

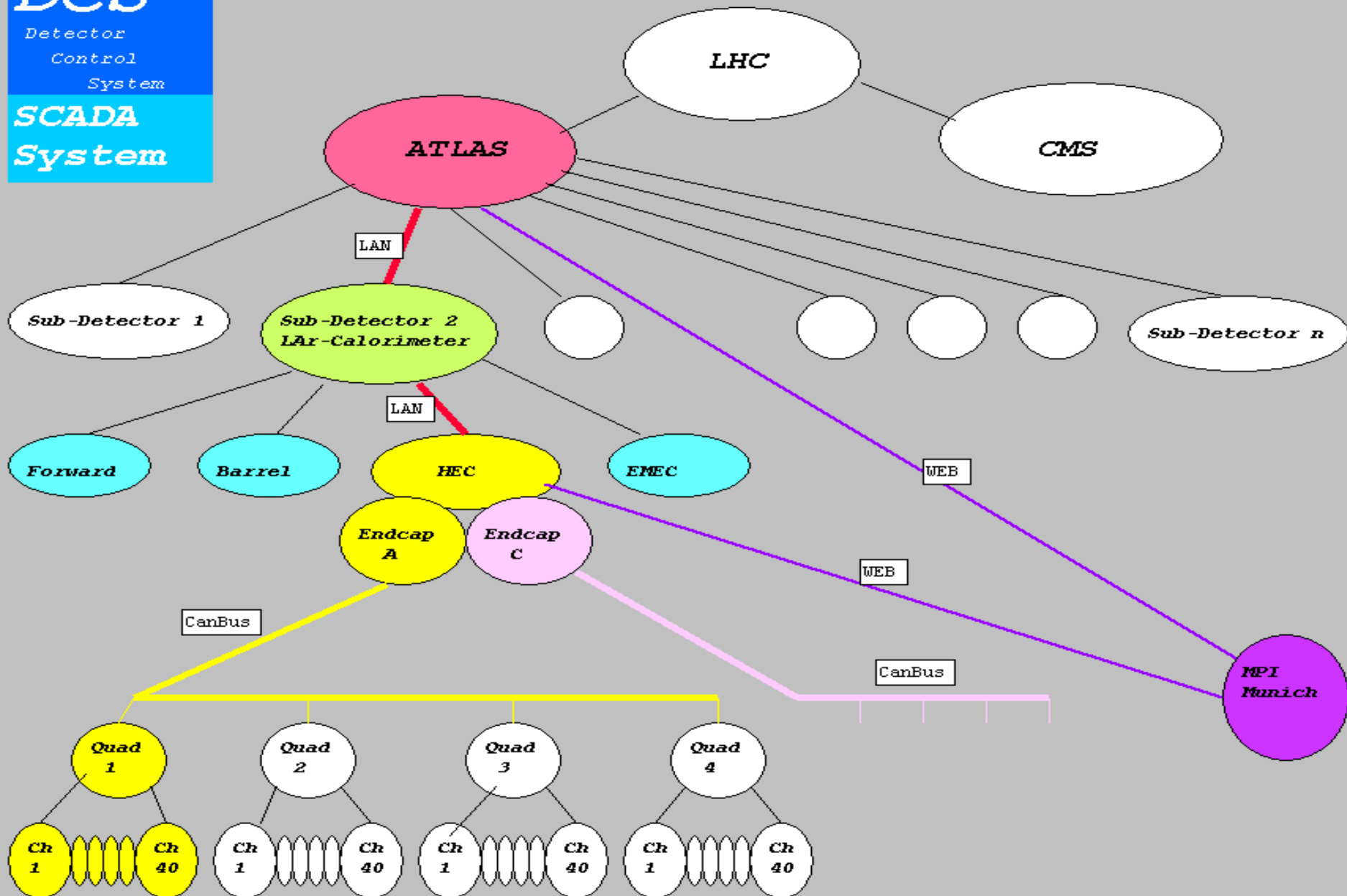
*Munich*

# Low Voltage Control for the Liquid Argon Hadronic End-Cap Calorimeter of ATLAS

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*Figure 1: ATLAS DCS*





# *Low Voltage Control of HEC*



## *Low Voltage Power*

2 wheels, 4 quadrants/wheel, 40 PSBs/quadrant (320 in total)

1 power box/quadrant (8 in total)

Power box near FEC between Tile Calo Fingers

1 power board, 2 control boards

300V DC in, +8, +4, -2V out (40 channels)

## *Control Hardware*

PC, NICANII-board, CanBus, ELMB, QuickLogic, LV-regulator

Graphical windows for operator

## *Control Software*

PVSS2, OPC-driver, CanOpen, Micro Code

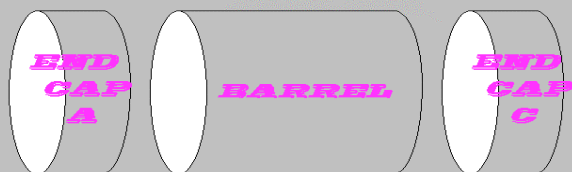


Figure 2: Liquid Argon Calorimeter

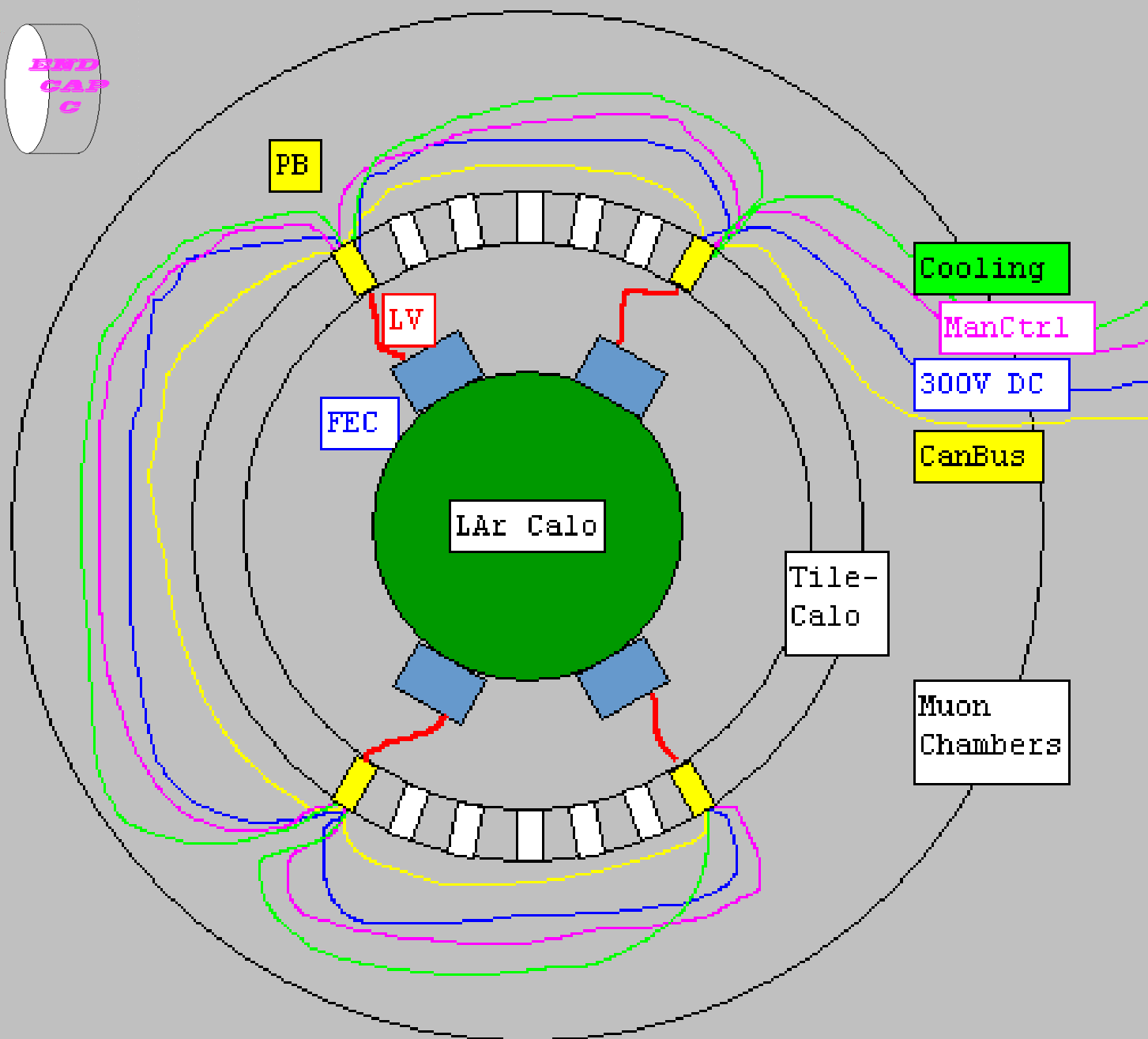
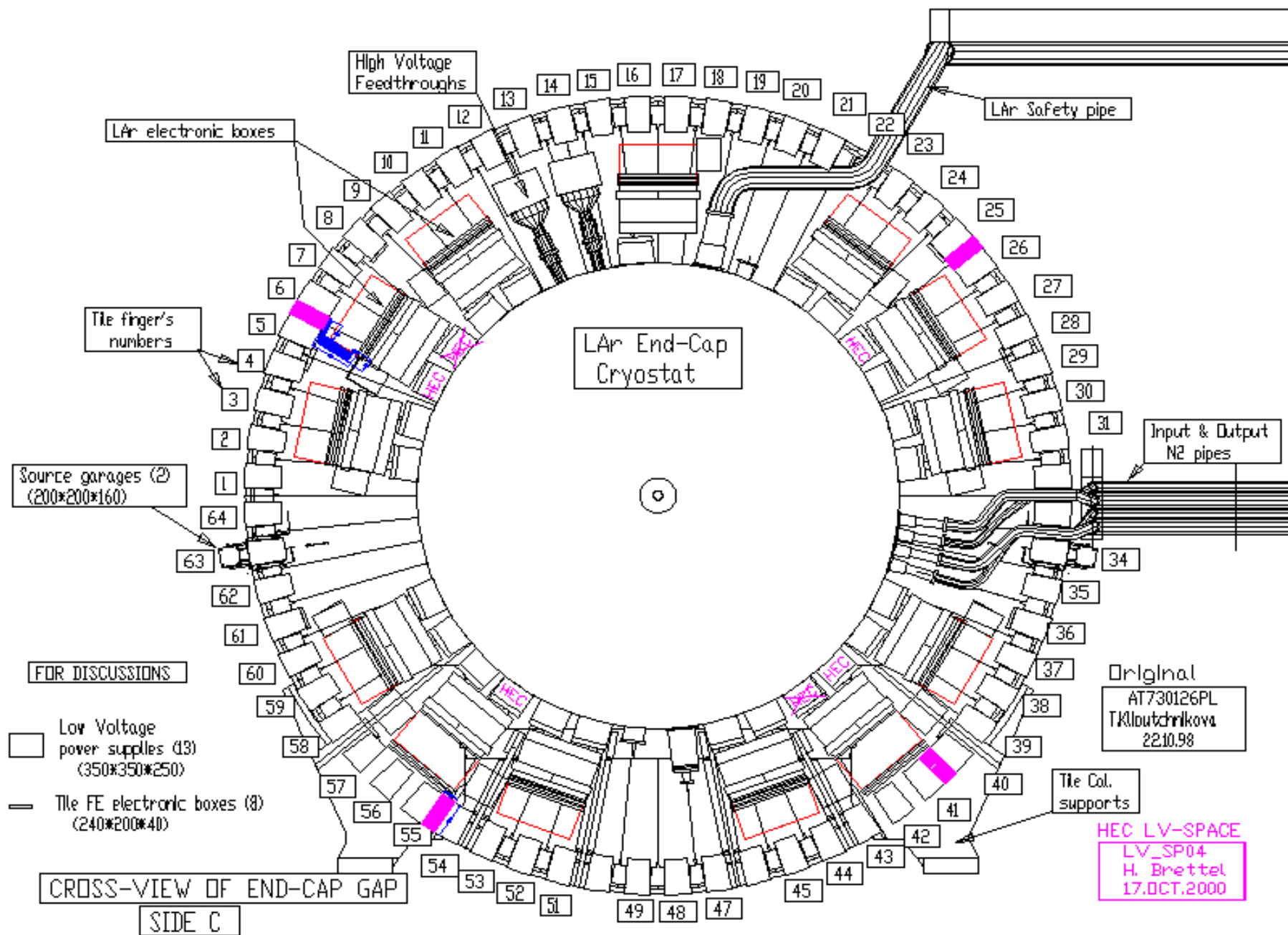
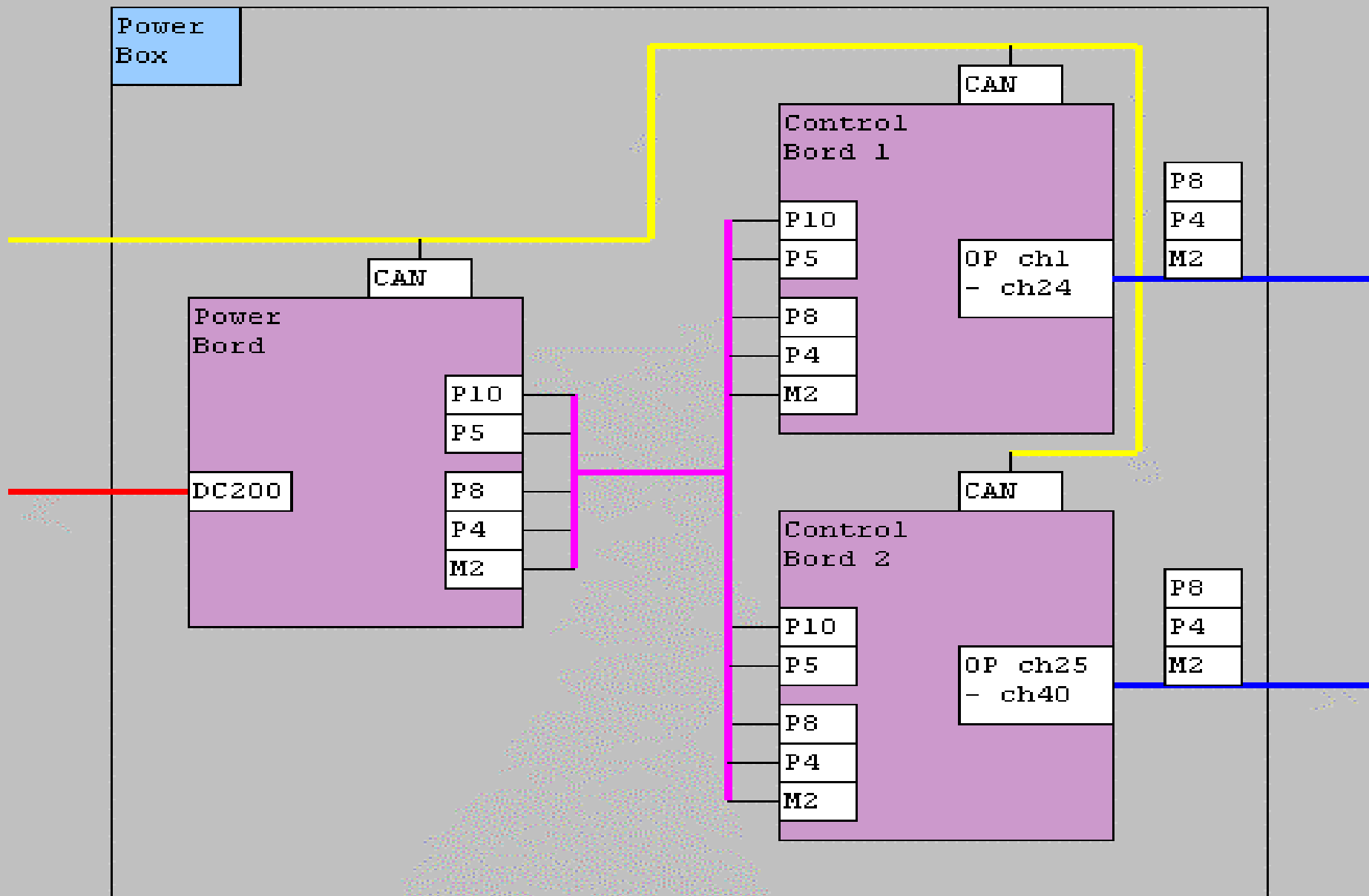


Figure 3: HEC low voltage system (one end-cap)

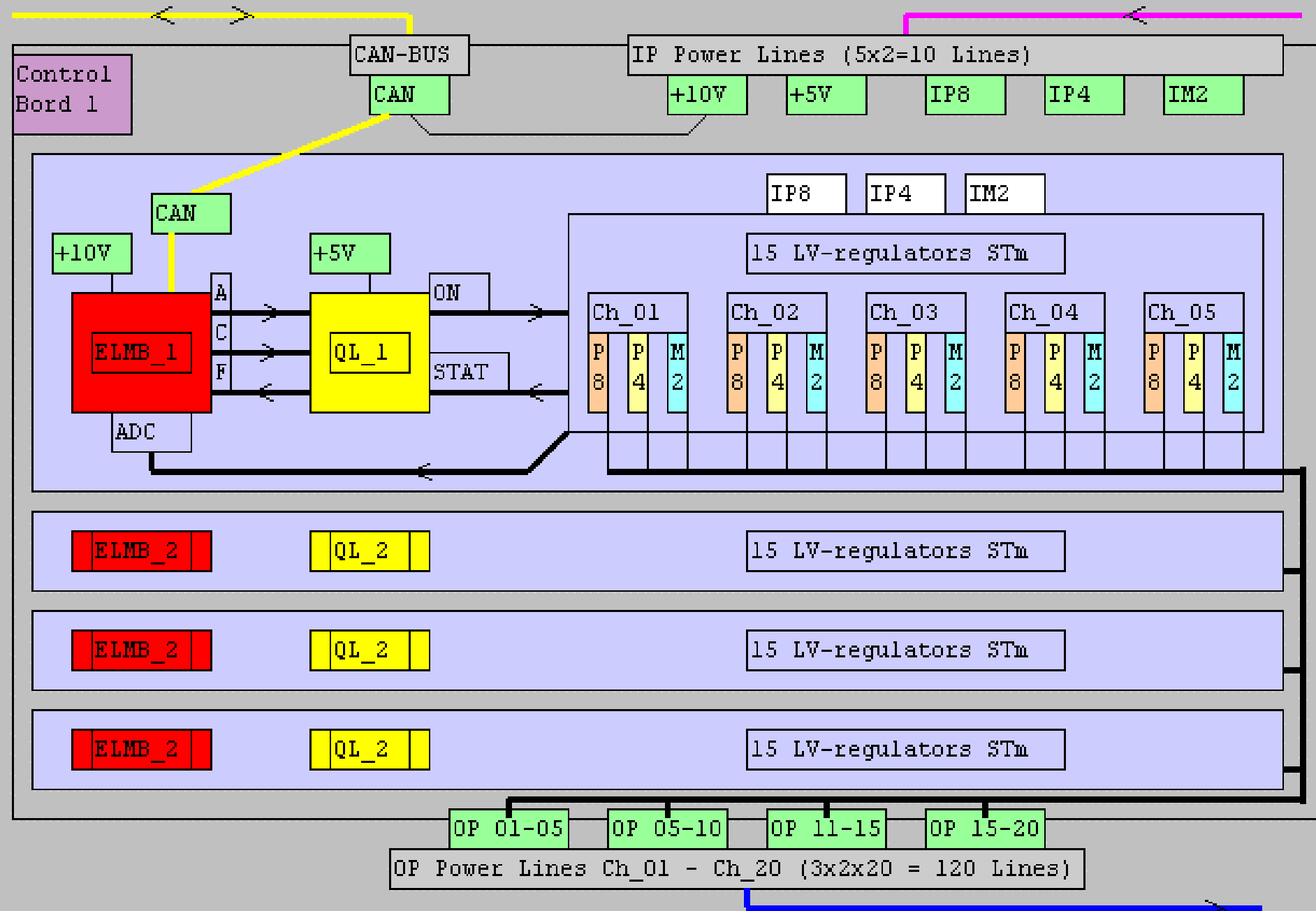
*Figure 4: POWER BOXES POSITIONS and CABLING*



*Figure 5: POWER BOX Block Diagram*



# Figure 6: LV Control Board





# *ELMB Requirements*

## *Number of units*

Total        64 ELMBs        (for 2 HEC-wheels) + 10 spares  
2002        12 ELMBs (for test beam + wheel construction)  
may be a second set (64) after 5 years of ATLAS-operation

## *Radiation hardness requirements*

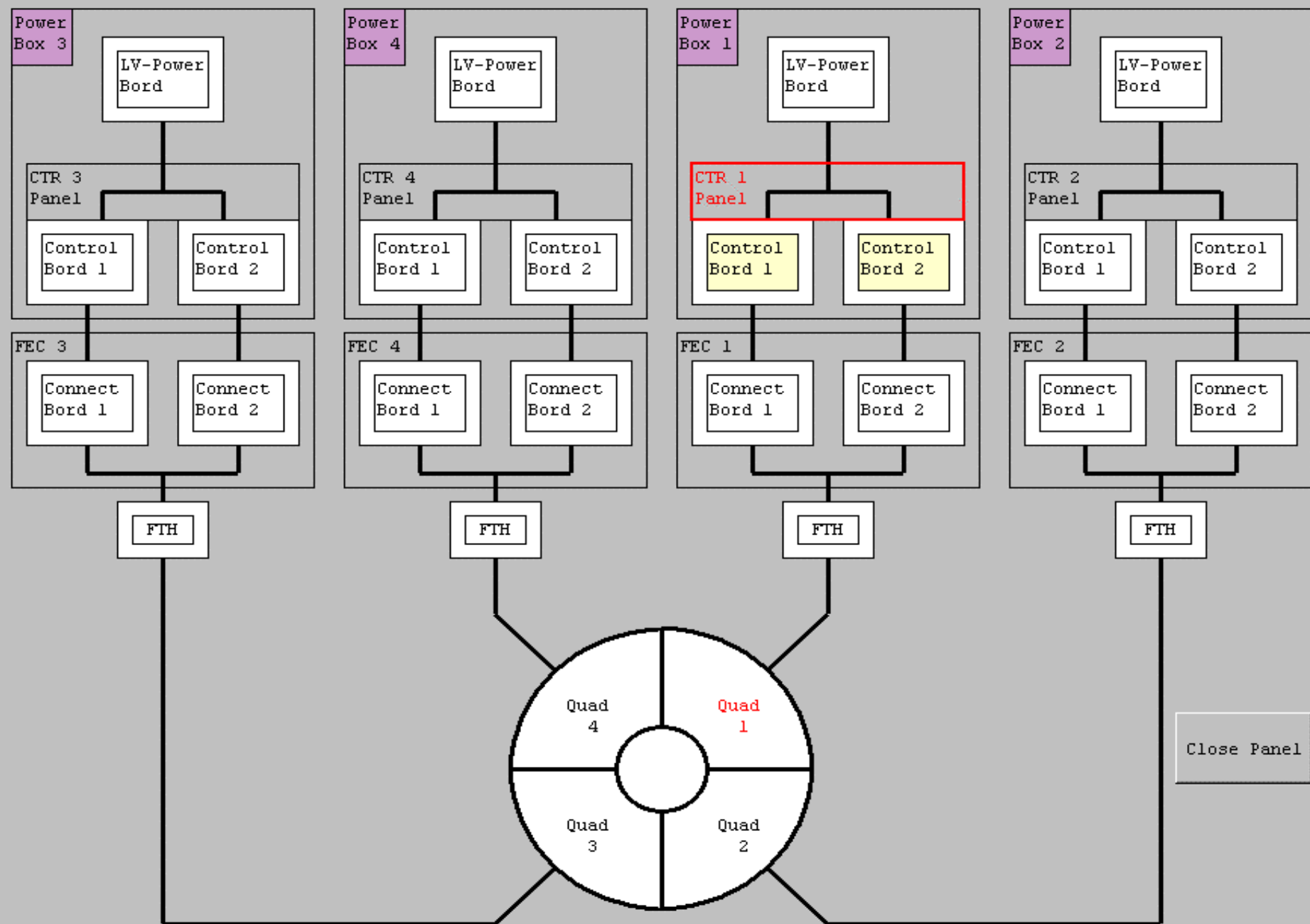
Position between fingers of TILE-Calorimeter

$R_{min}=387\text{cm}$ ,  $R_{max}=425\text{cm}$ ,  $Z_{min}=647\text{cm}$ ,  $Z_{max}=689\text{cm}$

Radiation maps of Aug 2001 (for 10 years of operation)

$TID=3E0\text{ Gy}$ ,  $NIEL=2E11\text{n/cm}^2$ ,  $SEE=1E2\text{ n/cm}^2/\text{s}$





*Figure 8: channel control*

TEST-DISPLAY all channels CURRENT OVL

TEST DISPLAY all channels VOLTAGE LOW

09:59:07 AM 03/20/01

Channels 01-20 Click STATUS

PHI-SEG	Channel	ON/OFF	Current
PHI-SEG 1	ch01	OFF	
	ch02	OFF	
	ch03	OFF	
	ch04	OFF	
	ch05	OFF	
PHI-SEG 2	ch06	OFF	
	ch07	OFF	
	ch08	OFF	
	ch09	OFF	
	ch10	OFF	
PHI-SEG 3	ch11	OFF	
	ch12	OFF	
	ch13	OFF	
	ch14	OFF	
	ch15	OFF	
PHI-SEG 4	ch16	OFF	
	ch17	OFF	
	ch18	OFF	
	ch19	OFF	
	ch20	OFF	

Voltage Current

Channels 21-40 Click STATUS

PHI-SEG	Channel	ON/OFF	Current
PHI-SEG 5	ch21	OFF	
	ch22	OFF	
	ch23	OFF	
	ch24	OFF	
	ch25	OFF	
PHI-SEG 6	ch26	OFF	
	ch27	OFF	
	ch28	OFF	
	ch29	OFF	
	ch30	OFF	
PHI-SEG 7	ch31	OFF	
	ch32	OFF	
	ch33	OFF	
	ch34	OFF	
	ch35	OFF	
PHI-SEG 8	ch36	OFF	
	ch37	OFF	
	ch38	OFF	
	ch39	OFF	
	ch40	OFF	

Voltage Current

SWITCH all CHANNELS

ON OFF

DISPLAY-CALO

DISPLAY-VOLTAGE

DISPLAY-CURRENT

Close Panel

CHANNEL

VOLTAGE -OK- CURRENT

ZERO 36 OFF ZERO

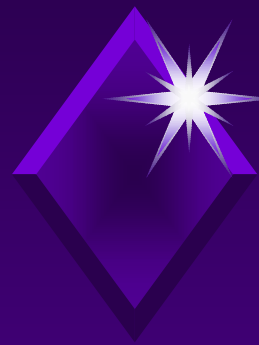
NORMAL 36 ON NORMAL

CHANNEL

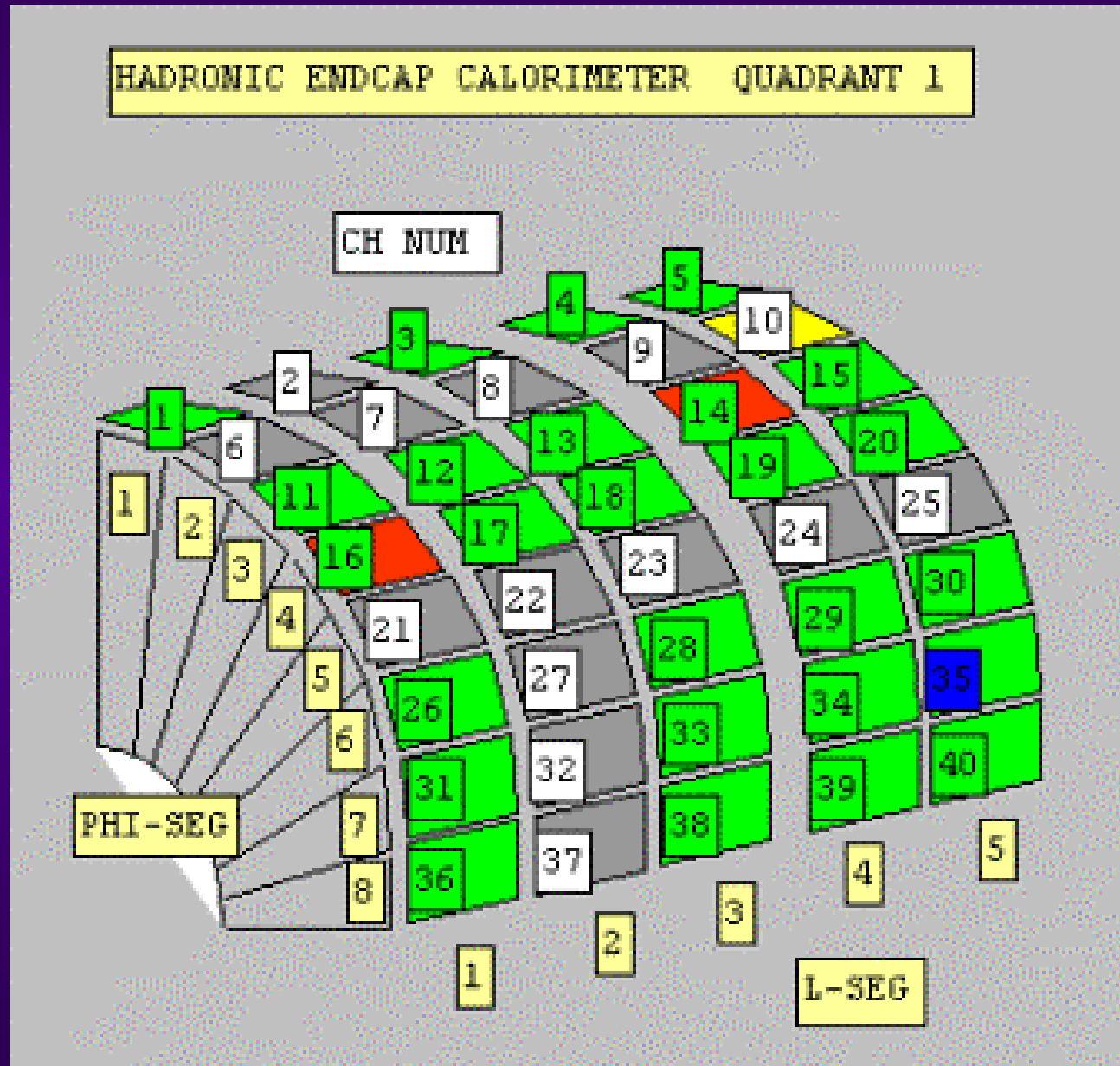
VOLTAGE -BAD- CURRENT

still ON 36 OFF too HIGH

too LOW 36 ON too HIGH



*Figure 9: Calo Quadrant*



# *Status of development*



*Hard and software components partially tested*

*Control boards, work progressing*

*Link PVSS2-OPC-NICANII-ELMB-QL operational*

*Gaining experience with software*

*Examples of graphics panels and control scripts in PVSS2*

## *Missing*

*Some radiation tests*

*Power boxes*

*PVSS2 Software for ATLAS operaten*



# *Experience with 1 ELMB*

## *Test Chain Hardware*

*PC, NICANII, CanBus, 1 ELMB on Mother Board (DCS-group)*

## *Test Chain Software*

*PVSS2, ELMB-Demo + OPCCanServer.cfg + openhost23.exe  
(CERN DCS),*

*Status    Running*

## *Remarks and Propositions*

*Add chNumber to panel “ADC Settings”,*

*Move data point “chNumber” to data point “ADC”,*

*SyncInterval can't be set in panel “CANopen Master Node”*

*Add “Transmission Mode” to panel “CANopen Master Node”*





# *Experience with 2 ELMBs*

## *Test Chain Hardware*

*PC, NICANII, CanBus, 2 ELMBs on 2 Mother Boards (DCS-group)*

## *Test Chain Software*

*Modified versions of ELMB-Demo + OPCCanServer.cfg,  
openhost23.exe*

*Status    Running by openhost23.exe*

*Not yet running by PVSS*

## *Remarks and Propositions*

*Give example of OPCCanServer.cfg for multiple ELMBs*

*Modify ELMB-Demo for multiple ELMBs*



# *Experience with PVSS2*

## *Startup and Support*

*Documentation in English language is needed,  
more tutorials are highly desirable.*

## *Paramodule*

*Size of window should be adjustable by mouse click.*

## *Trend Panel*

*Hard to work with: Size, scales etc. should be set by mouse actions,  
number of lines is too limited.*

## *Propositions*

*3-Display in Graphical Editor Panel would be nice*



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See you!  
Auf Wiedersehen!

