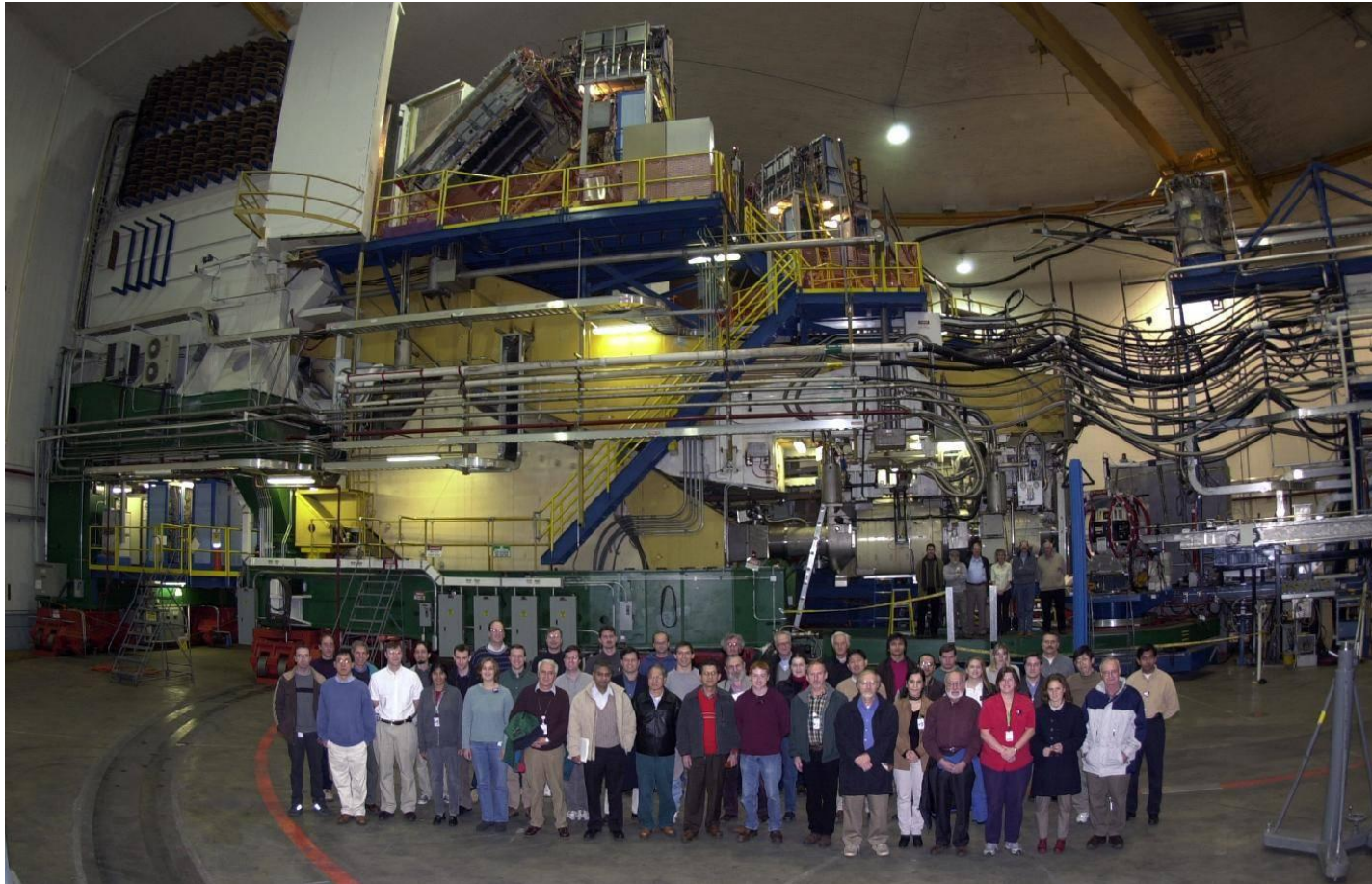
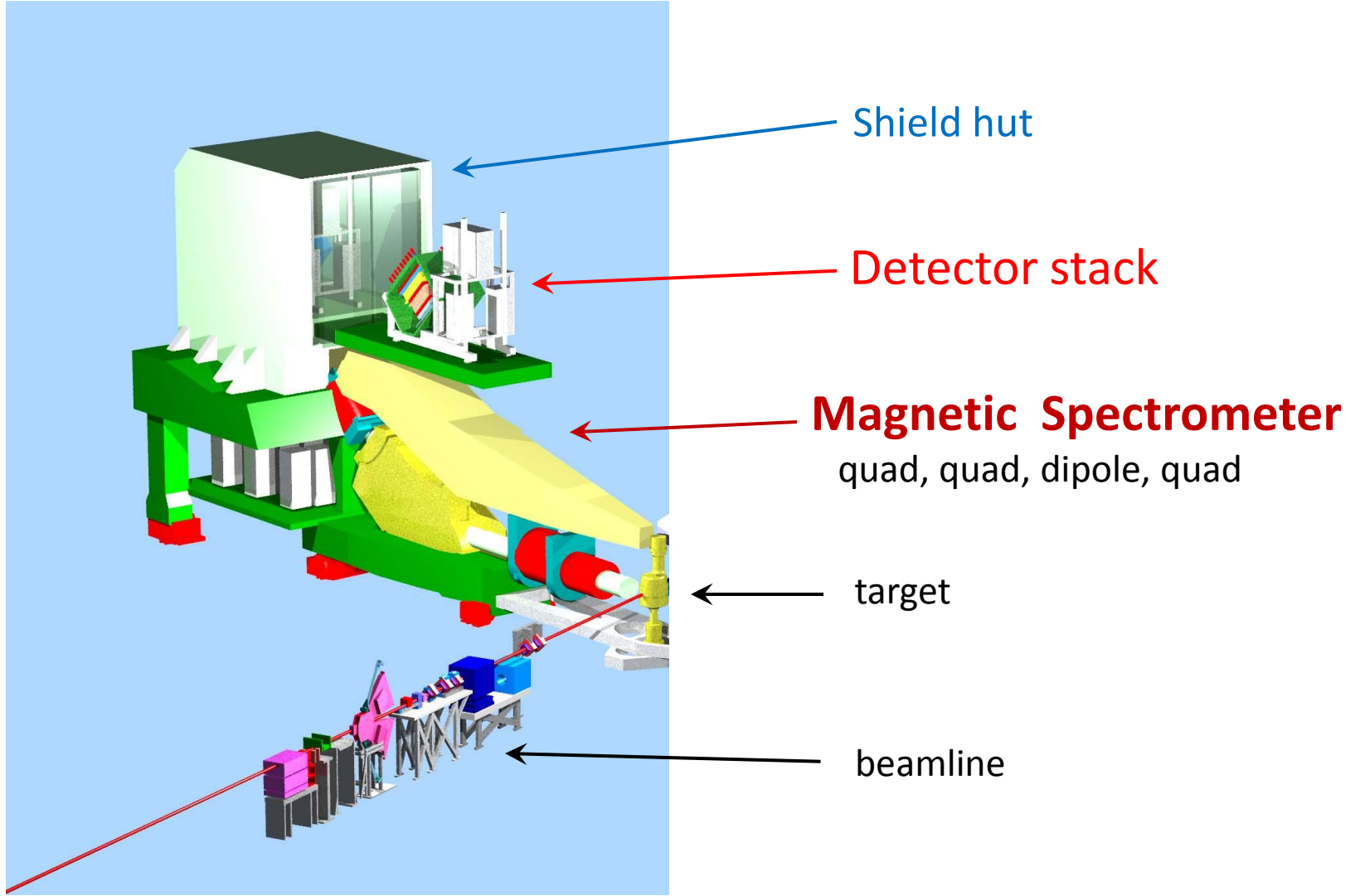


Left HRS Status and Plan

The Left High Resolution Spectrometer will be used to calibrate HCAL's neutron detection efficiency via $p(\gamma, \pi^+)n$ with π^+ on HRS and neutron on HCAL (Hadron Calorimeter). Also a hypernuclear approved experiment.



Anatomy of the Left HRS



L-HRS: Tasks , People

- Detector Setup and Checkout
- DAQ and Trigger
- Analysis Software
- Spectrometer Magnets
- Motion Control
- Sieve Slits, Optics



Team:

Bob Michaels,

Maria Satnik

W&M student

Advisor: Todd Averett

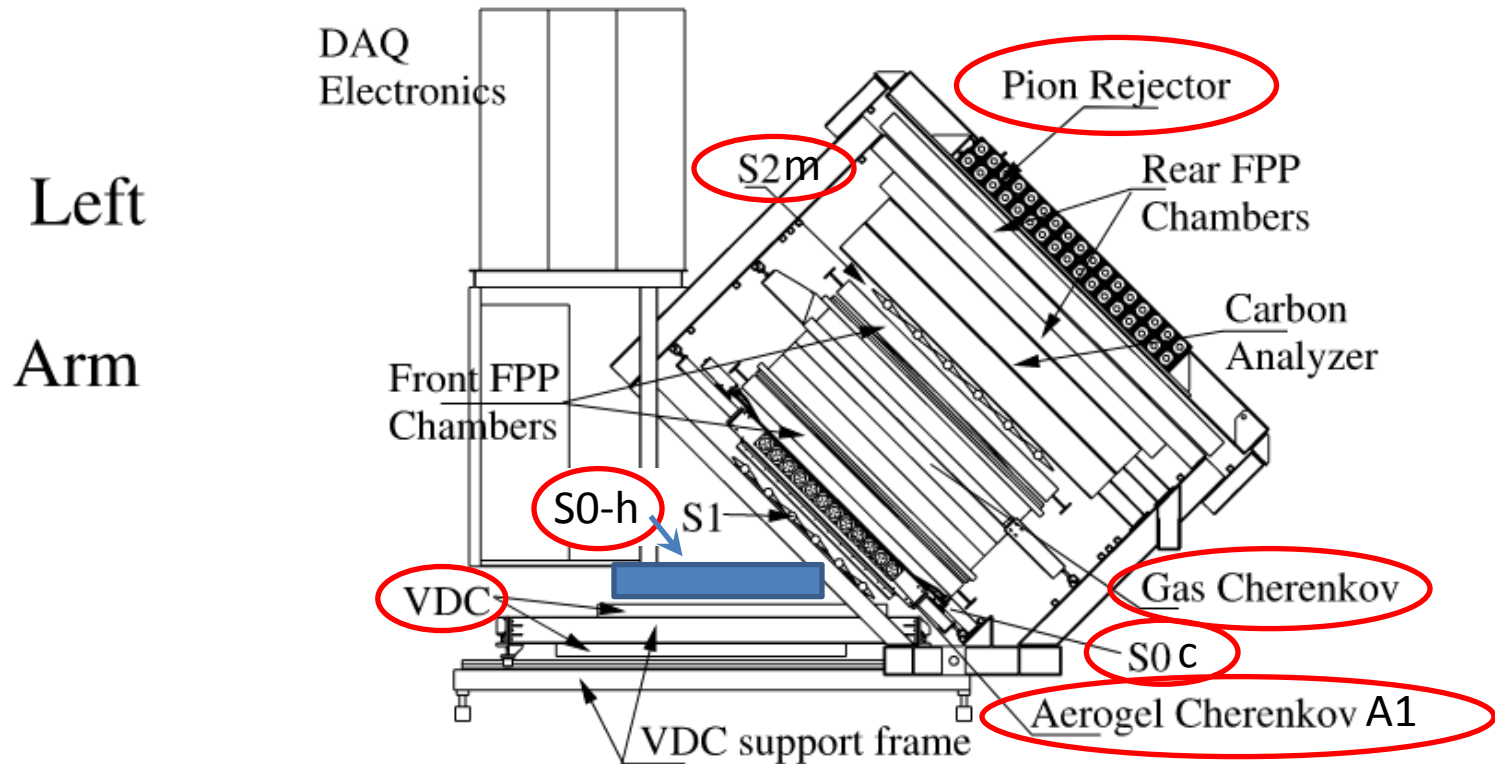
Bogdan Wojtsekhowski

Jack Segal

Jessie Butler and tech staff

The detectors circled are installed and will be used.

Also: BPM, BCM, raster pickoff, and helicity info

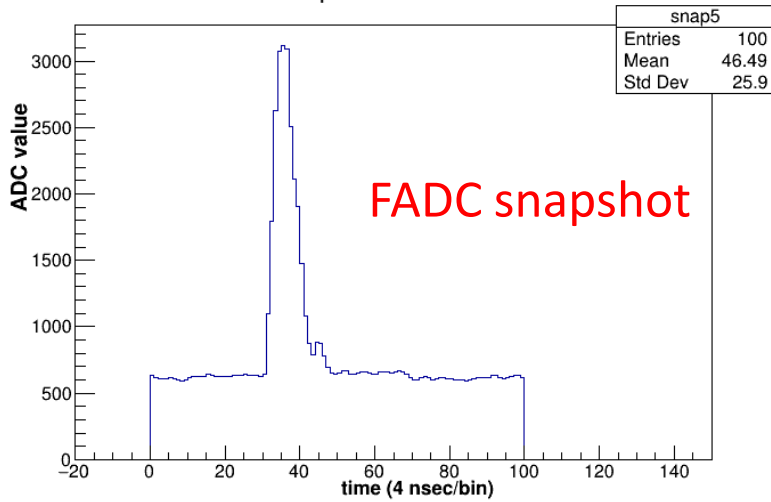


Left HRS Detector Status

Detector	Connected to DAQ ?	Tested ?	Software Ready ? (see 2 below)
VDC	✓	✓ missing 6 wires	✓
S0 c (near Cerenkov)	Need 2 PMTs		✓
S0 h (Happex)	✓	✓	✓
S2m	✓	Started testing	✓
Pion Rejector	Cables in place		✓
Gas Cherenkov	✓	✓ needs beam	✓
Aerogel A1	No cables yet (26 PMTs)	needs beam	✓

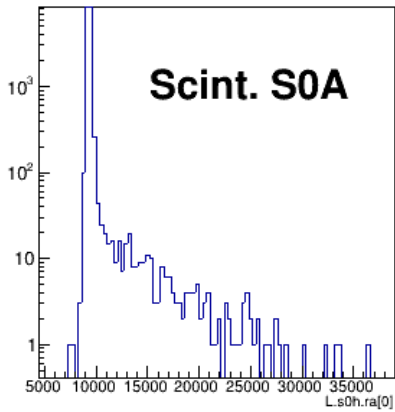
1. All detectors installed, thanks Jack Segal and tech staff
2. Analysis software is taken from the Tritium era.

Snapshot for event 5

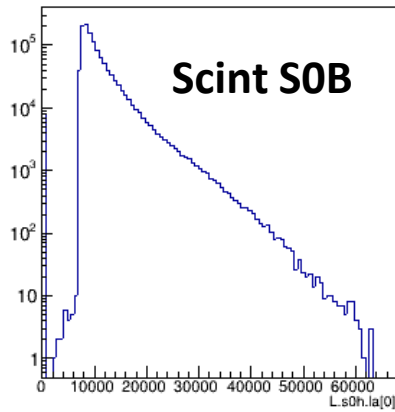


Detector Checkout

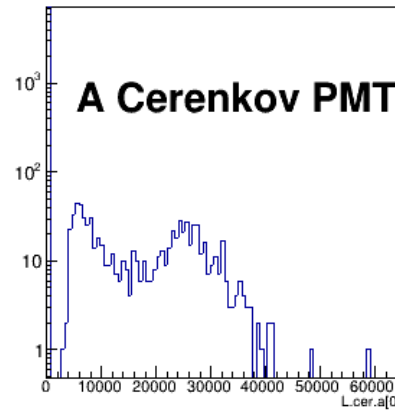
L.s0h.ra[0]



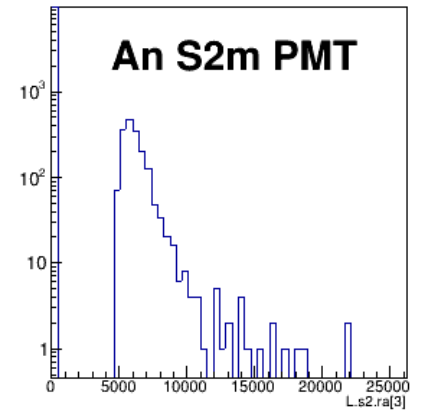
L.s0h.la[0]



L.cer.a[0]

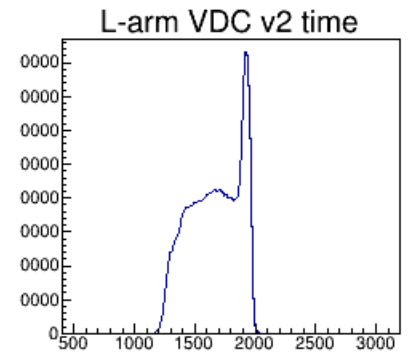
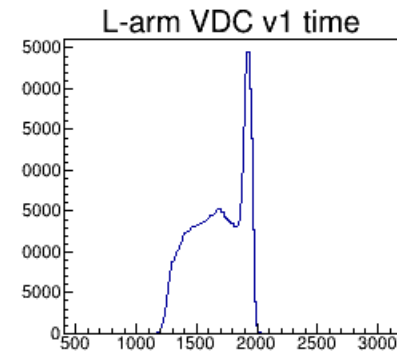
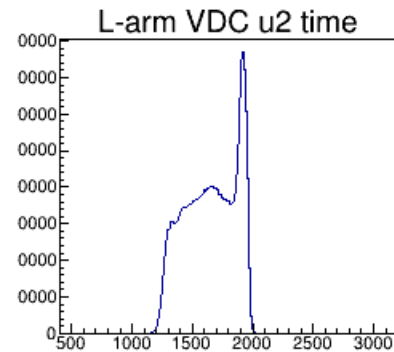
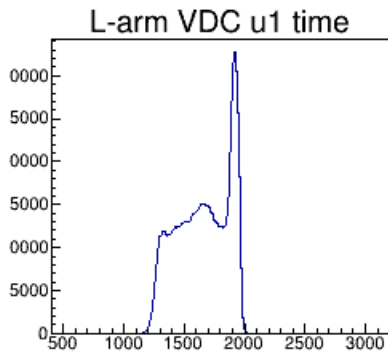
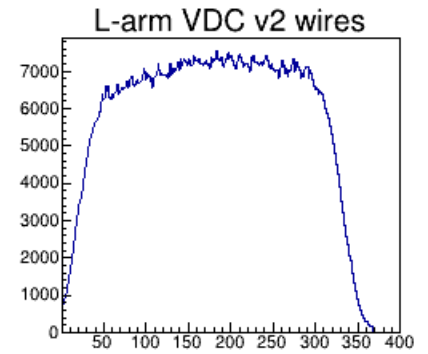
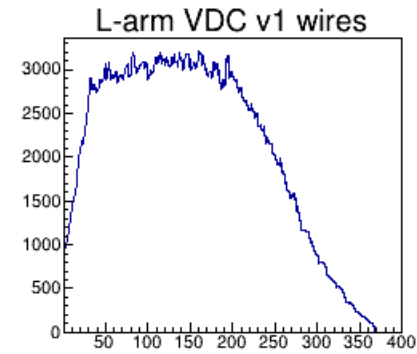
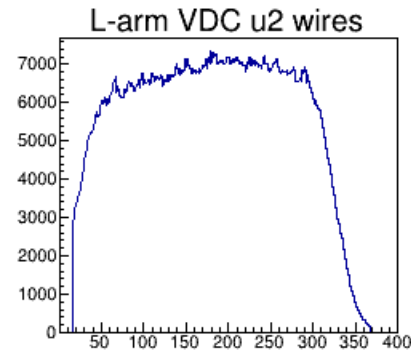
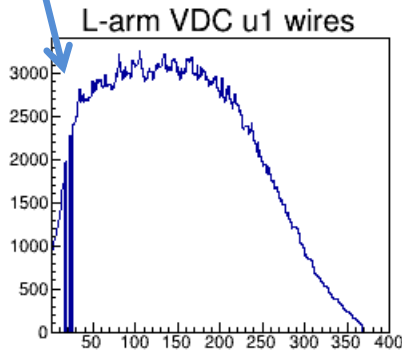


L.s2.ra[3]



Cosmic Checkout of VDCs

1 card with
6 missing wires



Left HRS DAQ

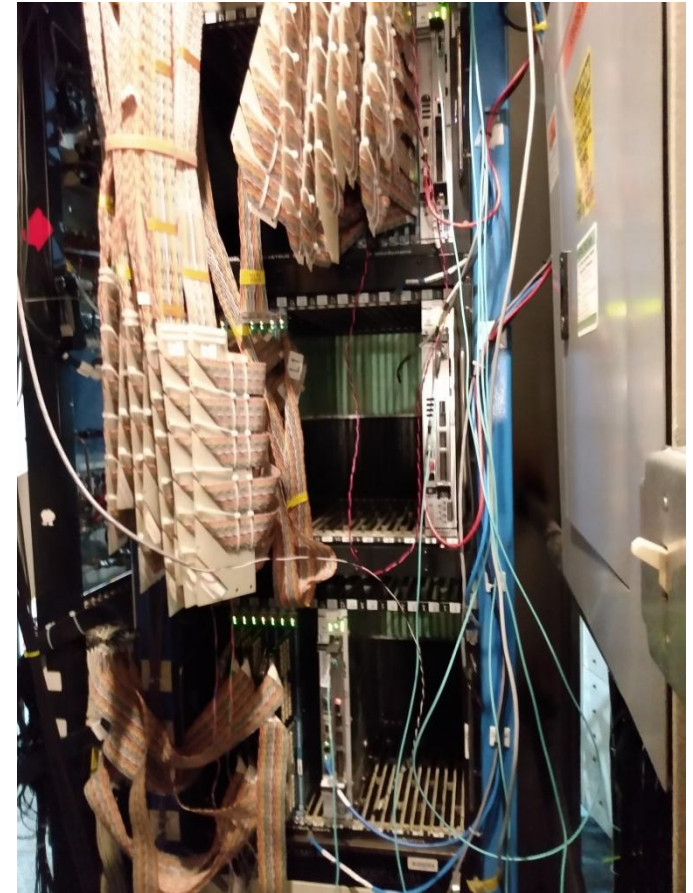
CODA 3.10 / CentOS7 -- working, stable

The screenshot shows the Run Control rcGui-99 interface. The top section displays control buttons and run status information, including Run Number 110 and Total Events 25,954. Below this is a table of active components:

Name	State	EvtRate	DataRate	IntEvtRate	IntDataR...
PEB1	active	50.0	328.0	48.5	324.2
ROC4	active	50.0	73.2	48.7	73.6
ROC2	active	50.0	83.5	48.8	84.1
ROC3	active	50.0	90.5	48.8	88.8
ROC1	active	50.0	70.0	50.1	68.9

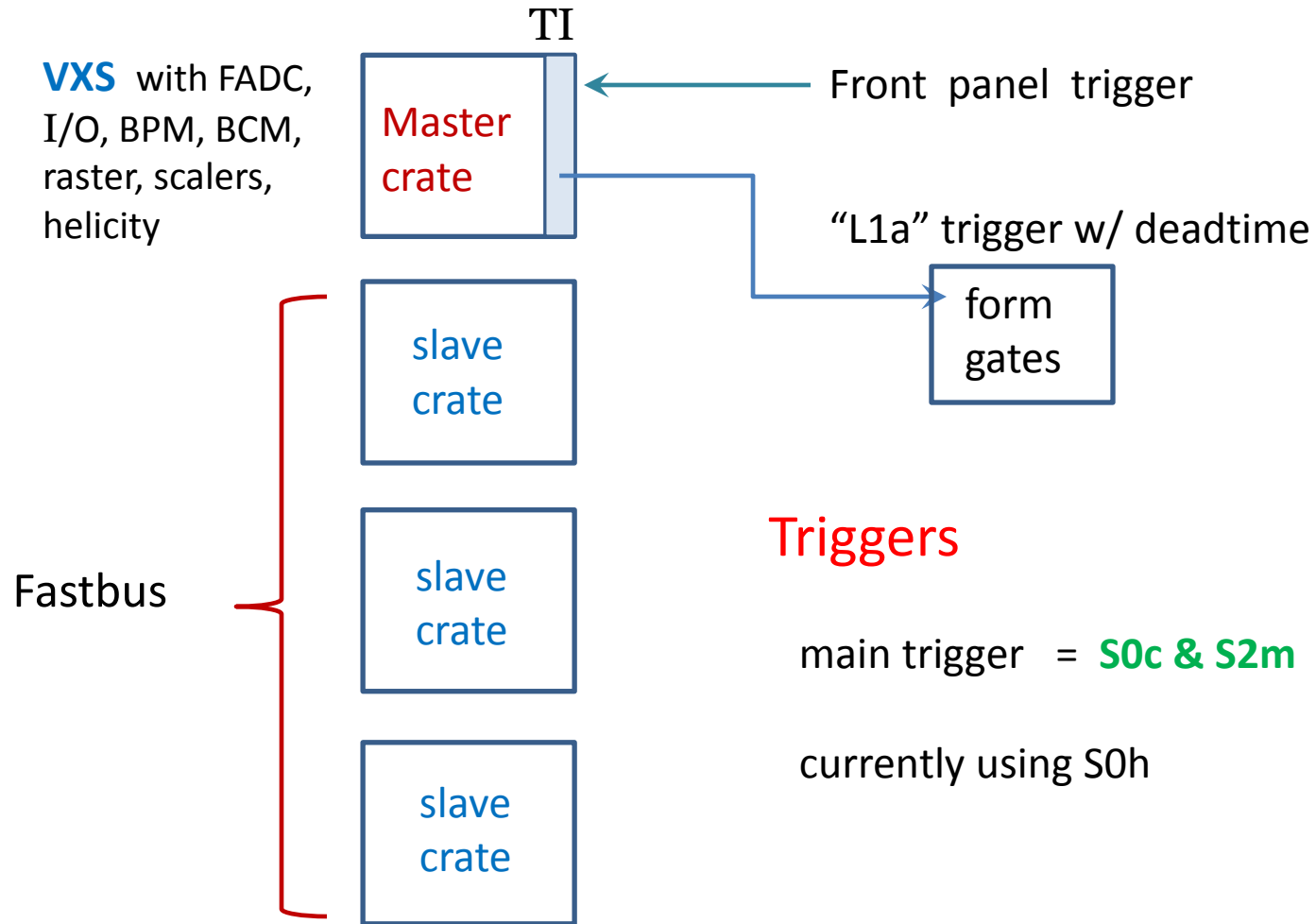
Below the table is a log window showing messages from various components like 'ADC rlen' and 'FADC-250'. A text overlay at the bottom of the log window reads: "CODA 3 on VME crate with 6 FADCs. This is a master crate with front-panel trigger".

VXS crate with 6 FADCs. Need min 2 more.

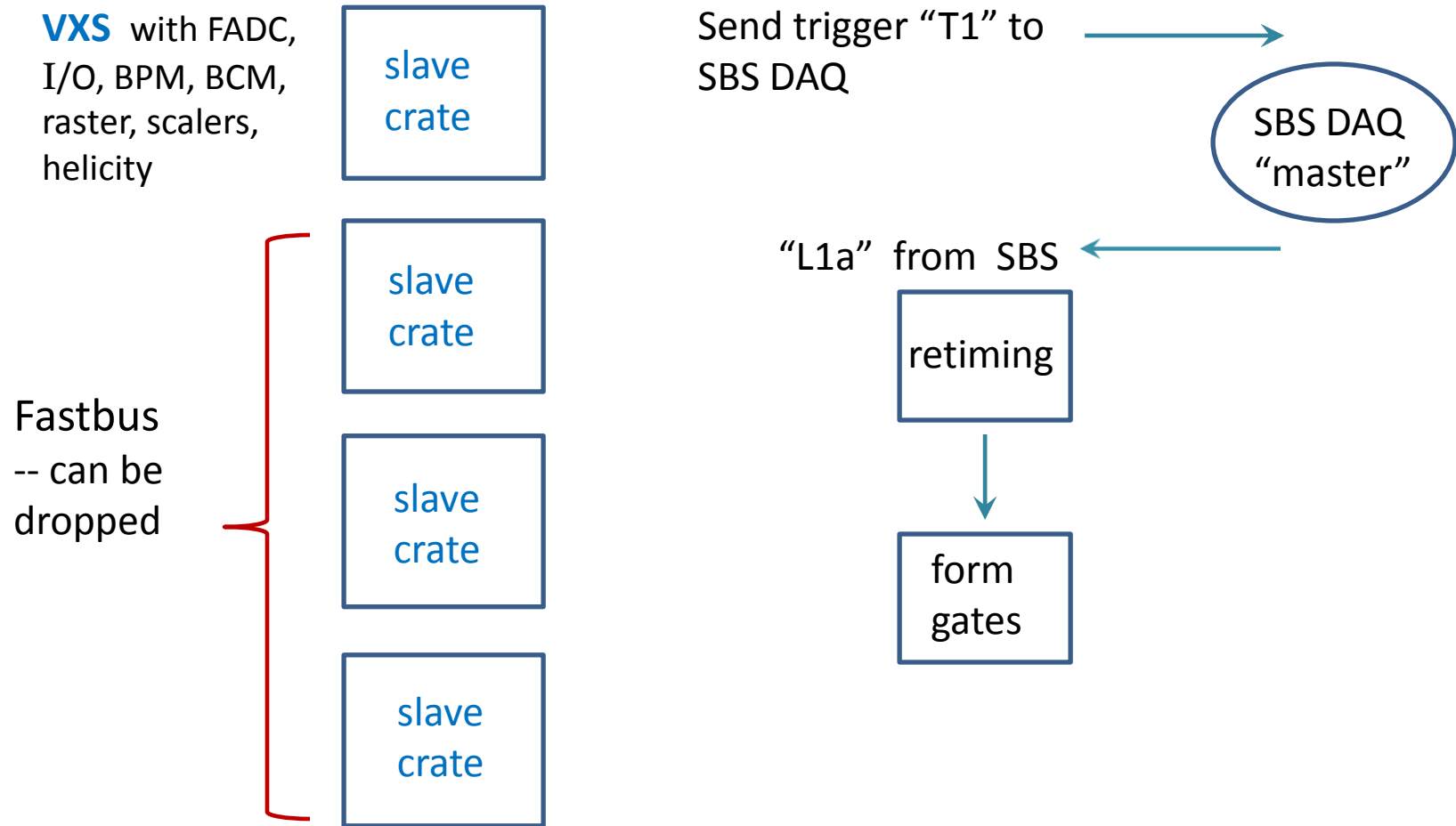


Three Fastbus crates (TDC, ADC)

Left HRS DAQ Setup -- Standalone



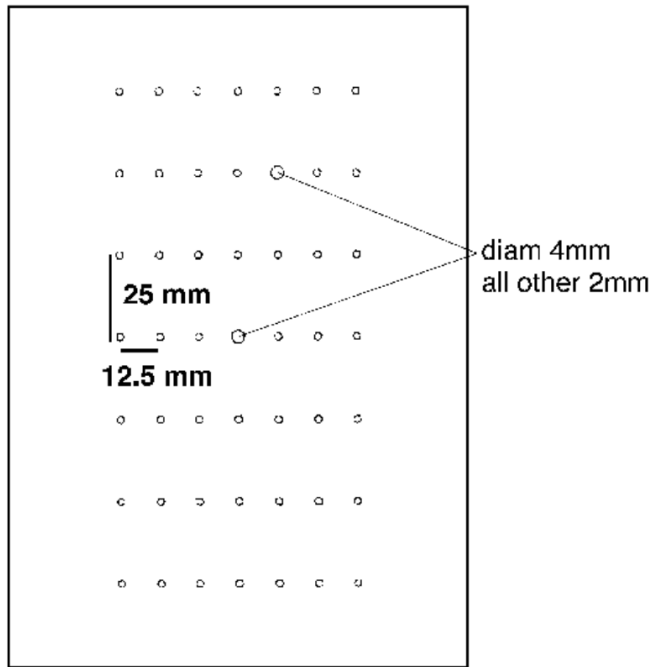
Left HRS DAQ Setup – coupled to SBS



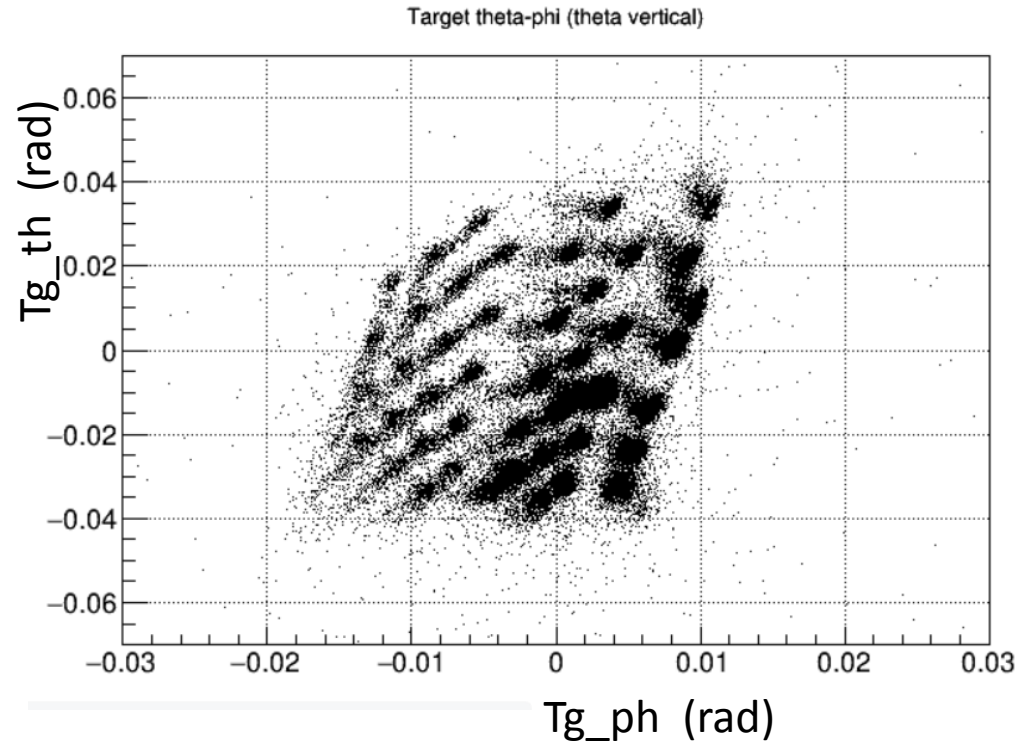
HRS Sieve Slit Calibration -- needed for angles at target

Put sieve slit plate at front of HRS, calibrate matrix elements (m.e.).
If the picture is “blurry” the m.e. needs refinement and we need an optics calibration.

Sieve Plate



Reconstruction (Data)



Left HRS To-Do List

What	When (or how long)	Who
Finish detector connections to DAQ	now – June 15	Maria, Bob
Finish Software	now – June 30	Maria, Bob
Implement BPM, raster, helicity, BCM, scalers	now - July 8	Paul King, Bob
High Rate DAQ Tests	July 8 - 12	Bob, Maria
Connection to SBS DAQ	3 days	Bob, Alex
Check magnets	in July	Tech staff, Bob
Commissioning with beam	5 - 11 hours (next page)	Bob, Maria

Left HRS Commissioning with Beam

- Nearly all basic checks done before beam with cosmics and pulsers.
- Tune HV of the two Cerenkovs. -- 3 hours beam.
- Magnetic optics check (sieve slits) – 2 hours beam
- **Possibly an Optics Run Plan -- 6 hours** (needed if Sieves look bad)

Do analysis for 1-2 days, and then ...

- Ready for HCAL calibrations.

Using HRS to calibrate HCAL

From GMN_plan_Jan6.pdf

3.14 HCAL calibration for GMn production parameters for 6.0 GeV²

The total allocated time is of 40 hours. The contact person is Brian Quinn.

The following is a plan:

- Beam energy is 4.4 GeV.
- Set the SBS magnet current at 2.0 kA.
- Have LHRS at 61.1 deg., 64.3 deg., 67.5 deg., and 70.7 deg.
- Set the LHRS momentum at 1.2 GeV/c.
- The targets are LH2, LH2+radiator, dummy, dummy+radiator
- HCal at 17 meters.
- Get beam current according to the table 13.
- Set raster size 2mm x 2mm.
- Set DAQ trigger from LHRS S2m&S0, others pre-scaled for 10% or total rate

Using HRS to calibrate HCAL

item	Q^2	Beam	Target	Beam	Time	LHRS angle	SBS angle/dist.	SBS	HCAL
#	GeV ²	GeV	6%X0	μ A	hour	deg.	deg. / meter	Bdl	dist. m
1a	6.1	4.4	LH2+6%	30	6	61.1	14.8/3.10	1.71	17
1b	6.1	4.4	LH2	60	1	61.1	14.8/3.10	1.71	17
1c	6.1	4.4	dummy+6%	20	1	61.1	14.8/3.10	1.71	17
1d	6.1	4.4	dummy	20	1	61.1	14.8/3.10	1.71	17
2a	6.1	4.4	LH2+6%	30	6	64.3	14.8/3.10	1.71	17
2b	6.1	4.4	LH2	60	1	64.3	14.8/3.10	1.71	17
2c	6.1	4.4	dummy+6%	20	1	64.3	14.8/3.10	1.71	17
2d	6.1	4.4	dummy	20	1	64.3	14.8/3.10	1.71	17
3a	6.1	4.4	LH2+6%	30	6	67.5	14.8/3.10	1.71	17
3b	6.1	4.4	LH2	60	1	67.7	14.8/3.10	1.71	17
3c	6.1	4.4	dummy+6%	20	1	67.7	14.8/3.10	1.71	17
3d	6.1	4.4	dummy	20	1	67.7	14.8/3.10	1.71	17
4a	6.1	4.4	LH2+6%	30	6	70.7	14.8/3.10	1.71	17
4b	6.1	4.4	LH2	60	1	70.7	14.8/3.10	1.71	17
4c	6.1	4.4	dummy+6%	20	1	70.7	14.8/3.10	1.71	17
4d	6.1	4.4	dummy	20	1	70.7	14.8/3.10	1.71	17

Table 13: The beam time and other parameters of the 6.0 GeV² calibration run. Total 36 hours of the beam on target. Total allocated time is of 40 hours.

Using HRS to calibrate HCal

3.15 HCal calibration for GMn production parameters for 3.5 GeV²

The total allocated time is of 38 hours. The contact person is Brian Quinn.

The following is a plan:

- Beam energy is 4.4 GeV.
- Have SBS at 31.1 deg and 3.10 m from the pivot.
- Set the SBS magnet current at 2.0 kA.
- Retune SBS beam line correctors.
- Have LHRS at 30.9 deg and 34.1 deg.
- Set the LHRS momentum at 2.54 GeV/c.
- The targets are LH2, LH2+radiator, dummy, dummy+radiator
- HCal at 17 meters.
- Get beam current according to the table 14.
- Set raster size 2mm x 2mm.
- Set DAQ trigger from LHRS S2m&S0, others pre-scaled for 10% or total rate

Using HRS to calibrate HCAL

item	Q^2	Beam	Target	Beam	Time	LHRS angle	SBS angle/dist.	SBS	HCAL
#	GeV ²	GeV	6%X0	μ A	hour	deg.	deg. / meter	Bdl	dist. m
1a	4.4	4.4	LH2+6%	30	12	34.1	25.5/3.10	1.71	17
1b	4.4	4.4	LH2	60	3	34.1	25.5/3.10	1.71	17
1c	4.4	4.4	dummy+6%	20	1	34.1	25.5/3.10	1.71	17
1d	4.4	4.4	dummy	20	1	34.1	25.5/3.10	1.71	17
2a	4.4	4.4	LH2+6%	30	12	30.9	25.5/3.10	1.71	17
2b	4.4	4.4	LH2	60	3	30.9	25.5/3.10	1.71	17
2c	4.4	4.4	dummy+6%	20	1	30.9	25.5/3.10	1.71	17
2d	4.4	4.4	dummy	20	1	30.9	25.5/3.10	1.71	17

Table 14: The beam time and other parameters of the 3.5 GeV² calibration run. Total 34 hours of the beam on target. Total allocated time is of 38 hours.