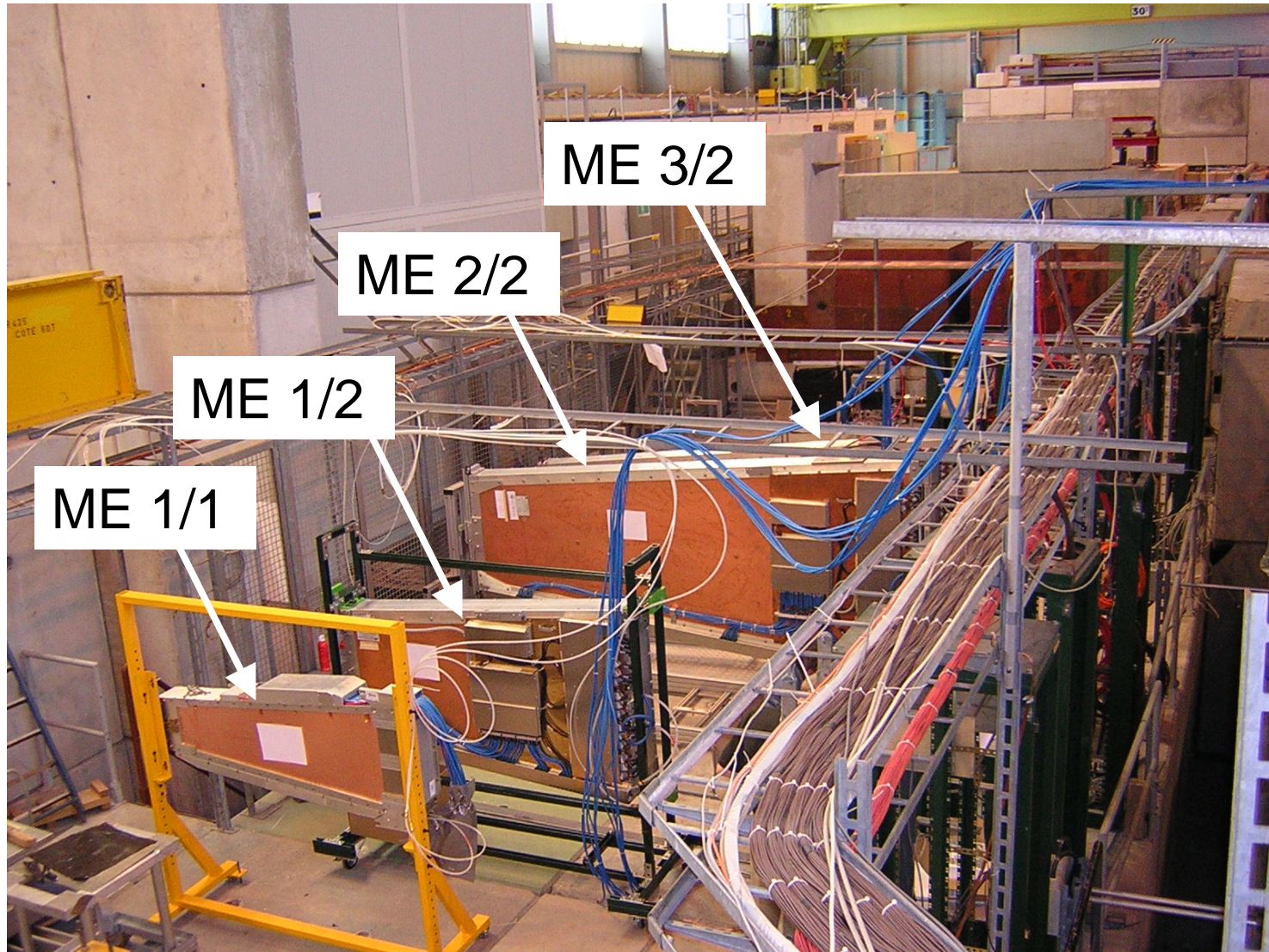


2004 CSC Beam Test Status

Darin Acosta



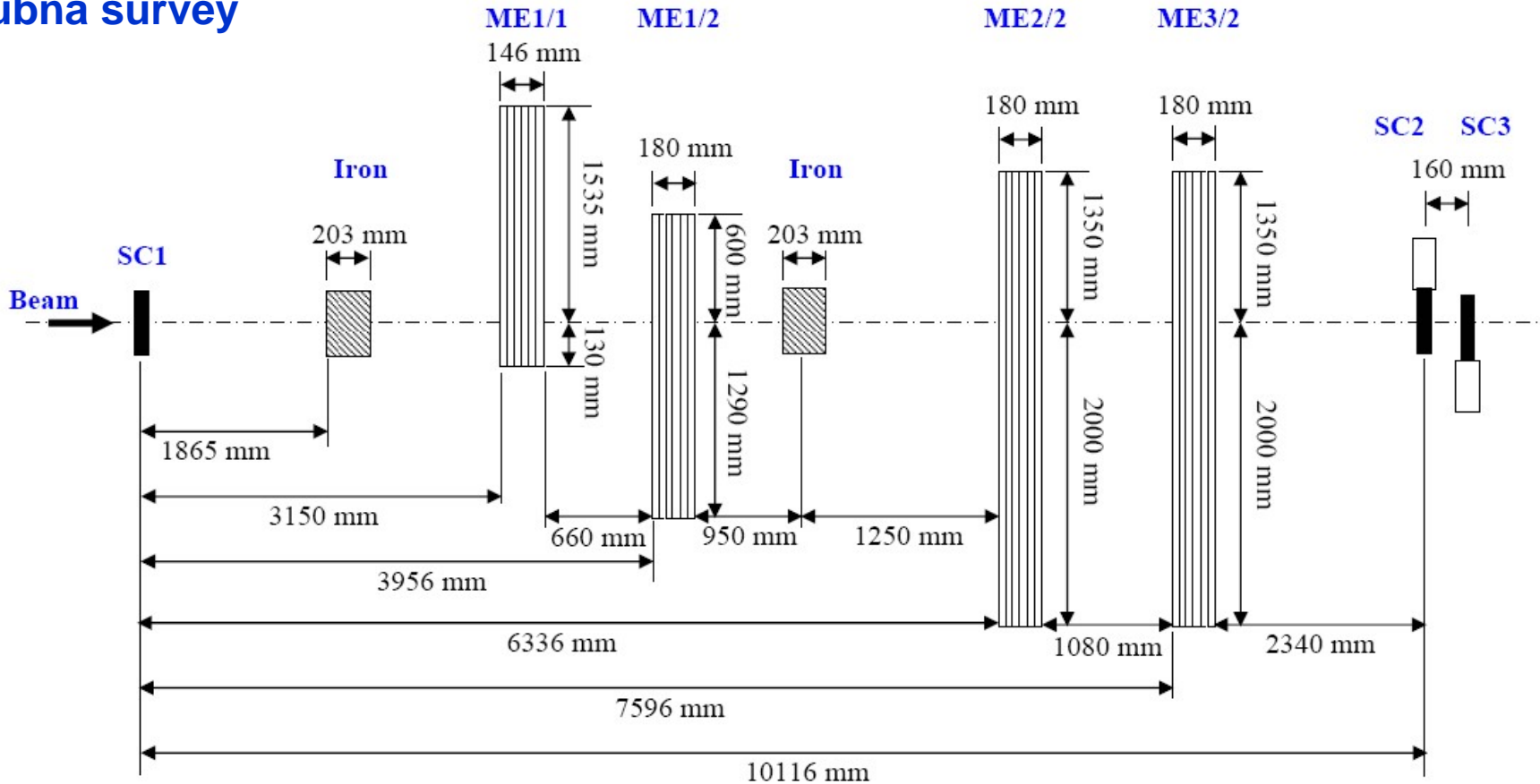
Initial CSC Arrangement





Initial Geometry

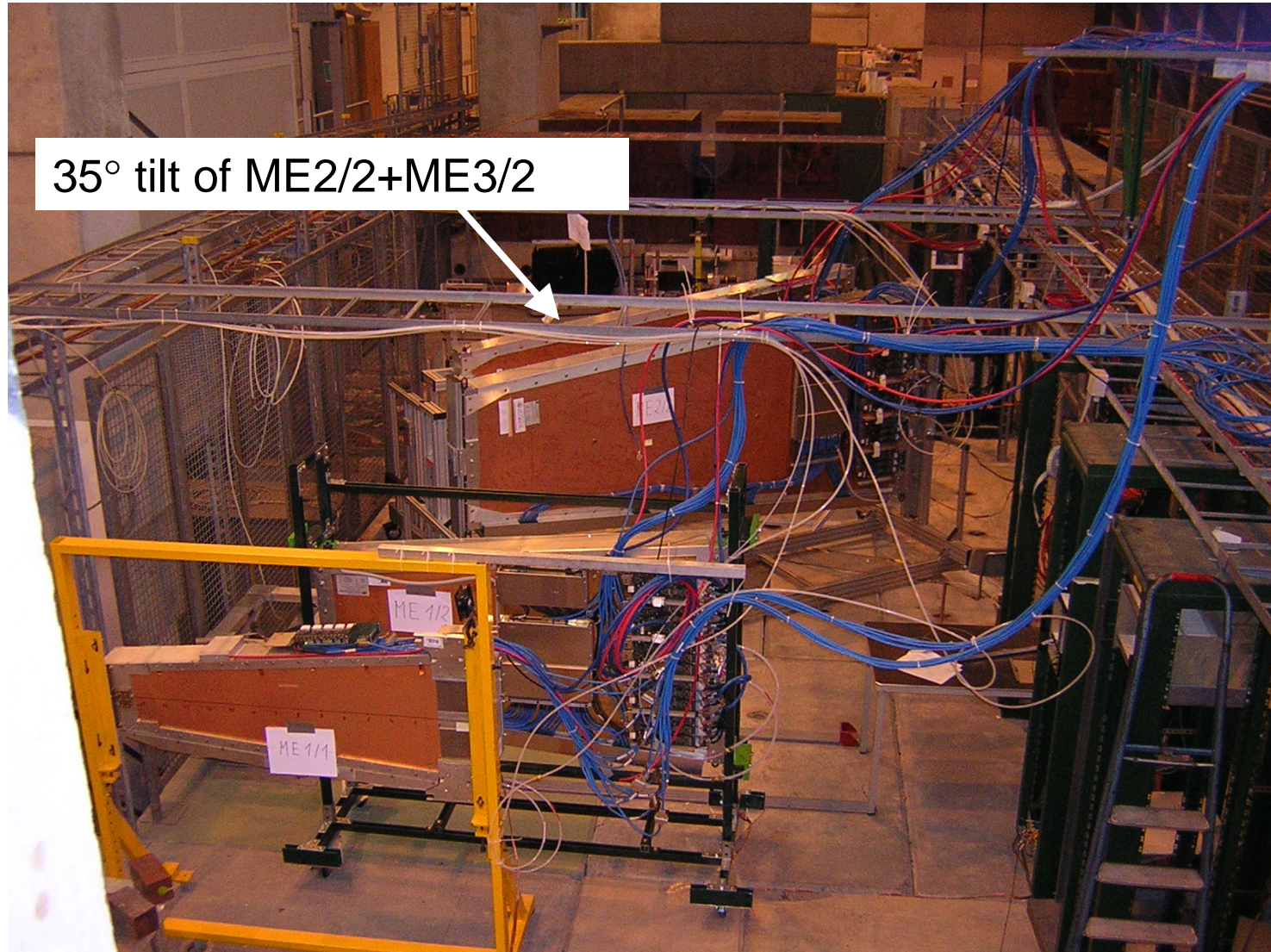
Dubna survey



X5A counting room

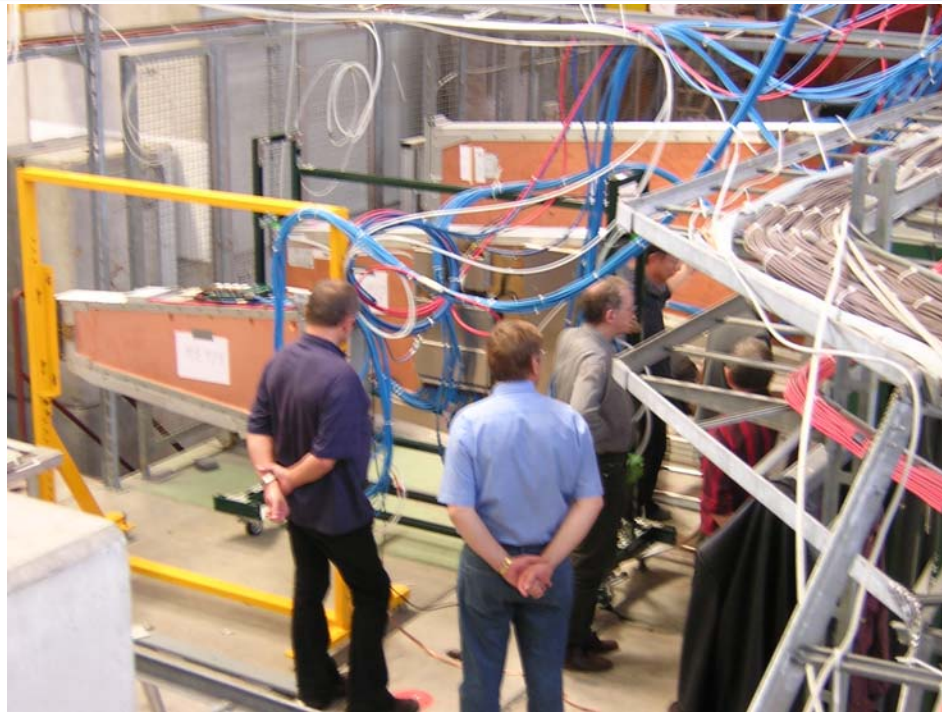


Current CSC Geometry



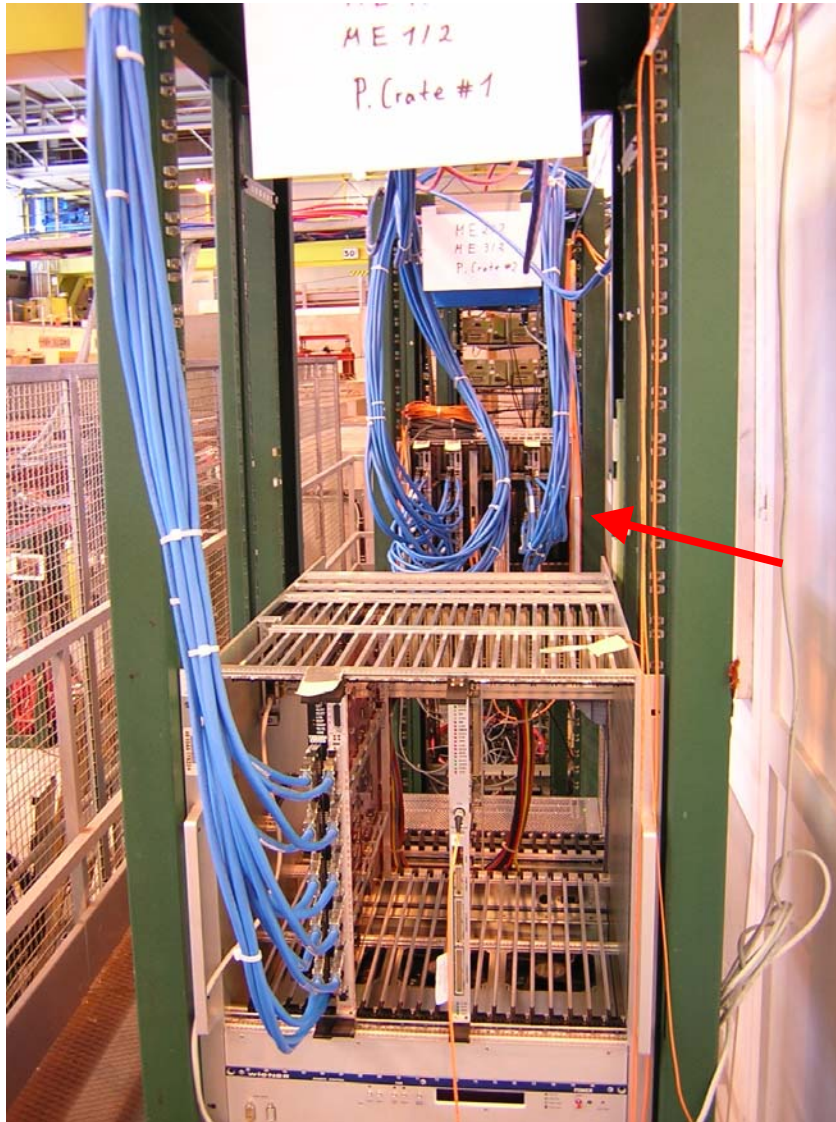


CSC Checkout with ISR Software



- **After installation, ISR + Dubna teams checkout CSC performance with FAST DAQ**
- **HV settings:**
 - ◆ **ME1/1: 3.0 kV**
 - ◆ **ME1/2, ME 2/2, ME3/2: 3.5 kV**

Peripheral Electronics

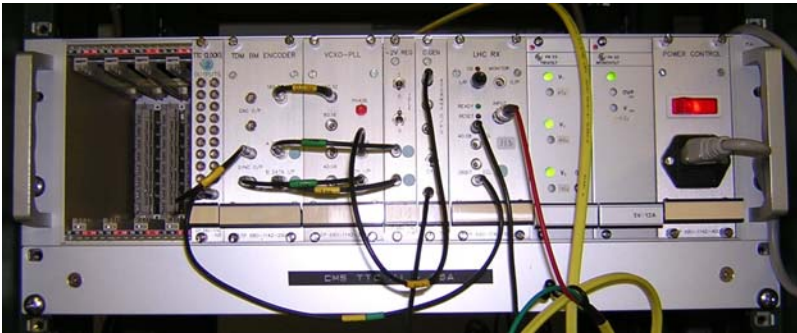


- **Two peripheral crates installed:**
 - ◆ Possible multi-crate control
 - ◆ Multi-MPC to Track-Finder test
- **Currently using just one crate, however**



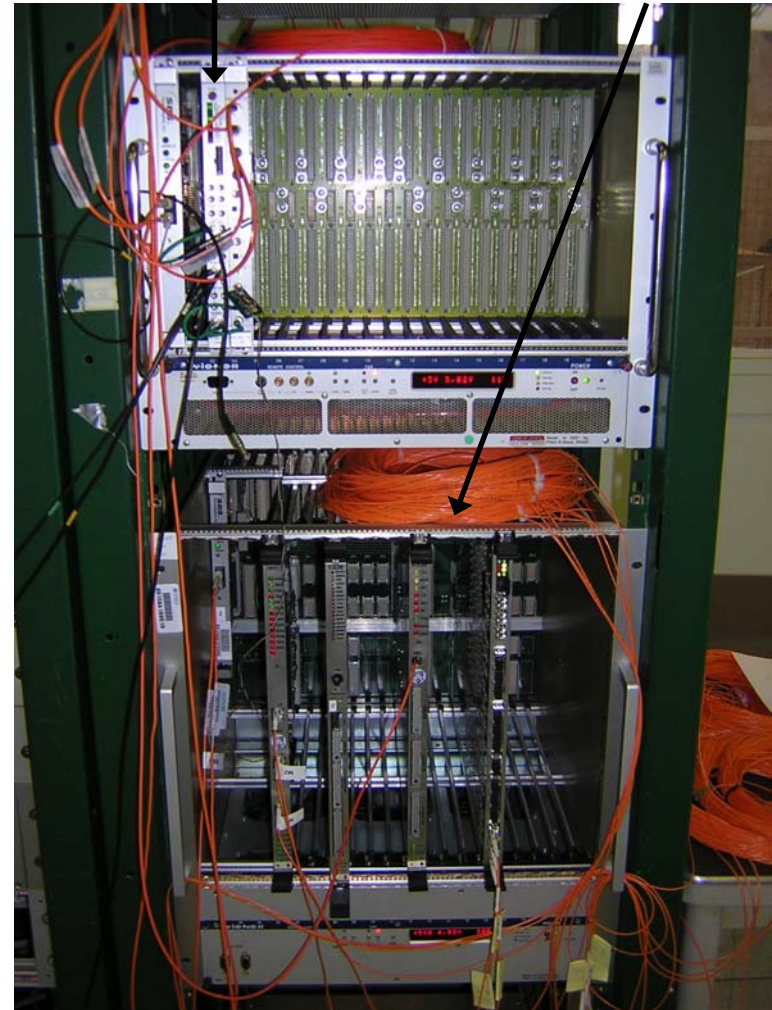
Track-Finder, TTC & Trigger Electronics

TTCmi crate
(not used for asynch beam)

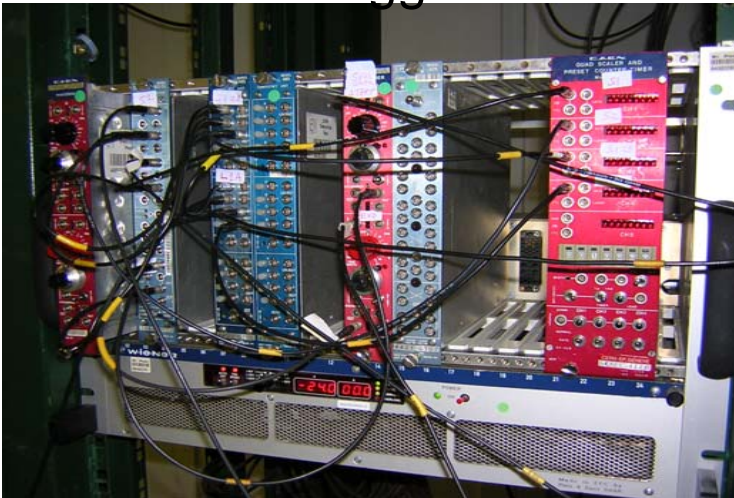


TTCvi crate

Track-Finder crate



NIM logic for scintillator-based L1A trigger





Beam Test Goals

- ◆ Test new CCB2004 with discrete logic (esp. during 25 ns beam)
- ◆ Test TMB2004 with RAT (RPC and ALCT Transition card)
- ◆ Use XDAQ-based (and unified) run control and event builder
 - Retire cfeb_control
 - New DAQ computer (RH9, dual-processor Xeon)
- ◆ Use fully functional Track-Finder system (Sector Processor – SP)
 - Full data format, self-triggering (L1A generation)
- ◆ Add in ME1/2
- ◆ Add in ME1/1
- ◆ Add an endcap RPC on ME1/2
 - Connect Link board to RAT, record RPC data in TMB
- ◆ Use new DDU+DCC (FED) developed by OSU
- ◆ Use new crate controller developed by OSU
- ◆ Test DCS prototype
- ◆ Test monitoring prototype
- ◆ Test new ALCT firmware with ghost-busting improvements
- ◆ Add a small block of iron absorber between to validate OSCAR/ORCA
- ◆ ...

} Muon slice tests!



May Test Beam Schedule

Period 1A 2004 May 17 to Jun 8

SPS243

Beam delivered early
14 May

n 1.7

(colour code: purple (dark) = scheduling meeting, light green (light) = weekend or holiday)

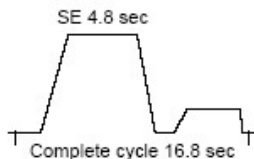
		Mon 17	Tue 18	Wed 19	Thu 20	Fri 21	Sat 22	Sun 23	Mon 24	Tue 25	Wed 26	Thu 27	Fri 28	Sat 29	Sun 30	Mon 31	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7	Tue 8
		Wk21	Ma	May	May	May	May	May	Wk22	May	May	May	May	May	May	Wk23	Jun	Jun	Jun	Jun	Jun	Jun	Wk24	Jun
Machine		Setup			Beam lost!				CPS M				CPS MD				Long MD + Scrubbing							
WEST AREA	T1 -X5	8h P Siegrist 105 X5A		CMS-CSC				120 GeV		8h P Siegrist 105 X5A 115 X5B		CMS-CSC/Tracker				120 GeV								
	T1 -GIF	8h S Zimmermann 125 X5C (GIF)		ATLAS-RPC						8h H Reithler 125 X5C (GIF)		CMS-RPC												
	T1 -X7	8h W Dulinski 077 X7A		CMOS						8h R Lindner 097 X7B		LHCb-HCAL		8h R Lindner 097 X7B		LHCb-PS								
NORTH AREA	T2 -H2	8h D Lazić 172 H2A		CMS-HB/HE																				
	T2 -H4	8h R Wigmans 134		DREAM						9h M Haguenaier 164 H4B		CMS-ECAL												
	T4 -H6	8h P Schacht 166 H6C		ATLAS-EMEC/HEC/FCAL																				
	T4 -H8	8h B Di Girolamo 158 H8A 168 H8B		ATLAS-Tilecal/LAr/Muon				250 GeV		8h B Di Girolamo 158 H8A 168 H8B		ATLAS-Combined				250 GeV -300								
	T4 -P0	8h V Kekelidze P42 - K12		NA48/2																				
	T6 -M2	8h G Mallot		COMPASS												+160GeV mu								

For further information contact the SPS/PS-Coordinator

Status: Approved 13-May-2004, modified 23-May-2004, 24-May-2004

SPS CYCLE

Protons	400 GeV	Approximate Intensities
MD	26 GeV	(10^{11} protons/pulse)
		T1: 20
		T2: 30
		T4: 30
		T6: 120
		Total: 200



Remarks

SPS/PS-Coordinator: Michael Hauschild
E-mail: SPS.Coordinator@cern.ch
phone: 73564 (ext. +41 22 767 3564)
mobile: 160143 (ext. +41 76 487 0143)

Discussion of P1A schedule on May 13 in the SPS users meeting
Discussion of P1B schedule on Jun 3 in the SPS users meeting



June Test Beam Schedule (25 ns)

SPS Operation

Period 1B 2004 Jun 8 to Jul 1

SPS244

Schedule issue date: 3-Jun-2004

Version 1.7

(colour code: purple (dark) = scheduling meeting, light green (light) = weekend or holiday)

		Tue 8 Jun	Wed 9 Jun	Thu 10 Jun	Fri 11 Jun	Sat 12 Jun	Sun 13 Jun	Mon 14 Jun Wk25	Tue 15 Jun	Wed 16 Jun	Thu 17 Jun	Fri 18 Jun	Sat 19 Jun	Sun 20 Jun	Mon 21 Jun Wk26	Tue 22 Jun	Wed 23 Jun	Thu 24 Jun	Fri 25 Jun	Sat 26 Jun	Sun 27 Jun	Mon 28 Jun Wk27	Tue 29 Jun	Wed 30 Jun	Thu 1 Jul
Machine		8 Long MD + Scrubbing							8-25ns---25ns---25ns---25ns-8				8 Scrubbing + Tech Stop							10 Long MD					
WEST AREA	T1 -X5								8h P Siegel 105 X5A 115 X5B 120 GeV CMS-CSC/Tracker				8h P Martinengo 105 X5A ALICE-HMPID							120 GeV					
	T1 -GIF	8h H Reithler 125 X5C (GIF) CMS-RPC							8h P Martinengo 125 X5C (GIF)							ALICE-RPC									
	T1 -X7								8h free							8h R Lindner 097 X7B LHCb-HCAL									
NORTH AREA	T2 -H2								8h D Lazic 172 H2A CMS-HB/HE/HO							8h D Lazic 172 H2A CMS-HF									
	T2 -H4								8h M Haguenaue 164 H4B CMS-ECAL							8h M Haguenaue 164 H4B CMS-ECAL									
	T4 -H6								8h TIS-RP 126 ATLAS-EMEC/HEC/FCAL							8h P Schacht 166 H6C ATLAS-EMEC/HEC/FCAL									
	T4 -H8								8h B Di Girolamo 158 H8A 168 H8B ATLAS-Combined							8h M Cobal 138 +180 GeV ATLAS-Pixel							+180 GeV (high int.)		
	T4 -P0								8h V Kekelidze P42 - K12 NA48/2-calibration							8h V Kekelidze P42 - K12 NA48/2									
	T6 -M2								8h G Mallot COMPASS-calibration							8h G Mallot COMPASS							+160GeV mu		

For further information contact the SPS/PS-Coordinator

Status: Approved 3-Jun-2004

SPS CYCLE

Protons	400 GeV	Approximate Intensities	
MD	26 GeV	(10 ¹¹ protons/pulse)	
		T1:	2
		T2:	2
		T4:	2
		T6:	2
		Total:	8



Remarks

SPS/PS-Coordinator: Michael Hauschild
 E-mail: SPS.Coordinator@cern.ch
 phone: 73564 (ext. +41 22 767 3564)
 mobile: 160143 (ext. +41 76 487 0143)

Discussion of P1B schedule on Jun 3 in the SPS users meeting
 Discussion of P1C schedule on Jun 24 in the SPS users meeting

Jun 14 - Jun 21:
 25ns bunched proton beam: 48 bunches, 400 GeV, 12.0 sec cycle, 2.2 sec spill length



Accomplishments

- **Using new Peripheral Crate software to control 4 chambers in one peripheral crate**
 - ◆ But logging data with DDU dump utility rather than XDAQ event builder
- **Started working with CCB2004 and TMB2004 right from the beginning**
 - ◆ Seem to be behaving OK, but can't sign off until data quality issues resolved and after 25 ns run
- **Track-Finder (SP) successfully logging data**
 - ◆ Separate control and DAQ system initially
- **DCS prototype working**
- **Monitoring prototype working offline**
- **Unified Run Control developed**

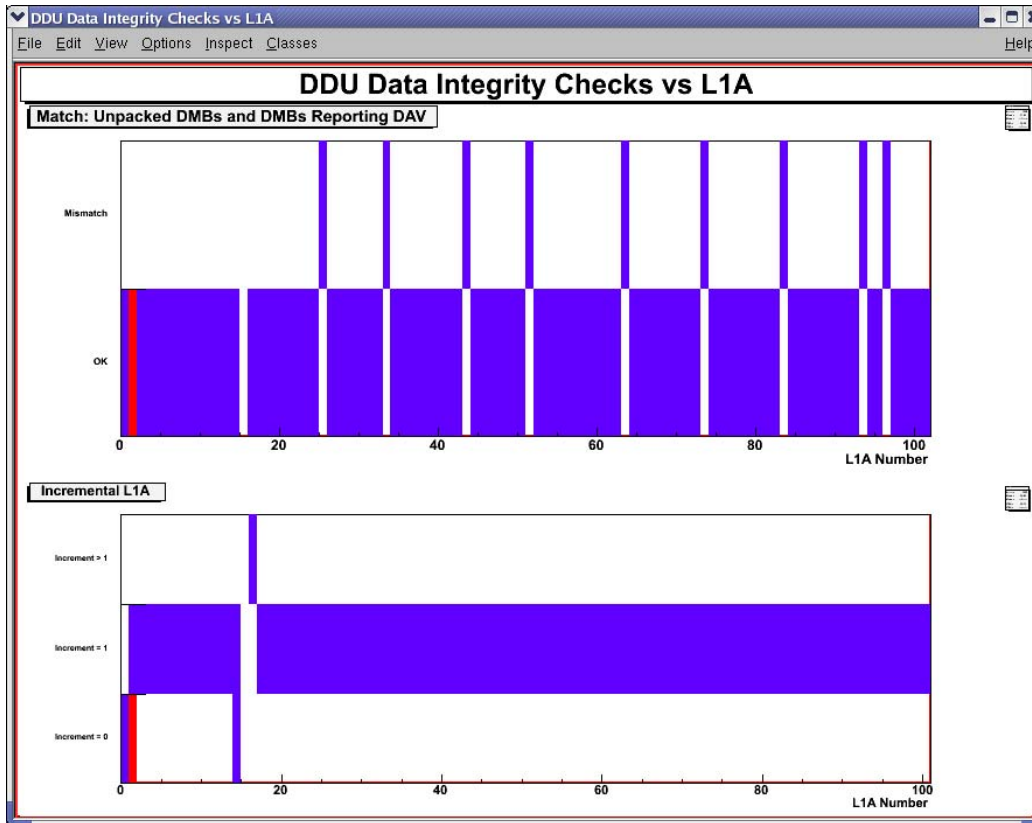


Problems Encountered

- **Some CFEBs and DMBs not getting programmed on power-up**
 - ◆ Solved recently with 2 hard resets issued by CCB (with 2 sec sleep between)
- **Driver reading DDU data in BigPhys memory hangs**
 - ◆ Serious problem holding up good data runs
 - ◆ Variable on when read gets stuck
- **Errors/bugs in DDU data unpacking**
- **“Interesting” mapping of CFEB channels in ME1/1...**
- **Cannot load new ALCT firmware in ME1/1**



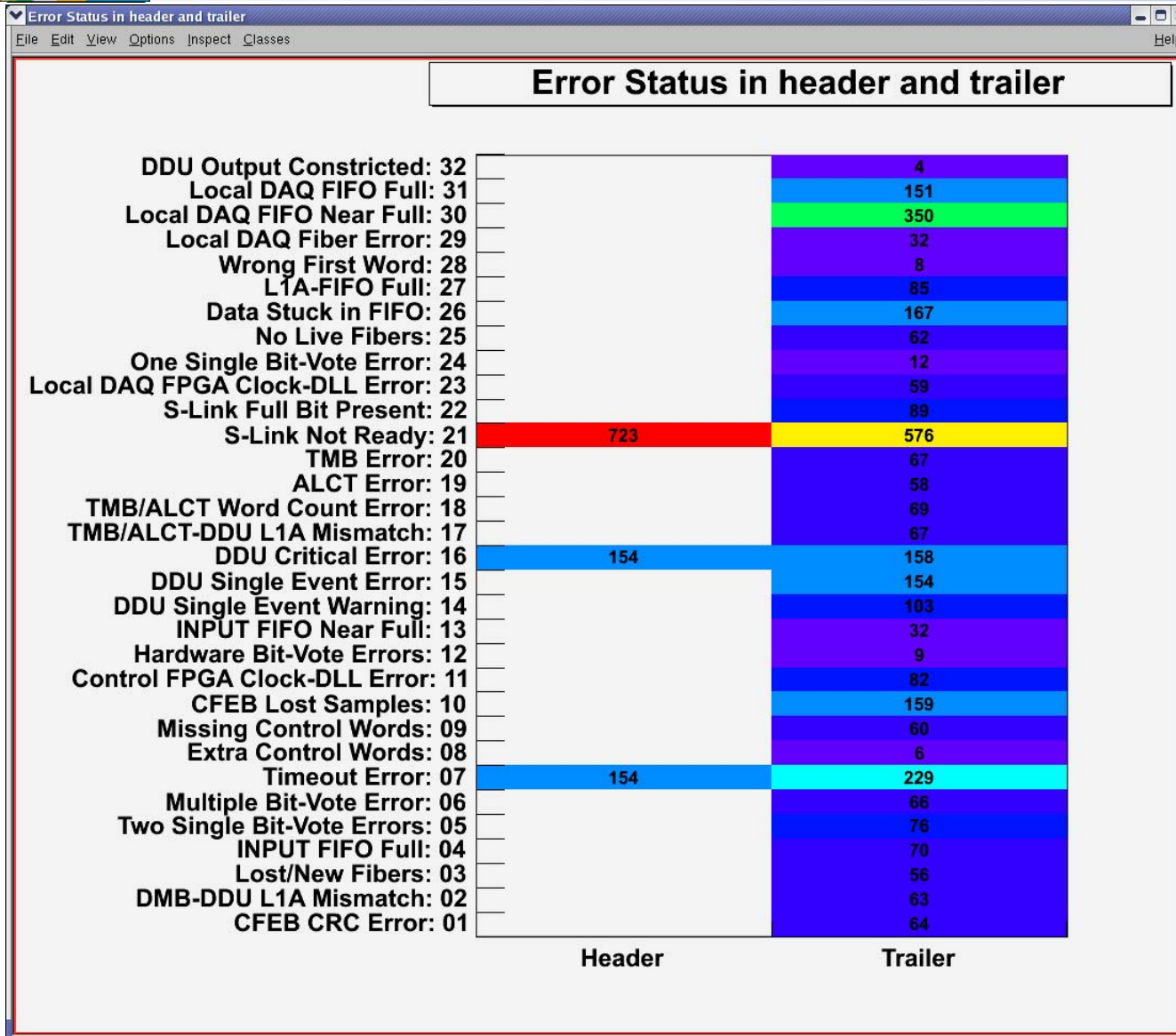
Monitoring Plots (Korytov et al.)



- **Data unpacking integrity**
 - ◆ Match/mismatch between number of unpacked DMB and number of DMB with DAV
 - ◆ Incremental L1A from DDU Header
 - >1 implies readout cannot keep up with rate



DDU Error stat word



Trailer unpacking still has bugs...



DCS

- Valeri Sytnik has working DCS prototype using PVSS II for EMU peripheral crate electronics
- Upgraded to handle TMB2004 and CCB2004 at beam test, and demonstrated to work
- Will need to resolve issues with sharing access to peripheral crate

The screenshot displays the DCS control interface. At the top, the 'System' is identified as 'CMS' with a state of 'ERROR'. Below this, a table lists sub-systems and their states:

Sub-System	State
DT	PHYSICS
CSC	ERROR
ECAL	PHYSICS
HCAL	PHYSICS
Tracker	PHYSICS

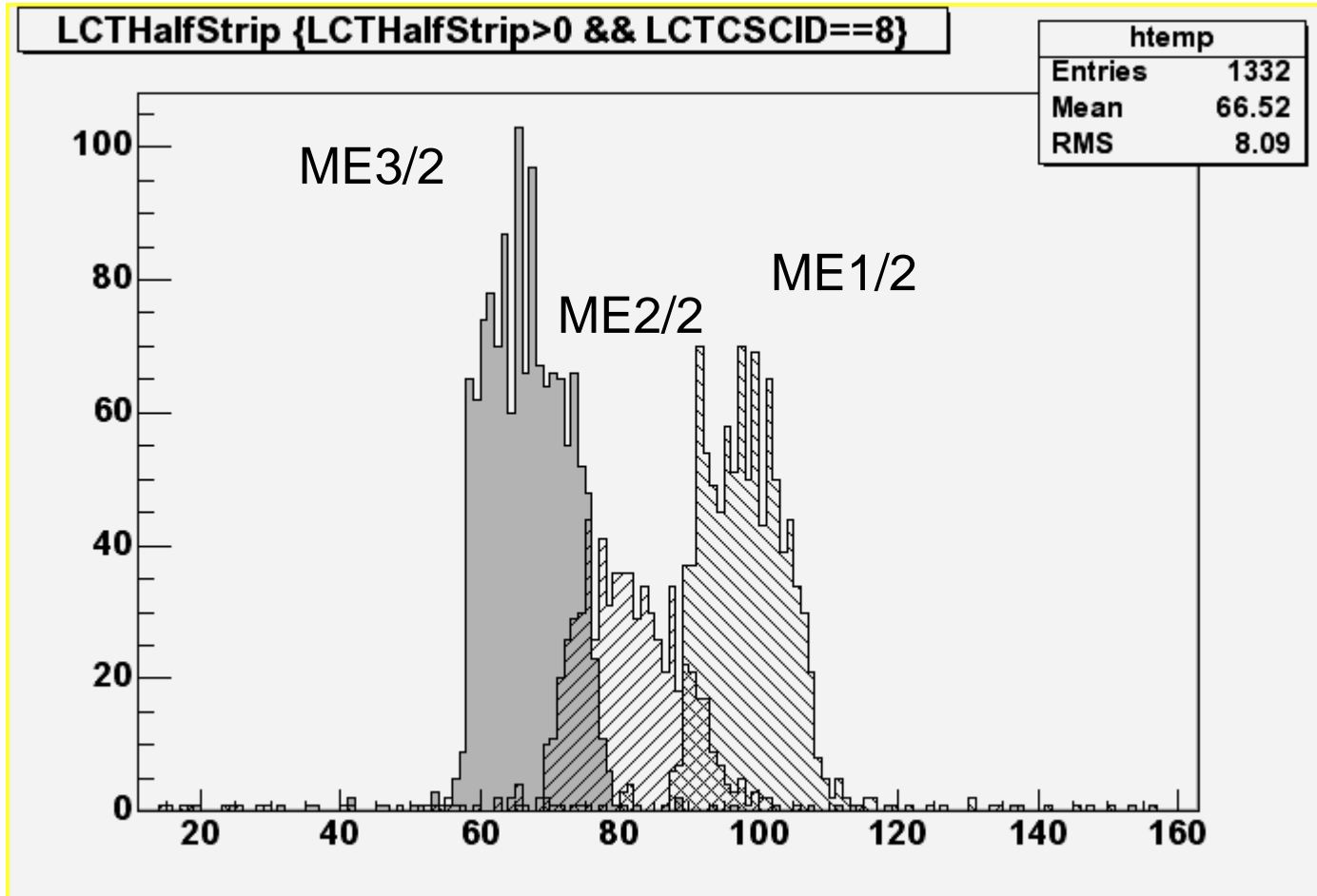
The main window shows a 3D model of the detector structure. A detailed view of the 'CSCdm4r2c01LV_1' device is open, showing its state as 'ERROR'. The 'gBrowser' tab is active, displaying 'CFEB currents' with a dropdown menu set to '1'. A table shows the following current values:

parameter	value
Cfeb#1 current 3.3	0.33665
Cfeb#1 current 5.0	5.12926
Cfeb#1 current 6.0	0.66323

Below the table, the 'POWER STATUS' is shown as 'ON' with a red button. A 'Messages' window at the bottom left displays an alarm: 'Alarm at: CSC,ME-4/2,CH#1,LV_1'. A 'Modes' window on the right shows 'CSCdm4r2c01LV_1 is Included' with an 'Exclude' button. A 'Close' button is located at the bottom right of the device window.



SP Input Data (LCT 1/2-Strip Distribution)





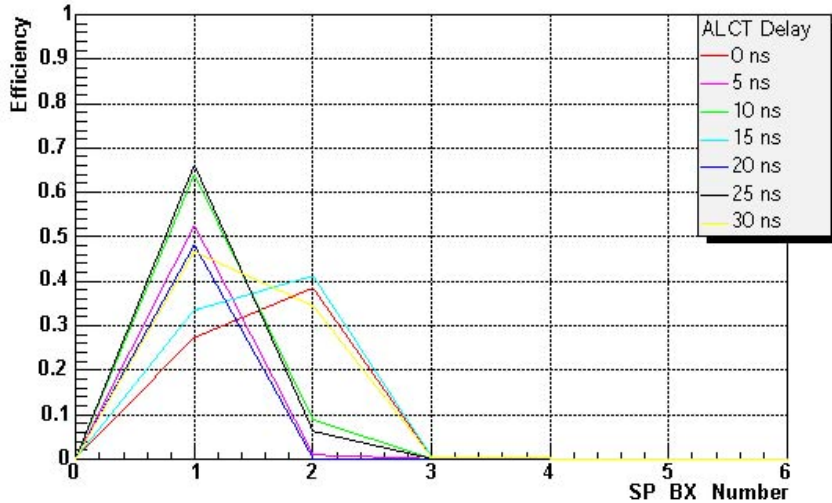
SP / TMB Data Comparison

- **Runs 77, 78:**
 - ◆ DDU and SP logged data simultaneously
- **Compare SP input with that expected based on TMB output:**
 - ◆ Take TMB data from DDU readout
 - ◆ Use ALCT BXN for BX assignment
 - ◆ Put LCT data through MPC simulation
 - ◆ Compare with SP input for 4 BX every L1A
- **Result (run 77):**
 - Number of L1A matches: 1000
 - Number of missed DDU events: 7
 - Number of missed SP events: 7
 - Number of mismatched MPC/SP events: 27
 - ◆ 97% agreement
 - ◆ Differences seem to be mostly data missing in the TMB/DDU readout when the LCT is has shifted by about 2 BX from nominal

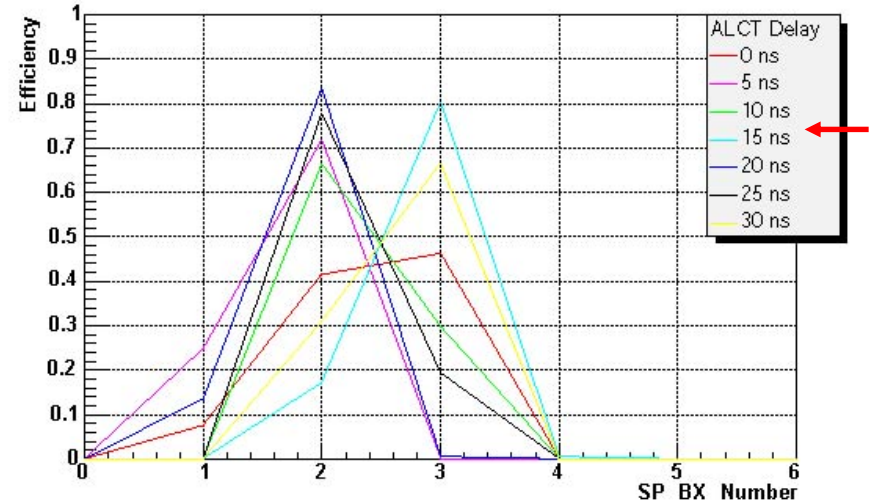


LCT Efficiency vs. BX (Read out by SP)

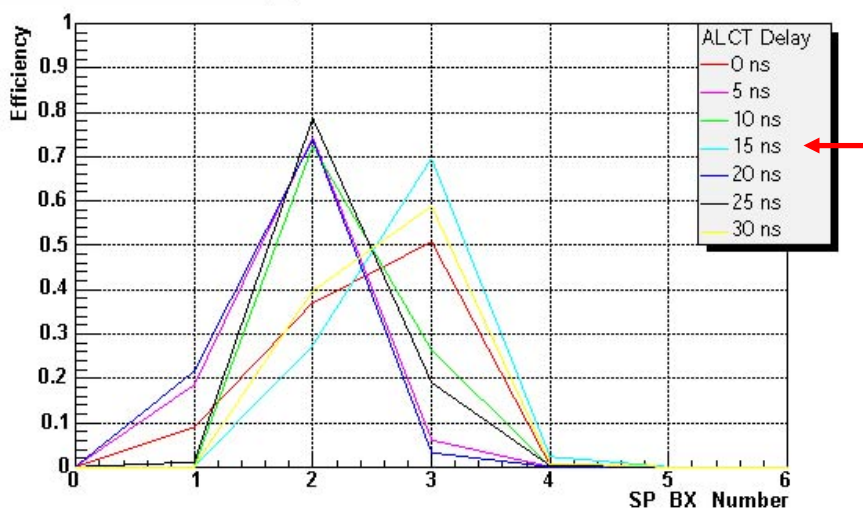
CSC #10 LCT Efficiency ME1/1 79.0% overall



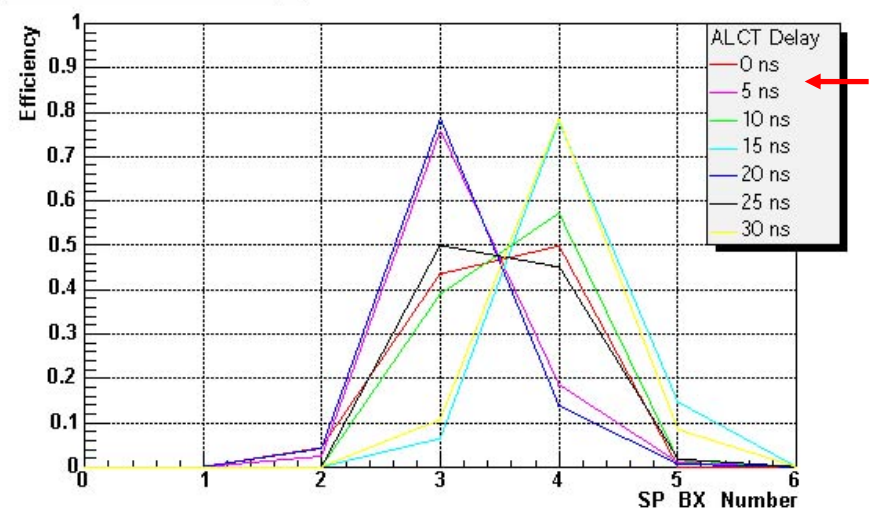
CSC #1 LCT Efficiency ME1/2 97.5% overall



CSC #3 LCT Efficiency ME2/2 99.0% overall



CSC #8 LCT Efficiency ME3/2 98.0% overall



→ To align CSC data in SP BX #3



ALCT Efficiency and Ghost Study

- **Several Track-Finder only data runs were logged by the SP DAQ program, for old and new ALCT firmware, various ALCT settings, and different incident angles**
- **Purpose is to understand accelerator and collision pattern efficiencies, as well as ghost rate**

- **Results:**

- ◆ **For 28° incidence, the ghost probability is 40–50% for collision and accelerator patterns on, as observed last year**
- ◆ **No difference with new ALCT firmware**
- ◆ **Ghost rate ~5% for collision patterns only**
- ◆ **No discrimination yet between accelerator and collision patterns, since latter includes former!**

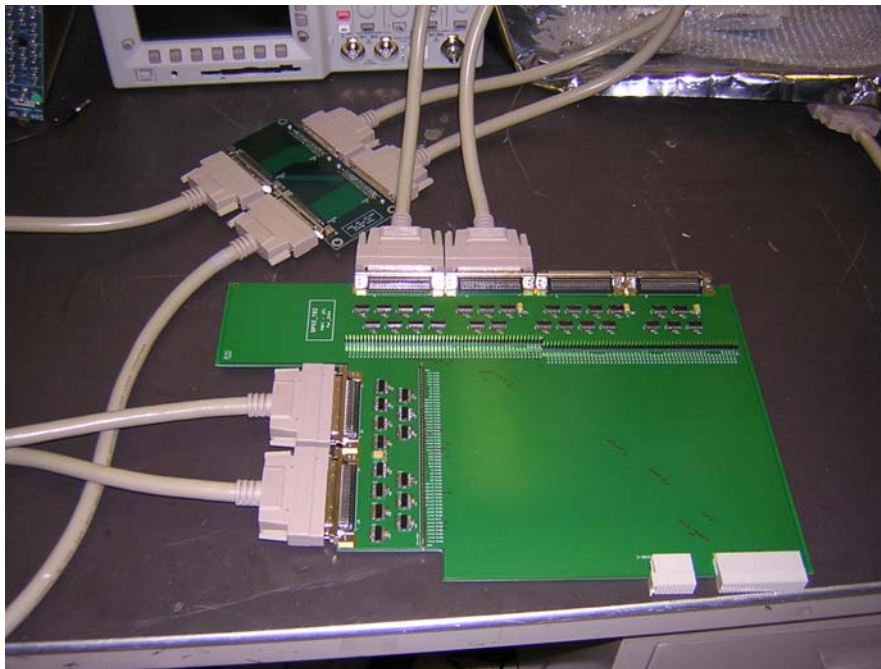
- **Will change collision patterns and re-study**

Pattern A:			
1y0	2	1	0
1y1	4	3	
1y2	5		
1y3	7	6	
1y4	10	9	8
1y5	13	12	11



DT/CSC Transition Card Test

- **While we were waiting for beam, managed to test a new DT/CSC transition card for the Track-Finder**
 - ◆ New design solves connector space problem
 - ◆ Tester board allows loopback test without DT Track-Finder
- **Data test succeeded, except for 1 broken backplane pin**





The CSC Beam Test Page, 2004

Test Beam May-June 2004

- Overall goals [[PDF](#), [PPT](#)]
- [News](#) (Updated daily)
- [Plot directory](#)
- [SPS Machine display](#)
- [2004 Run Database](#)
- 2004 CSC beam test configuration [[PDF](#), [PPT](#)]
- [Beam test geometry](#) (as of 28 May 2004) [[PDF](#), [DOC](#)]
- [RPC Status](#) (5/11/04)
- [Photos](#)
- [SPS Users Schedule 2004](#)
- [Equipment manifest](#) [[PDF](#), [XLS](#)]
- People's schedules and contact numbers at CERN [[PDF](#), [XLS](#)]
- Testbeam task list and schedule [[PDF](#), [MPP](#)]
- Testbeam data is archived at CERN here: [/castor/cern.ch/user/t/tbx5ccdr/tb2004/](#)
- [How to use the CERN Castor data storage system](#)
 - Use "rfdir" for ls, and "rfcp" to copy

Test Beam September 2003

- Preliminary results from CSC Test Beam, September 2003 [[PPT](#), [PDF](#)]
- [Online logbook area for September beam tests](#)
 - [Simpler view](#) (but not as up-to-date)
- [Scanned pages from general logbook](#) (mostly documents cfeb_control runs)
- [Scanned pages from Darin's SP logbook](#) (includes run info, QPLL results)
- [Test Beam Run-Log Database](#)
- [Test Beam web page by OSU for May/June 2003 tests](#)
- UCLA spreadsheet on useful trigger runs [[XLS](#)]
- [Test Beam web page by UCLA for May/June 2003 tests](#)
- Testbeam data is archived at CERN here: [/castor/cern.ch/user/t/tbx5ccdr/](#) and at FNAL here: [/pnfs/cms/emu/BT_Sep_03/](#)
- [Pictures by Jay H.](#)
- Spreadsheet on personnel and equipment manifest for Sept. 2003 beam test [[PDF](#), [XLS](#)]
- [Test beam task list](#)
- [General info on beam test and schedule](#)

News

SPS status

Contact info

Location of data
archived on Castor



Plans

- **DAQ:**
 - ◆ Solve driver issues
 - ◆ Verify data integrity
- **Track-Finder:**
 - ◆ Demonstrate track-finding, self-trigger experiment
 - ◆ Collect more data correlated with DDU
 - ◆ Tune ALCT patterns, take data with various ALCT settings
 - ◆ Multiple peripheral crates (multiple MPC's)
- **ME1/1:**
 - ◆ HV scan
 - ◆ Spatial scan
 - ◆ Iron absorber runs
- **Data analysis:**
 - ◆ Collect data with iron between CSC's, compare with simulation

Acosta, Darin	UF
Barashko, Victor	UF
Bondar, Nikolai	PNPI
Breedon, Richard	UCD
Case, Michael	UCD
Chertok, Max	UCD
Cox, Tim	UCD
Drozdetski, Alexei	UF
Durkin, Stan	OSU
Geurts, Frank	Rice
Gilmore, Jason	OSU
Golovtsov, Victor	PNPI
Golunov, Alexander	Dubna
Gray, Lindsey	UF
Gu, Jianhui	OSU
Karjavine, Vladimir	Dubna
Khabarov, S.	Dubna
Korytov, Andrey	UF
Kotov, Kostya	UF
Kraemer, Tami	USCMS
Lanaro, Armando	UW
Lee, Sang-Joon	Rice
Levchenko, Peter	UF
Matveev, Mike	Rice
Moissenz, Peter	Dubna
Movchan, Sergei	Dubna
Mumford, Jason	UCLA
Pakhotin, Yury	UF
Roberts, Jay	Rice
Scurlock, Bobby	UF
Sharma, Archana	CERN
Stoeck, Holger	UF
Sytnik, Valeri	UCR
Tsesmelis, Emmanuel	CERN
Trevino, Andrea	Rice
Tumanov, Alex	Rice
Uvarov, Lev	PNPI
Von der Mey, Martin	UCLA
Wilkinson, Rick	CIT
Yang, Xiofeng	UCLA

People

- **Thanks to everyone contributing to the beam test effort, especially those experts putting in countless hours in the control room**

