

HCAL RBX PRR

H C A L

Readout Box (RBX) PRR

Dan Green HCAL Project Manager



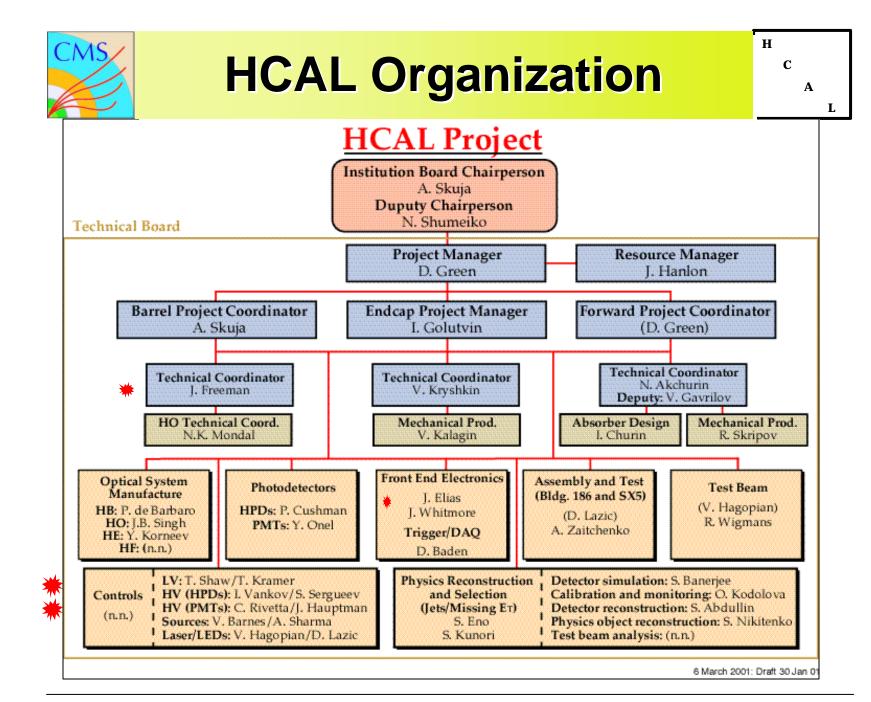
Outline

C A

L

Н

- Schedule and Milestones
- R&D experience
- RBX components
 - shell
 - backplanes
 - ODU
 - HPD
 - Calib laser, LED, sources
 - Services HV, LV, cooling,
 - Controls





HCAL - ML, HB

Milesta	one	Level	1999 Oct Apr C	2000 oct Apr	2001 Oct Apr	2002 Oct Apr	2003 Oct Apr	2004 Oct Apr	2005 Oct A
Ξ	Barrel (HB)			or mpr	oor mpi	oor mpr	oor mpr	001 1101	001
	CMS test beam motion table delivered to CERN	ML3	🔶 30 Oct						
	HB-PPP1 absorber delivered to CERN	ML2	🔶 30 Oct						
	HB Engineering Design Review complete	ML2	<mark>∳</mark> 3 Nov						
	HB optics production start	ML3	🔶 6 Jan						8
	HB absorber production start	ML3	👗 6 Jan		7				
k	HB readout box production start	ML3			• 30	Мау			
	HB-PPP2 absorber delivered to CERN	ML2	🔶 15 Ap	г	0.2016				
	HB HPD procurement start	ML3			♦2	9 Jun			
	HB Front-end ASIC Production	ML3				♦ 30 Oct	-		
	HB- absorber delivered to CERN	ML2			🏹 30 Nov				
	HB optics installation in absorber start	ML3			🛛 🍎 28 Fe	tp 🛛			
	HB readout box installation on absorber start	ML3				<mark>🍇 30</mark> Nov			
	HB Calibration in H2 Test Beam - start	ML2				*** 30	Арг		
	End Assembly of HB- in SX5	ML2			•	30 Aug			
	HB+ absorber delivered to CERN	ML2			90°	<mark>♦29</mark> Dec			
	HB optics installation in absorber complete	ML3				- 🍫 2	9 Jun		
	HB readout box installation on absorber complete	ML3						May	
	HB electronics installation in readout boxes complete	ML3					*	30 Jul	
	End Assembly of Hadron Barrel (HB) in SX5	ML1					30 Sep		
	End Trial Insertion of HB in Vac-tank	ML1						🍫 29 Dec	
	End Trial Mounting of EB Super Module on HB	ML1						🐴 🐴 🐴	n
	Start Cool-down of Coil	ML1						🔶 30 Ja	n
	Close Yoke, Start Magnet Test in SX5	ML1						→ ♦ 30 Ja	n
	HB lower to UX5 complete	ML3						♦3	0 Jun
	HB installation in solenoid in UX5 complete	ML2						•	30 Jul
	Install H1 Scintillator Complete	ML3						•	30 Jul
	End Installation and Test of HB in UX5	ML1						•	30 Aug



HCAL Critical Path and RBX

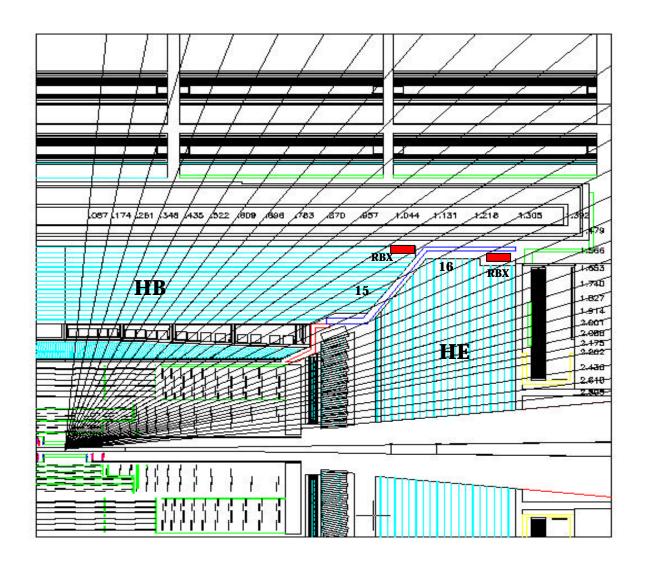
L

Н

ML?	Task Name		99) ct (A	in the	00 Oct	0 mr	01	Apr	02 Oct	Apr	03	Apr	Oct Ap
	HB+1 Absorber Production	- I Apr	10		vhi I	our	Apr		Abr		[Abi		TAbr	
	HB-1 Optical Production			*	:									
	HB+1 Optical Production						Ť.			-				
	Install Optics into HB-1							Ĩ	-	89			1	
	Install Optics into HB+1									Ť	6		1.0	
	HB-1, HB+1: ODU Installation on Absorber									8			h	
	HB-1, HB+1: System Integration									8			Tř	
	Trial Insertion of HB-1/HB+1 in Vacuum Tank									8				h
	Assemble HE-1 & Optics to YE-1										_		10 and	
	HE-1: ODU Installation on Absorber									81			h	
	HE-1: System Integration									8			Tř	
	Assemble HE+1 & Optics to YE+1									8				
	HE+1: ODU Installation on Absorber									8				
	HE+1: System Integration									8			T	
ML2	HO Optics Installation on YB Completed									8				
ML1	Close Yoke and Start Magnet Test in SX5									8				۲
ML3	HCAL Readout Box Production Start							-	1	1				
	HB Readout Box Production								I					
	HE Readout Box Production											-		
	HO Readout Box Production													
ML3	HCAL HPD Delivery & Testing Start								•1	8				
	HCAL HPD Procurement and Testing													
	Front-End Electronics Production										_ 1			
	Front-end Electronics (Explicit Slack)									8				
ML2	Complete Front-end Electronics Production									8		•		
	ASIC Packaging and Testing									8		Ľ,		
	Mount ASIC's on Boards, Checkout and Burn-In									8		Ē	1	



Central HCAL



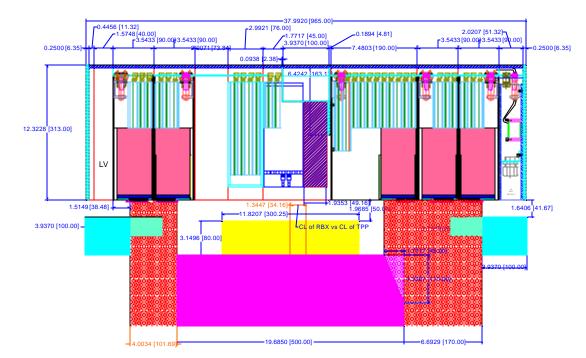


HB RBX Detail View

C A

L

Н



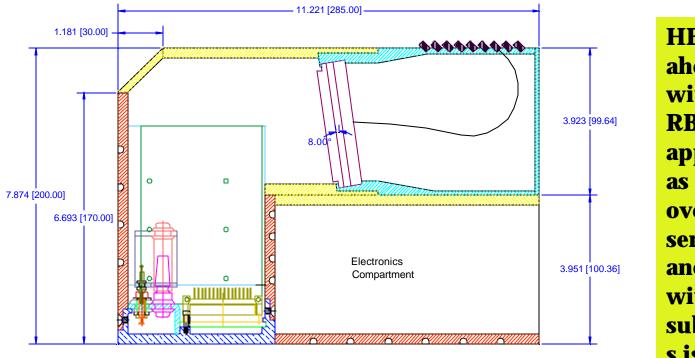
The issue for the **RBX** is the access to the HPD. There are integration issues with the tracker patch panel. A mockup was made and changes appear possible which will ease the problem. Schedule is such that the RBX is near to the critical path.



HE RBX Conceptual Design

C A L

Н



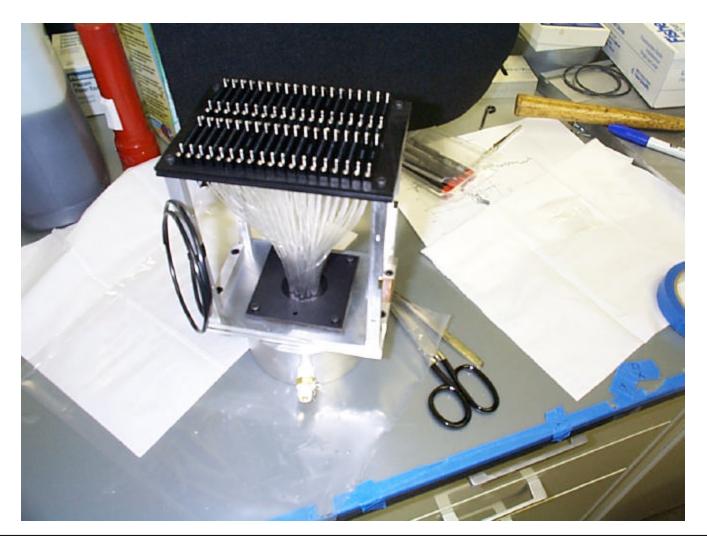
HE can go ahead with the **RBX**, it appears, as the overlap of services and cables with other subsystem s is not as severe as it is with HB.



ODU - Optics for Layer-->Tower

H C A

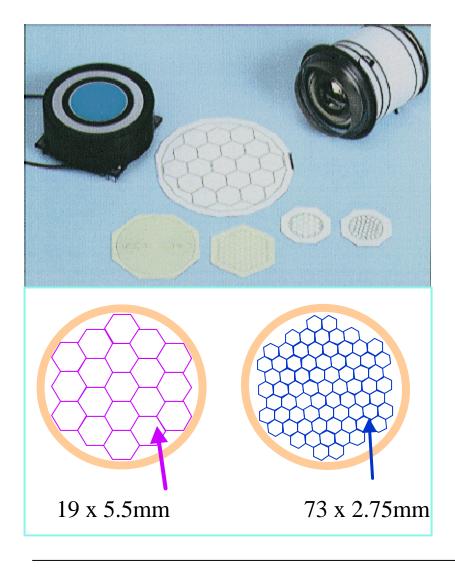
L











The HPD have had many problems which have been solved - sequentially. At present we specify an Al electrode and an antireflection coating. This "works" but the problem of low yields at the vendor must be solved.

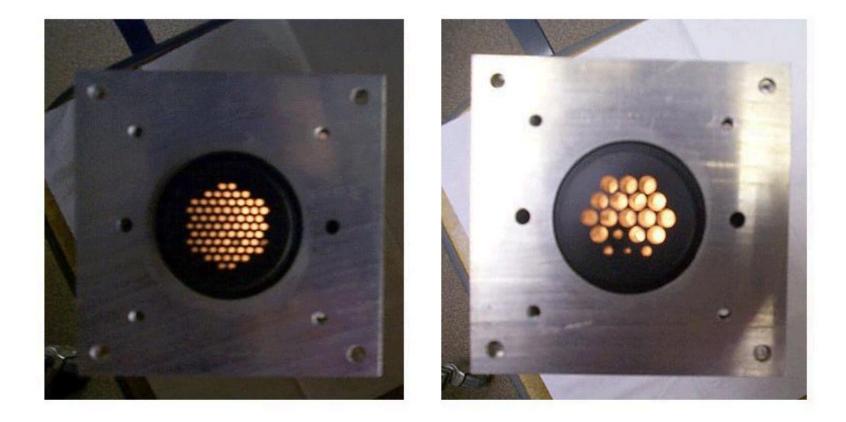


H1 and H2 Layers

C A L

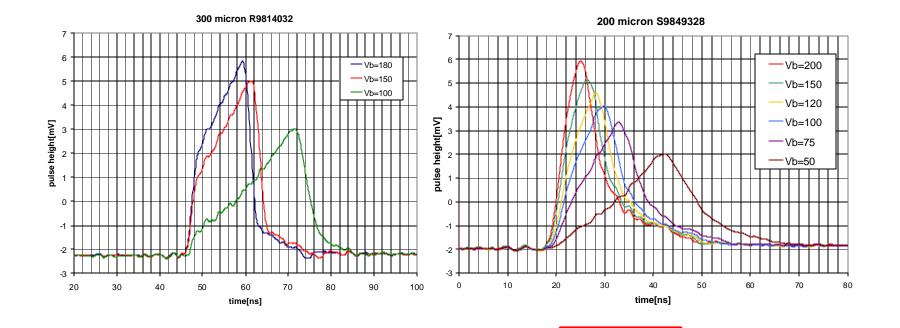
Н

73-channel (HB) 19-channel (HB right)





Pulse Formation - Bias



We have developed at fast diode which - with guard rings - can be run at very high bias.



Near Term HPD R&D

H C A

L

DEP=red Canberra=yellow MN=green

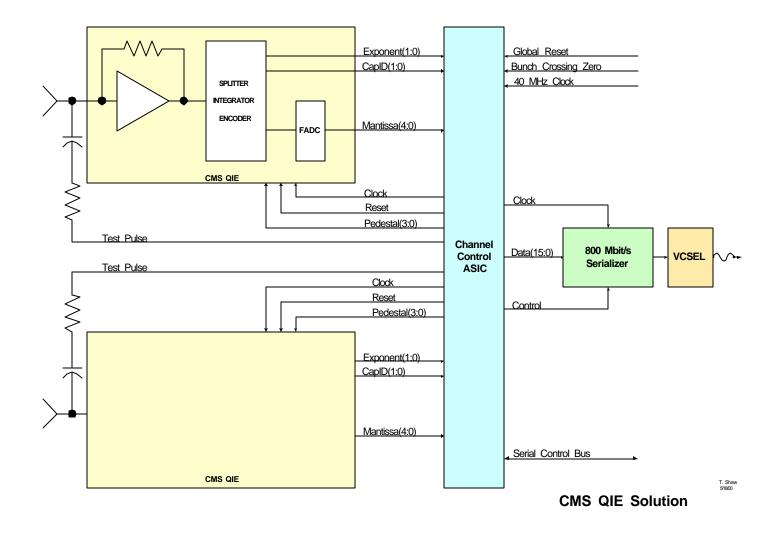
	M	A	м	J	J	A	S	0	N
prodution diode order + 2 waters									
Type 1 Development									
Canberra process develpm.									
DEP 16 nm a-sion Altest									
VIN reflextion measurement	-							_	
2 HP D a-Si/Al prototypes									
evaluation by MN HPD prototypes									
inish 2 waters option 1				15	_				
evaluate leakage current atter bake out									
inish first production run waters									
Type 2 Development									
SiO2/Ag/a-si coating on rejected diode:	s								
MN relextion & leakage studies									-
finish 2 waters option 2				-					
DEP SIO2/Ag/a-Si 3 HPD prototypes	i.			1					
evaluation by MN HPD prototypes					_		2		
Production									+
DEP Production start									
First Production HPDs at MN		-	_				-	-	



HCAL QIE-based Front End

L

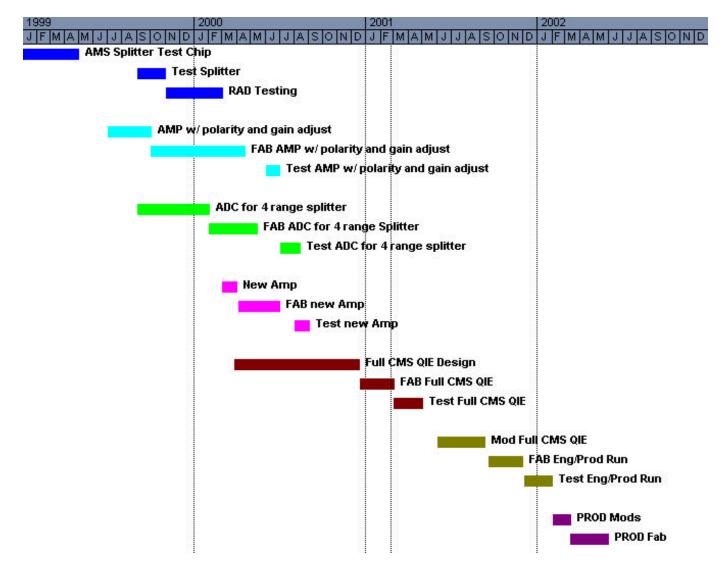
Н





QIE Schedule

Η





Decoder Box, Test Beam R&D

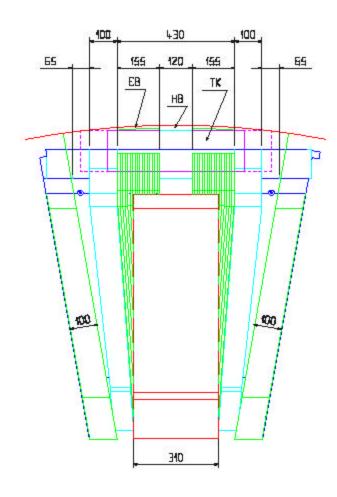
H C A L





Access to FE Electronics

Н



53 degree end of HB wedge.

Blue = HCAL services

Green = ECAL

Red = Tracker

End of HB wedges obscured by cables and services from HB, EB, tracker. Servicing electronics nontrivial.



Goals

- H C A
- We have a ~ final design which has been on hold for 6 months.
- The schedule for RBX is near to the critical path.
- The design has been sent to CMS for evaluation and optimization.
- We need approval of the RBX optical cables, ODU, shell, etc. The HPD and QIE are not yet ready for prime time.