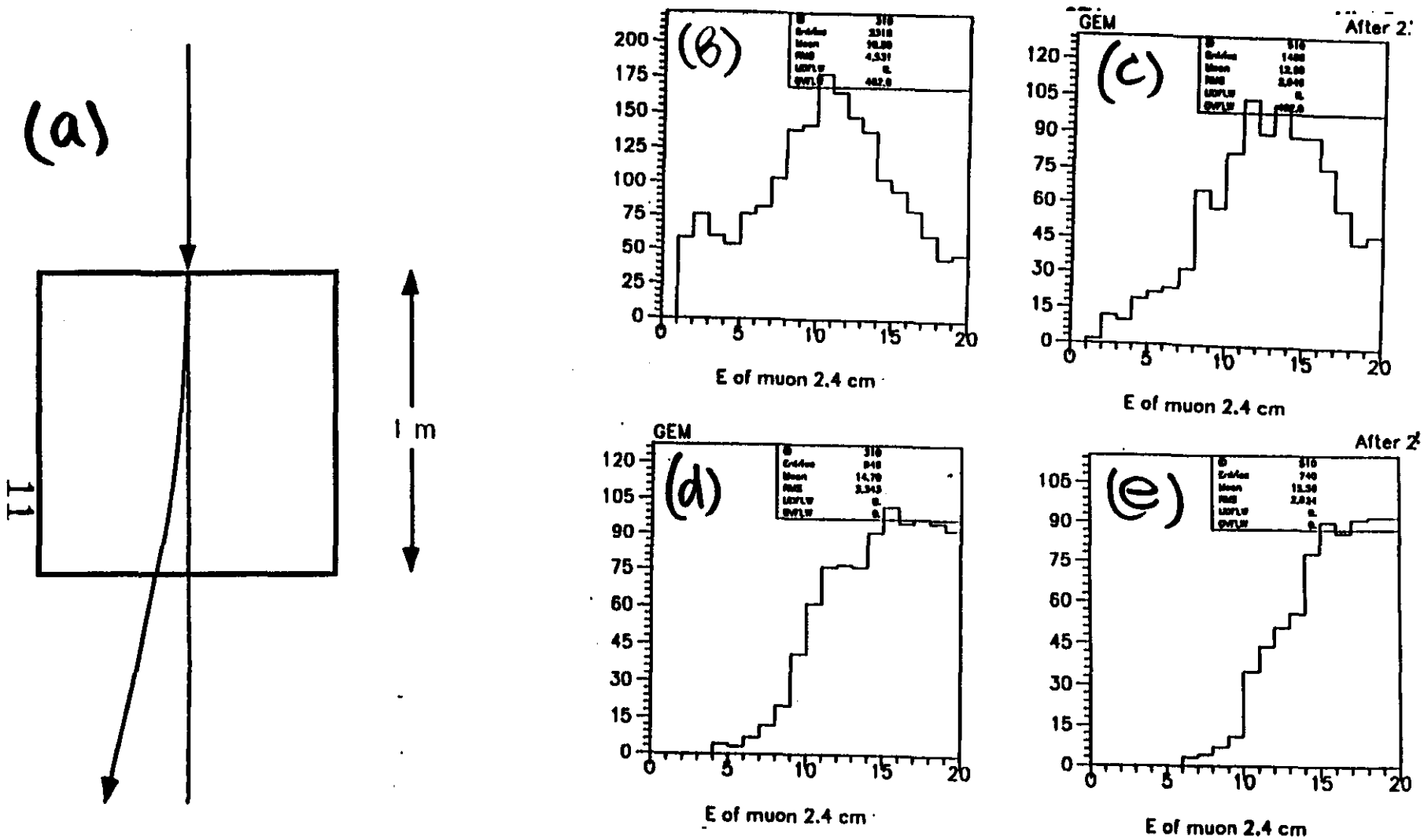


Figure 5: Muon Spectra for a 1 m Fe magnet with a 1.5 T field: (a) Layout of the 1 m magnet configuration; (b) Muon energy spectrum after a cut of 2.4 cm on track deviation in the magnet; (c) same as in (b) with the 2σ cut on deviation in another plane is applied; (d) Efficiency of the cut in (b) versus muon energy; (e) same as in (d) with the 2σ cut on deviation in another plane applied.

A QUESTION:

SWITCHED vs SPLIT test beams

@ SSCL

SWITCHED ⇒ 1 BURST TO EACH BEAM IN SEQUENCE.

WORST EFFECT: 1 BURST/24 seconds

vs 1 BURST/8 seconds

Depending on how many beams are in use and what energy they are running at.

Run @ 3x the flux to compensate??

Cost savings to test beams program:

1.8 M $

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Presentation by:

J. Thomas

J. Thomas

TRACKER TESTS

IPCs

cosmics?

✓ • RESOLUTION – MIN I

• HIGH RATE RUNNING ~16ns / track

✓ + SOURCE • SPACE CHARGE

✓(? + SOURCE) • ELECTRONICS FAST

Si

• RESOLUTION

DO WE REALLY NEED IT? 1 Hz = 86K / DAY

$, TIME VS NO BEAM WHEN WE GET THERE

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Presentation by:

Rick Shypit

Rick Slypit

DAQ FOR CENTRAL TRACKER TEST BEAM 8/12/92

two observations ① we need a DAQ system
② we don't have one

NEED TO BALANCE

Capabilities/performance desired of the DAQ against manpower/$cost needed to assemble it.

Some Considerations

1. portability - the whole system travels (road show)

2. calibrations, monitoring need to be run onsite possibly frequently (after electronics repair/replacement
after gas mishaps

3. have inhand, onsite all the tools one has learned to use to make sense of the test setup, data, calibrations, etc...

eg: PAW, CERN libraries ⇒ "workstation" PC

4. instrumentation, channel count, data rates need info to ascertain minimum DAQ requirements

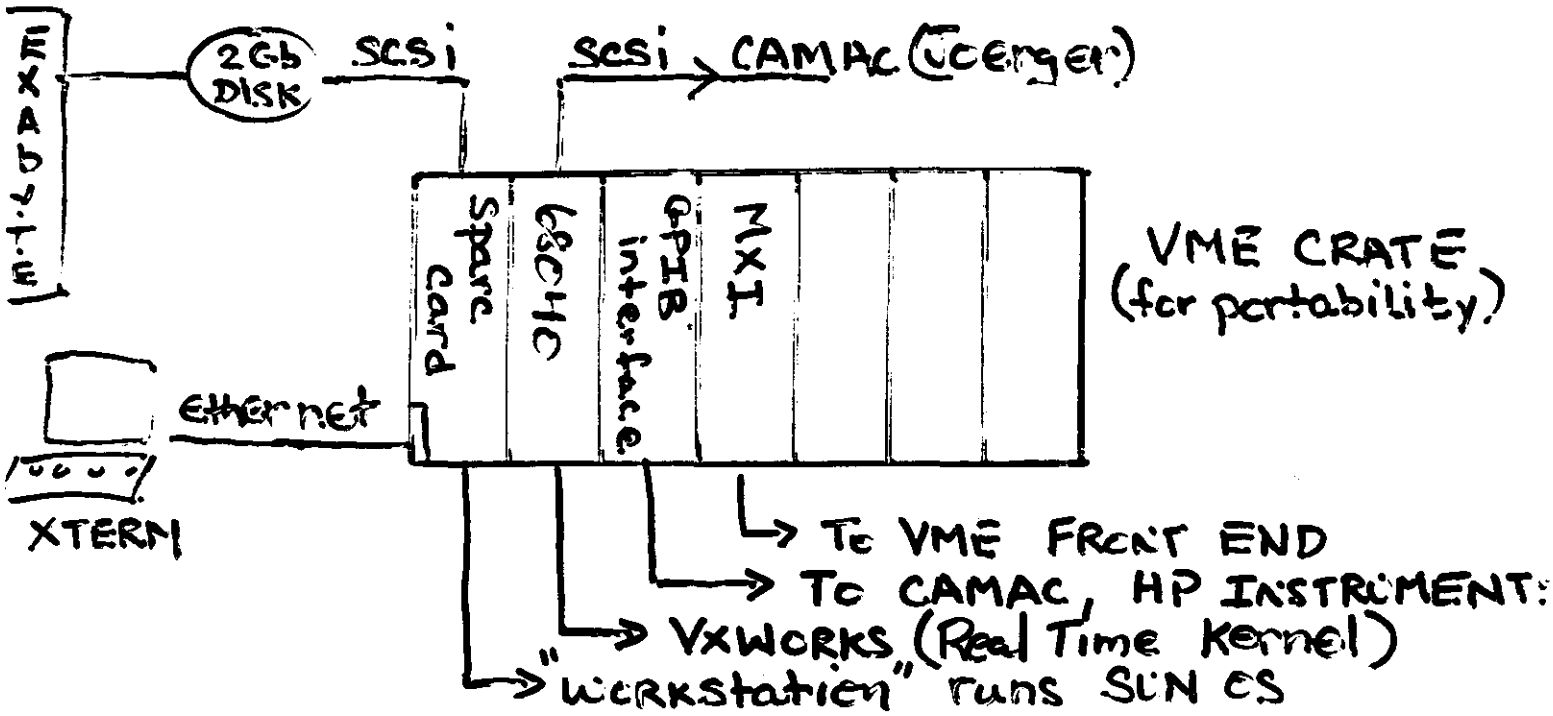
5. Permanent recording medium

- floppies
- Scsi hard disks (2 Gbytes)
- efabyte
- optical disk ?

] easy in workstation environment

DAQ System Supported by SSC DAQ group (M. Botlo et al.)

- offers best overall capabilities / performance
- supports multiple front ends (CAMAC, VME, GPIB but not FASTBUS yet)
- expandable and upgradable



Sparc card: "workstation environment" – real computer
runs SUN OS
32 mbytes core memory
ethernet controller – xterminal
– network access
scsi devices (hard disks, exabyte ...)
MAIN FUNCTION: data recording, histo, analysis

68040: runs VXWORKS (real time kernel) {6 μs interrupt service / 1 ms for SUN}
tested and approuved
{ on board scsi interfaces to CAMAC via Joerger control
(received at SSCL ~1 week ago for evaluation)
NO LAM CAPABILITY! good reason to offload from workstation
* low level drivers written inhouse
MAIN FUNCTION: event readout
event builder / formatter

GPIB controller: interface to CAMAC
" " Printers, plotters
" " HP INSTRUMENTS (voltmeters
Function Generators, etc. --

MXI: interface to VME FRONT ENDS

$$$$$

Spare card	7,000	
SUN CS	1,500	
68 K processor	1,300	model 162 - no ethernet, slower memory inhouse development board (147, 167) cost $4,500
VXWORKS	200	operating kernel
Joerger scsi → CAMAC controller	1,600	
2 Gbyte Scsi hard disk	2,000	
VME CRATE	2,000	
PV-WAVE	500	commercial histogramm (almost real time PAW too slow)
GPIB	1,000	VME CONTROLLER - run hp instruments

$17,100

+ Scsi cables
+ EXAbyte
+ XTERMINAL
+ Printers, plotters

A FEW MORE REMARKS

* Continuing support for this system
  ... likely to be long lived
  - accelerator division using this idea
  - emerging as the lab standard
  - may be incarnated elsewhere

* continuing development, will not go the way of the dinosaurs
  - interest in VIC BUS
  - hp alternative to sparc card (cheaper) will be evaluated
  - I/o module to trigger different event types
    data
    calibration
    pulser runs

* low level drivers written inhouse
  almost no reliance on proprietary software

* working 'model' exists at TTR
* standard/documented data format exists

EVENT HEADER
{ group header { data { {
TRAILER EVENT CHECK

obvious advantage for data export – presumably many GEM INSTITUTES WILL WANT THE DATA

ALTERNATIVE: PC system
SOME OF US may be spending years in test beam – should take care not to be under-equipped in the area of DAQ

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Presentation by:

Jim Brau / Ray Frey

R. Frey
Oregon

Silicon Beam Tests?

- GEM-like detectors + GEM-like electronics
  - ↳ Winter '93 ?
  - ↳ Spring '93 - Los Alamos
    - ? - others
  - ⇒ Late summer - Fall time early
- Earlier Tests?

  To the extent that detector questions are factorizable, it would be sensible to test with non-GEM electronics.

  - 18 cm ladders
  - high rate
  - resolution ($\geq$ 3 layers)
  - ?
- Combine with IPC test if possible

Beam Lines

- Brookhaven: New B2 beam line

  $p \lesssim 9$ GeV/c

  rate $\lesssim 10^6$ Hz

  $\sigma_x \sim 2$ cm , $\sigma_y \sim 2$ mm

  pions ; $e^{\pm}$ at low level – 2 Čerenkov detectors

  1993 Run : ~ June 1 — ~ July 1

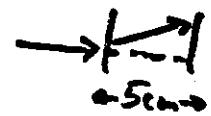
- TRIUMF, LAMPF :

  $p \lesssim 500$ MeV/c

  $$\theta_{ms} \simeq \frac{14}{500} \cdot \sqrt{0.1} = 9 \text{ mrad}$$

  3 in rad

  $\rightarrow \sigma_x \sim 400 \mu m$

- CERN? (LHC)
- FNAL??