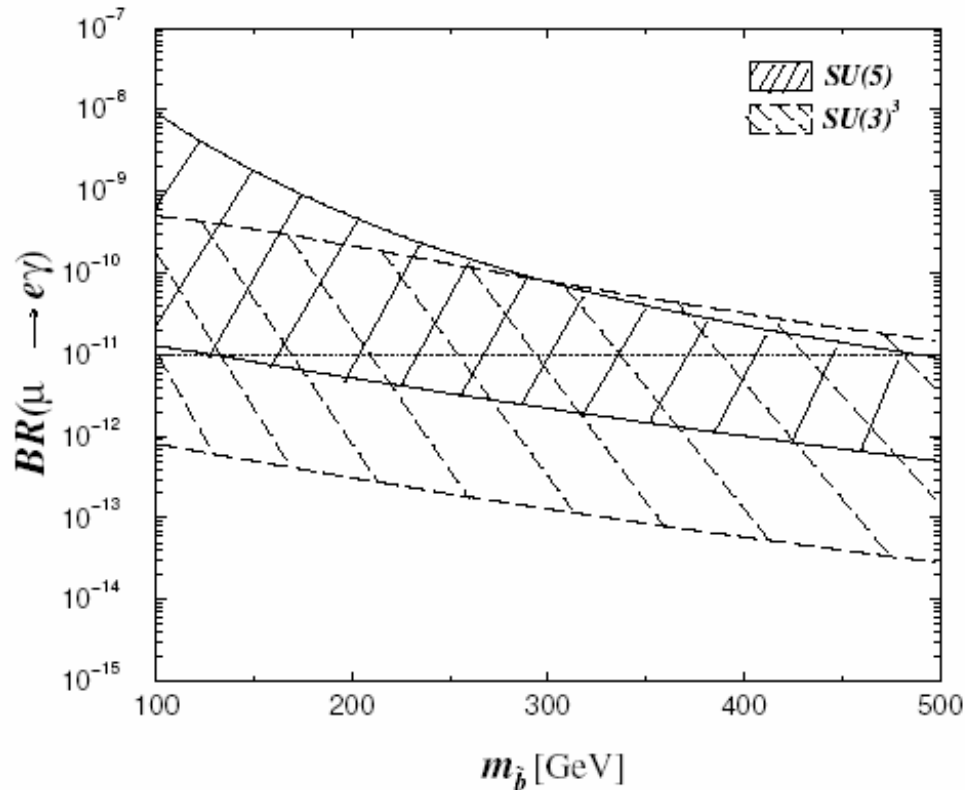


Prediction

W. Buchmüller (DESY)



arXiv:hep-ph/9912317 (1999)

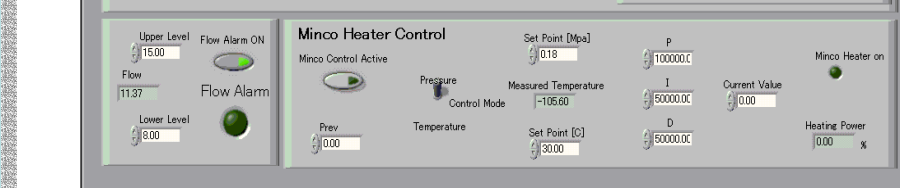
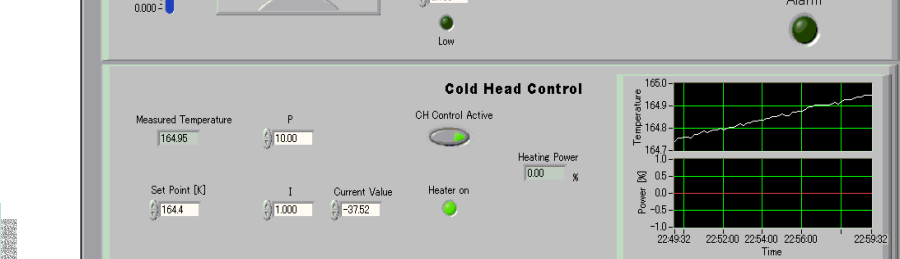
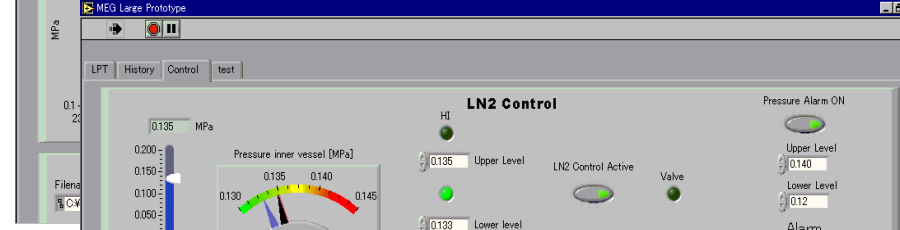
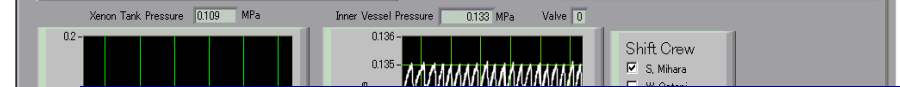
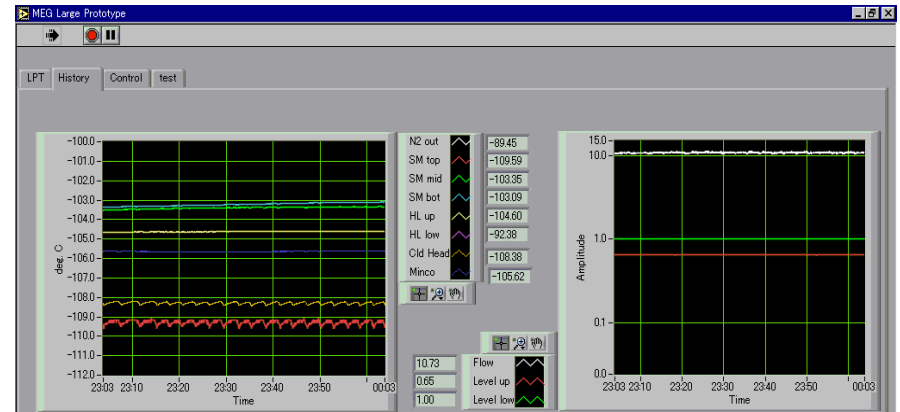
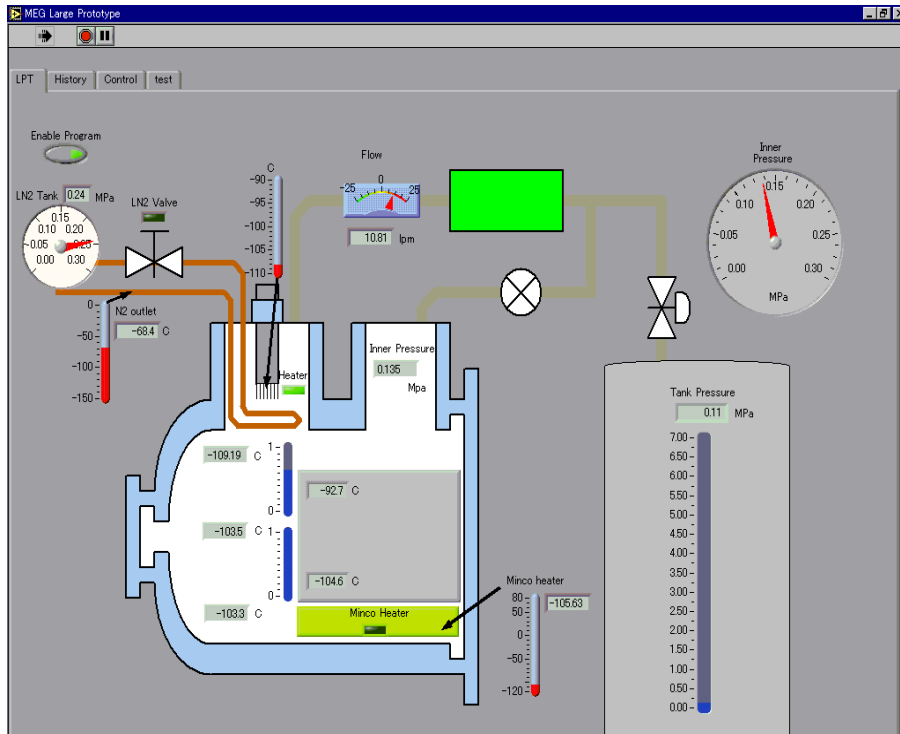
Computing

- DC track reconstruction
- Slow control system
- DRS sampling chip
- Software framework

Pattern Finding & Track Fitting

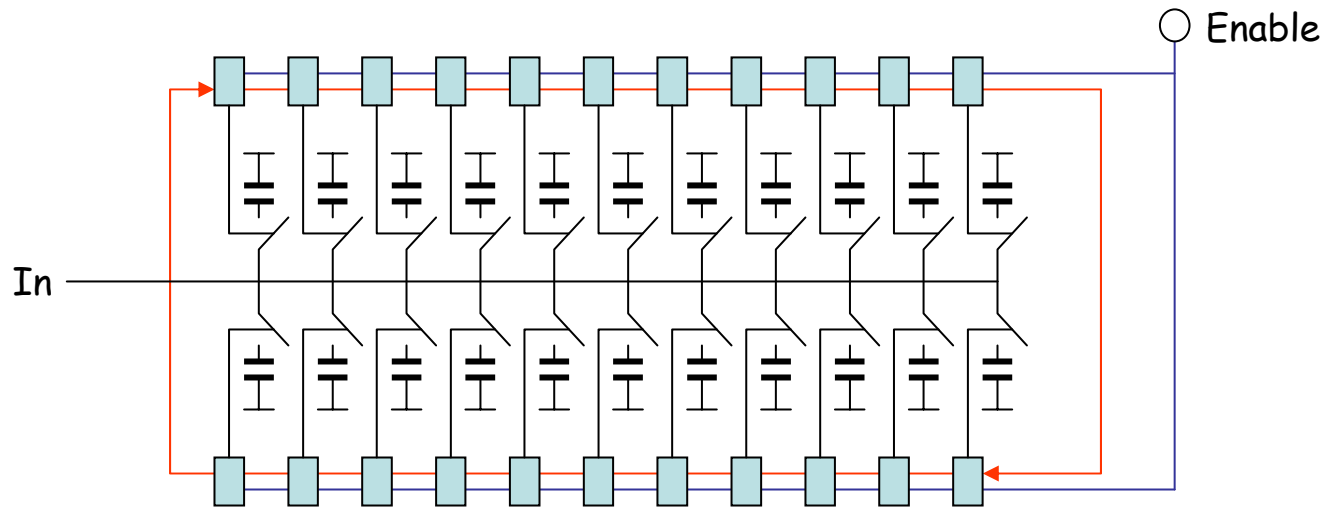
- Basic Track Fitting done in Pisa MC
- PSI will concentrate on **building** the DC and on **noise minimization**, but not on PF & TF
- Interface: $\phi/r/z$ from waveform analysis done at PSI

Labview control of Large Prototype



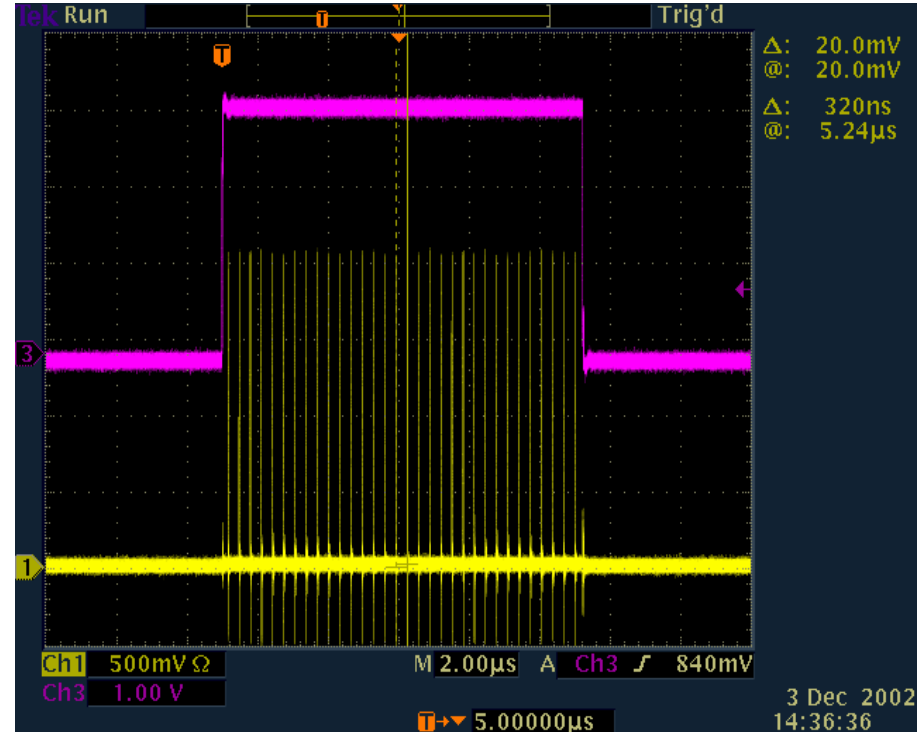
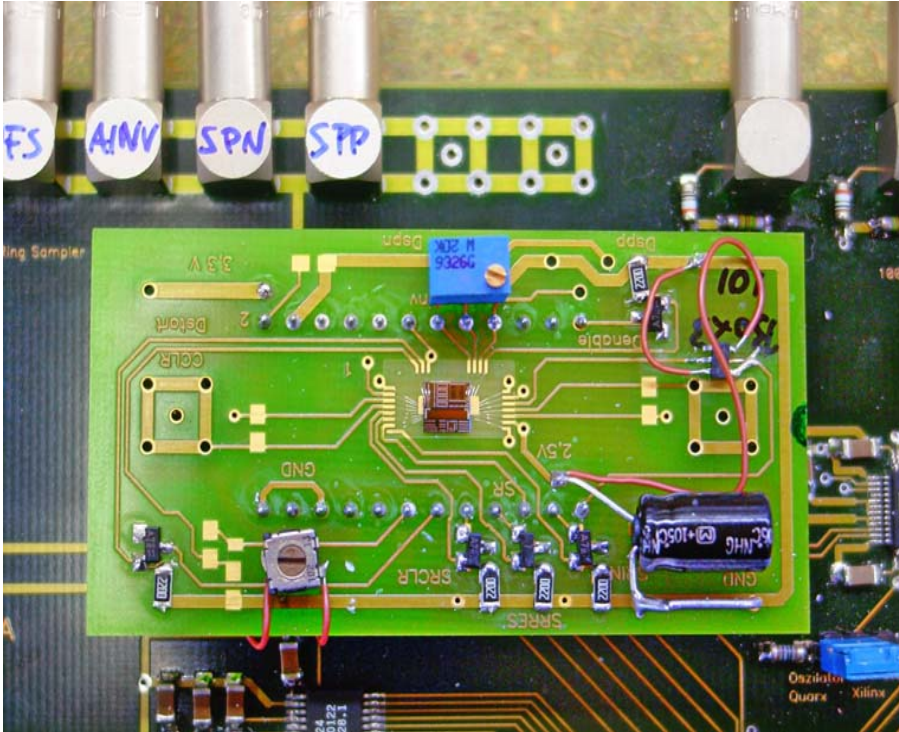
- MSCB Bus works stable
- Hardware in bulk production
- Used by 3 other experiments at PSI

Domino Ring Sampler (DRS)



- Free running domino wave, stopped with trigger
- Sampling speed 2 GHz (500ps/bin), trigger gate sampling gives 50ps timing resolution
- 1024 bins \rightarrow 150ns waveform + 350ns delay
- 40 MHz readout

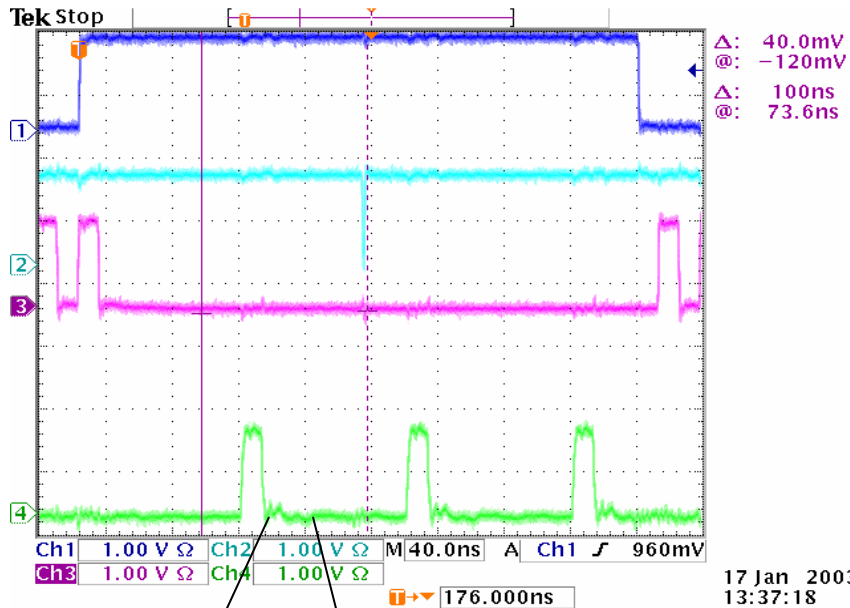
DRS Tests



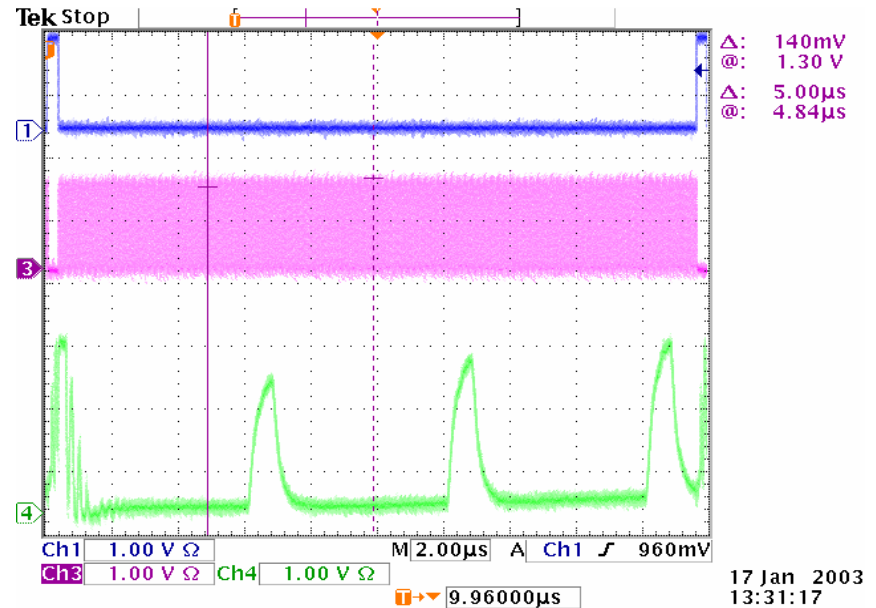
- Sampling Speed 0.7 - 2.5 GHz
- Power Supply 35mW (@2.5V), 6mW (@1.8V)
- Timing jitter: 100ps

- Readout stable at 40 MHz
- TC: 0.2% / deg. C

Test Pulse Readout



12ns
Input pulses

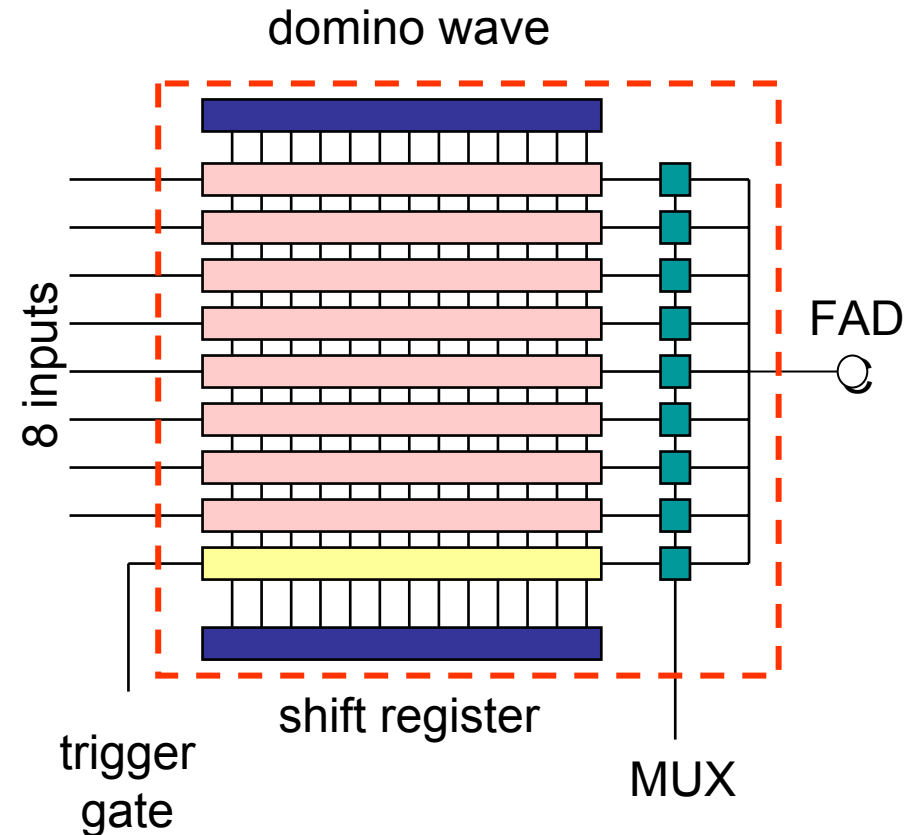
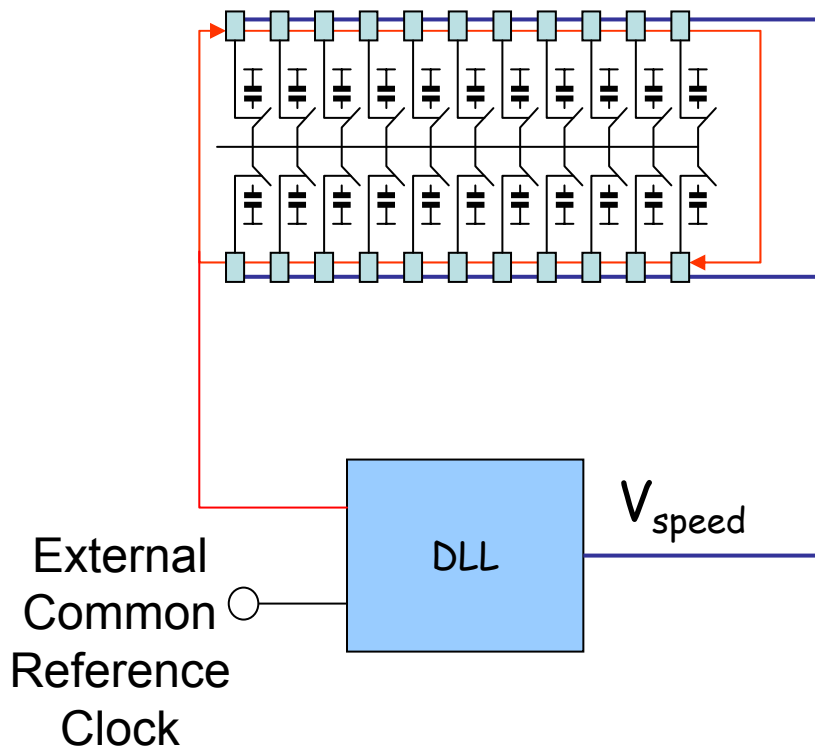


Limited by readout circuitry!

Domino Wave Stabilization

Phase and Frequency Stabilization

Trigger Signal Sampling



Schedule

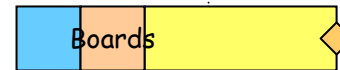
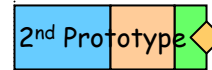
July 2002:

2001

2002

2003

2004



Jan 2003:



◇ Milestone

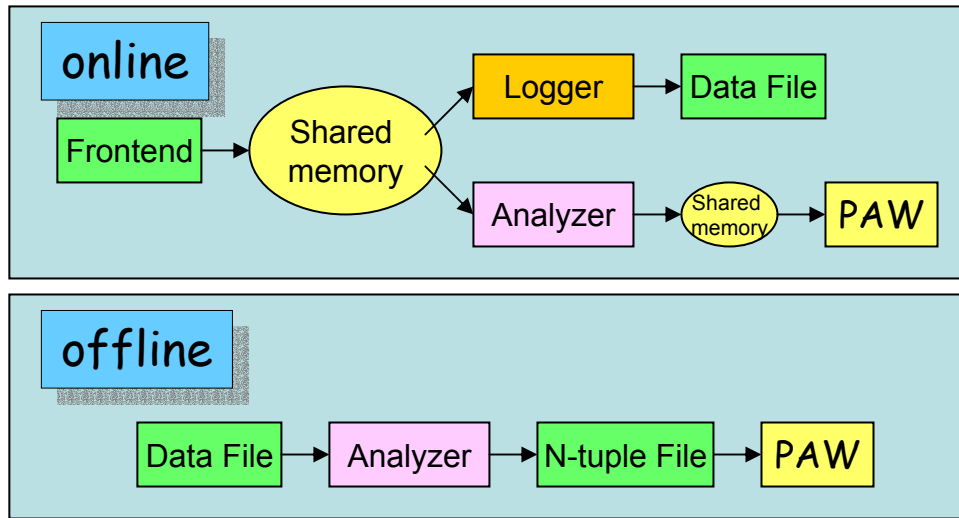
Software Framework

HOWTO Questions (A. Blondel)

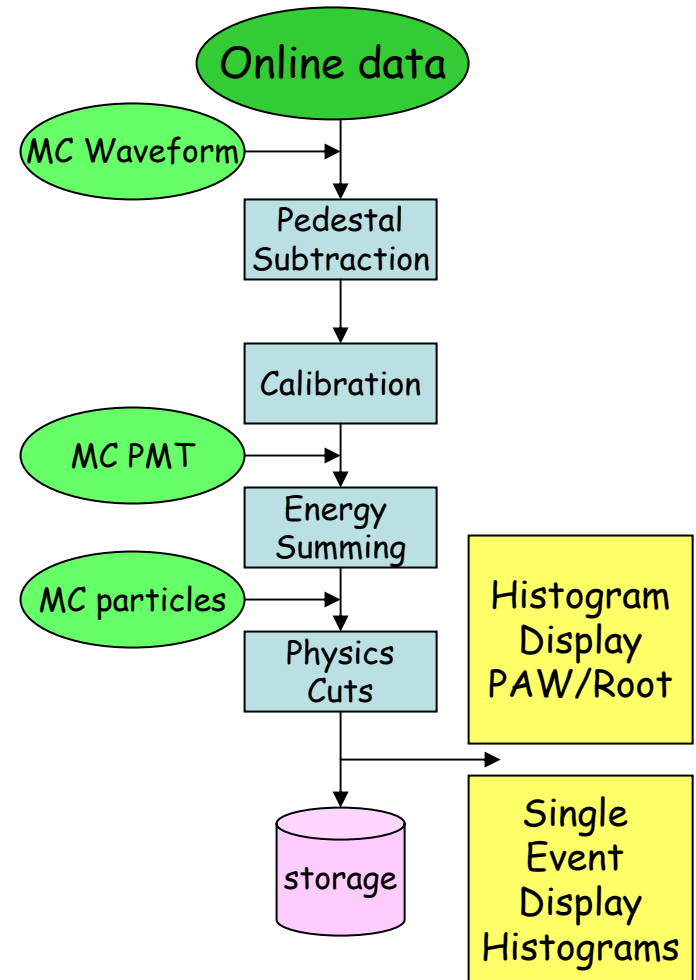
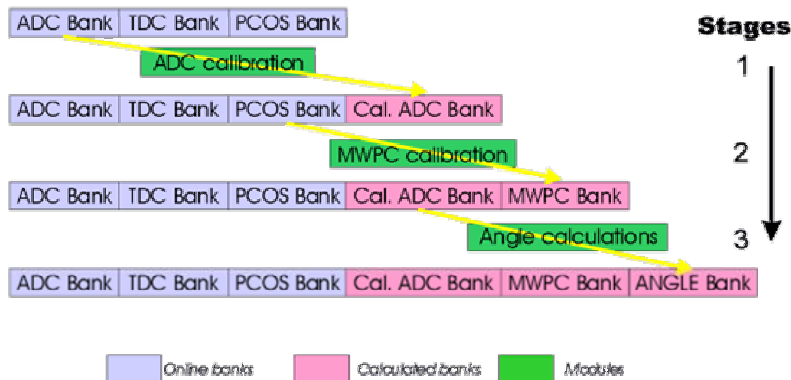
- Process MC events through analysis chain
- Handle calibration constants, bookkeeping and monitoring
- Visualize single events
- "Harmonize" software, have same framework in Japan, Italy and PSI
- Description of current software (beam tests)
- Organization to develop software
- Data processing capabilities

Analyzing MC Data

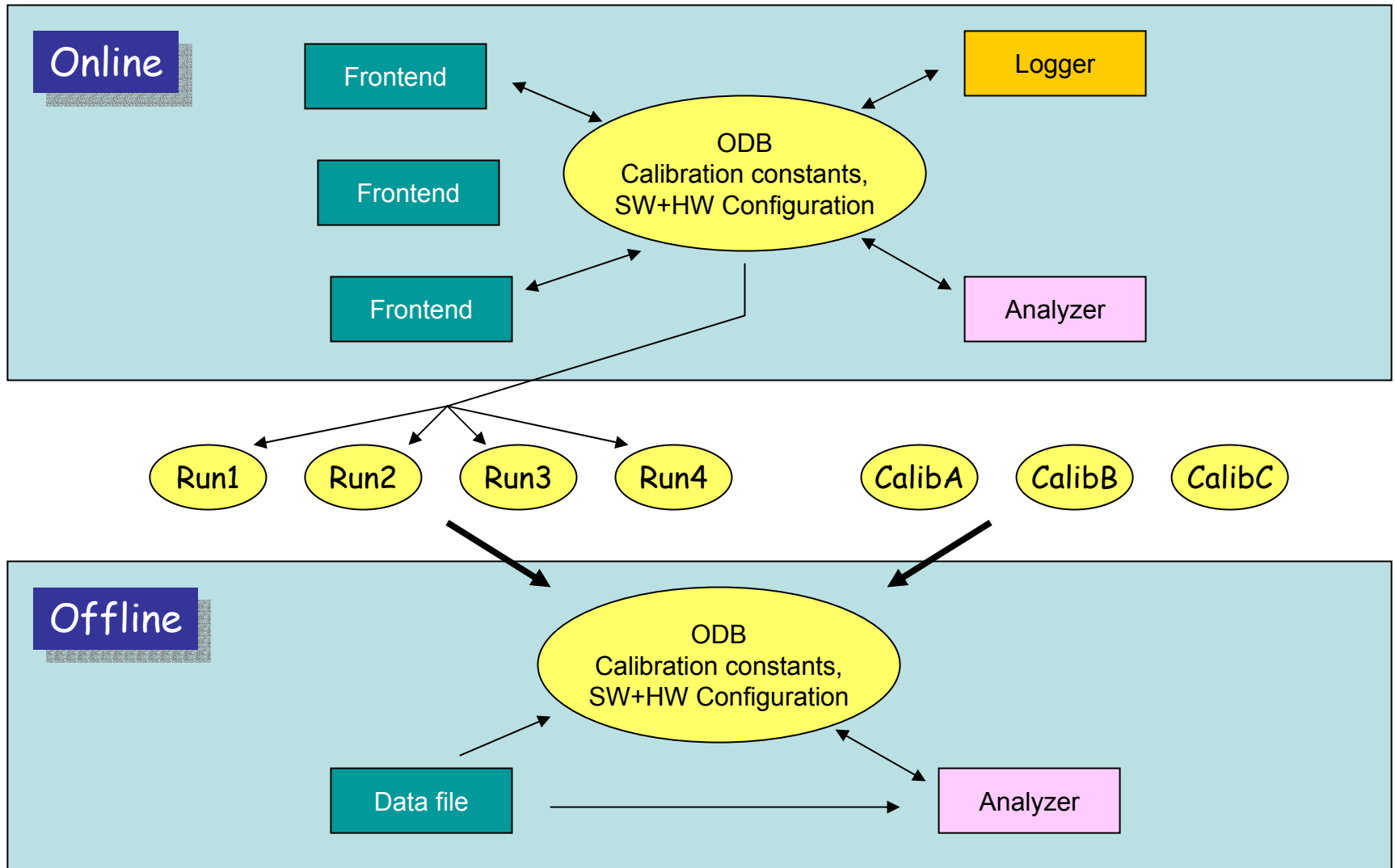
MIDAS structure



"Staged" MIDAS analyzer



Online Database



Bookkeeping with ELOG

ELOG search result - Mozilla {Build ID: 2002053012}

File Edit View Go Bookmarks Tools Window Help

http://localhost/Shift%20Logbook/?mode=full&attach=1&reverse=1&npp=20

Bookmarks People Muegamma Home Page

ELOG search result

Home Shift Logbook Configuration FAQs Monitoring

MEG Shift Logbook, Page 1 of 1 **ELOG**

New Find Select Config Help

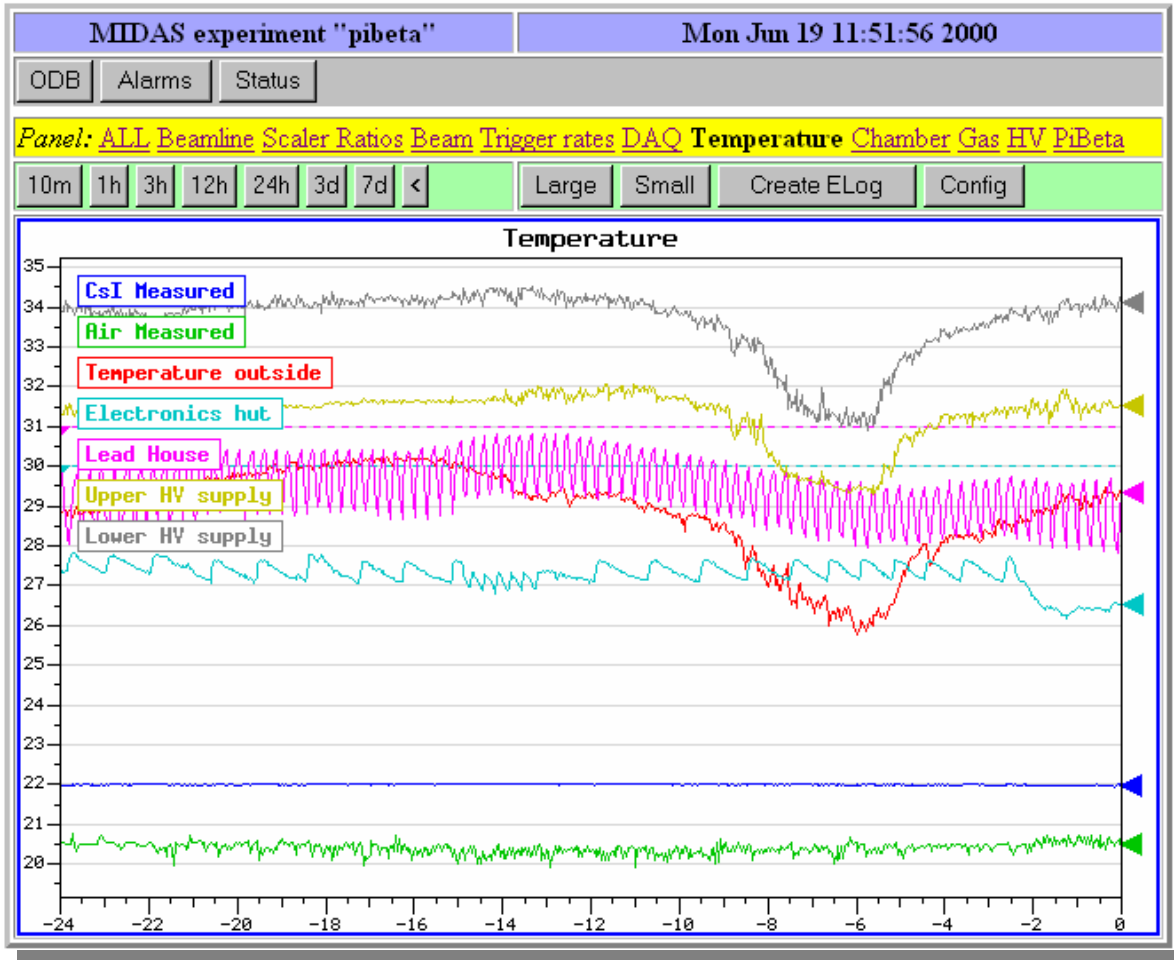
Full Summary Threaded Show last All entries Type: All entries System: All entries

#	Date	Author	Type	System	
4	Wed Jan 29 09:42:37 2003	SR	Routine	Target	Beam c
<p>The attached tomography picture of the target shows that the beam is very nicely centered in the middle. Take the picture as a reference for the future...</p> <p>Attachment: target.gif</p>					
3	Wed Jan 29 09:40:48 2003	SR	Problem Fixed	Trigger	T
<p>We saw that crate #1-3 had power off. We reset the crate and the trigger now seems to work fine. If this happens more often, we probably have to exchange the power supply in that crate. We should also put the crate power monitoring into the alarm system...</p>					
2	Wed Jan 29 09:39:19 2003	SR	Problem Report	DAQ	Trigger rate zero
<p>The trigger rate suddenly dropped to zero.</p> <p>We are going down to investigate the situation.</p>					
1	Wed Jan 29 09:38:15 2003	SR	Routine	DAQ	Run #3210 started
<p>Run #3210 has been started with data logging off for deubugging purposes.</p>					

[ELOG V2.2.5](#)

Document: Done (0.35 secs)

Monitoring



MIDAS History

- Trendlines over time
- Slow control (temperatures, pressures, etc.)
- Scaler ratios
- Efficiencies
- "Physics" rates

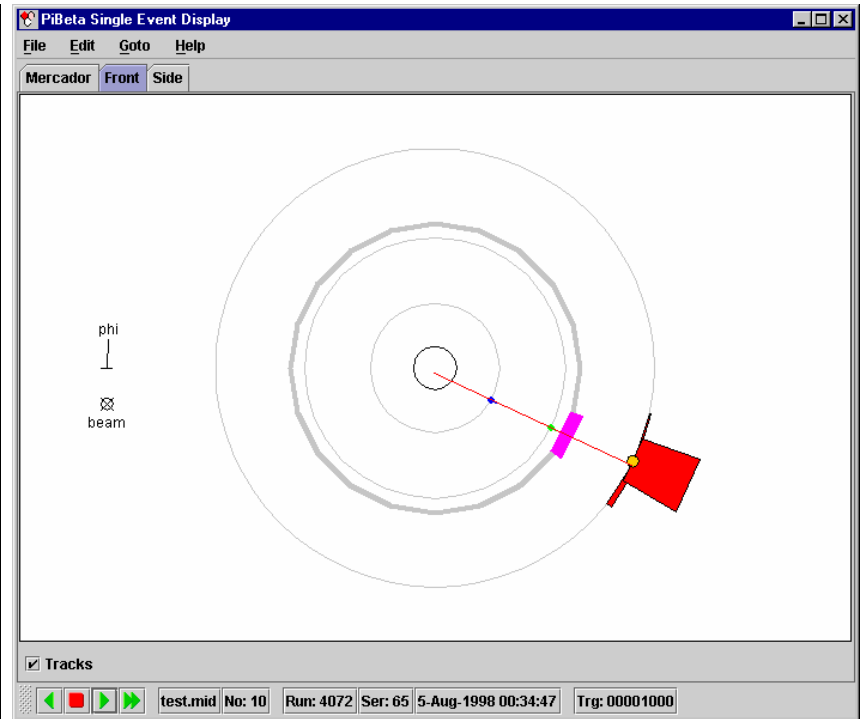
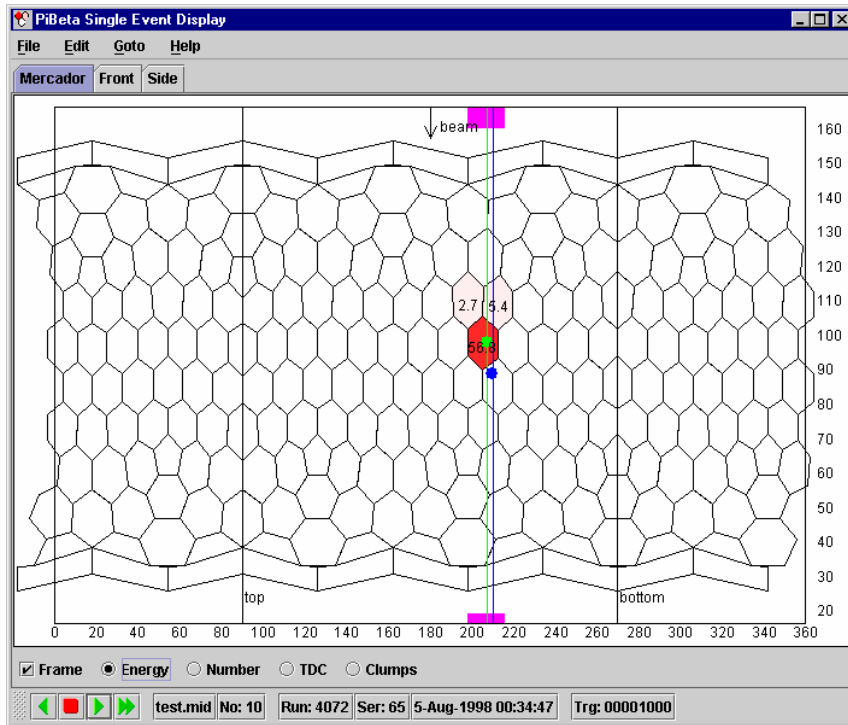
Alarm System

MIDAS experiment "Pibeta"			Wed Apr 12 12:55:30 2000		
Reset all alarms		Alarms on/off		Status	
Evaluated alarms					
Alarm	State	First triggered	Class	Condition	Current value
Electronics Temp.	OK	-	Alarm	/Equipment/Environment/Variables/Input[12] > 25	21.54
Gas bootle pressure	OK	-	Alarm	/Equipment/Environment/Variables/Input[22] < 1	19.043
B0 rate	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/B0-MHC < 0.6	3.54528
FE active	Triggered	Wed Apr 12 08:37:37 2000	Alarm	access(/Equipment/Scaler/Variables/SCLR) > 600	16092
PiStop rate	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/PiStop-B0 < 0.3	0.346074
CsI Hi rate	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/CsI Hi-PiStop < 0.005	0.0159845
CsI Lo rate	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/CsI Lo-PiStop < 0.6	1.17673
Trigger rate	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/Trigger-PiStop < 10	14.7369
Trigger electronics	OK	-	Alarm	/Equipment/Scaler/Variables/RATI/Trigger-PiStop > 100	14.7369

- Integrated into MIDAS DAQ
- Slow control variables and analyzer variables
- Connected to pager system

$\pi\beta$ Single Event Display

$\pi \rightarrow e\nu$



Software organization

- Analyzer contains "common" and "private" modules
- Three "software managers" (Japan, Italy, PSI) maintain software locally and decide about common modules
- Algorithms are developed inside MC and converted to analyzer modules
- Revision management with CVS
- MC upgrade: Pisa?
- Single event display: small task for one person

Processing capabilities

- Assume: 100 Hz trigger, 50% occupancy (LXe) and 10% occupancy (DC)
- Data: 1.2MB/event or 120MB/sec
- Online Linux cluster: each node <10MB/sec
- 3rd level trigger: waveforms only for $\mu \rightarrow e\gamma$ candidates stored, else ADC/TDC analysis (\rightarrow 10kB/event)
- Waveform compression: 10x
- 90Hz ADC/TDC data, 10Hz waveform data
 $10 \times 1.2\text{MB} \times 0.1 + 90 \times 0.01\text{MB} = 2.1 \text{ MB}$



Software Framework Summary

- Existing
 - Online DAQ system
 - History system
 - Alarm system
 - Electronic logbook
 - Analyzer framework
 - PAW histogram display
 - Used in Japan, PSI, Pisa
- Elaborate MC

- Required
 - Single Event Display (1-2 PM)
 - MC interface to DAQ (1 PW)
 - MC "upgrade" (noise, inefficiencies, pileup)
 - Track reconstruction
 - Analyzer modules