

HPS ECAL review

Mechanical, thermal and integration aspects

(By P. Rosier)

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DVCS (2004-2005)

Crystals support frames

Support structure

(internal and external)

Integration of:

Crystals

Apd 5x5

Preamplifiers

Connecting and
motherboard

Insulated box

Cooling circuit

(Chiller compatibility)

Alignment tool

...

ECAL test run (2011-2012)

Crystal frames

Support structure

-space for front light injection

-space to double number of crystals

Thermal box

Cooling circuit

Alignment tool

Motherboard KIV

Connection board

Preamp rail system

ECAL support system

Pre-assembly at Orsay

Transport

Mounting at JLAB

Vacuum chamber

For the ECAL test run, the design and construction required 1.5 engineers and 0.6 technicians (men/year FTE)

For the ECAL C1 preparation, the mechanical design and construction will require 0.55 engineers and 0.3 technicians (men/year FTE)

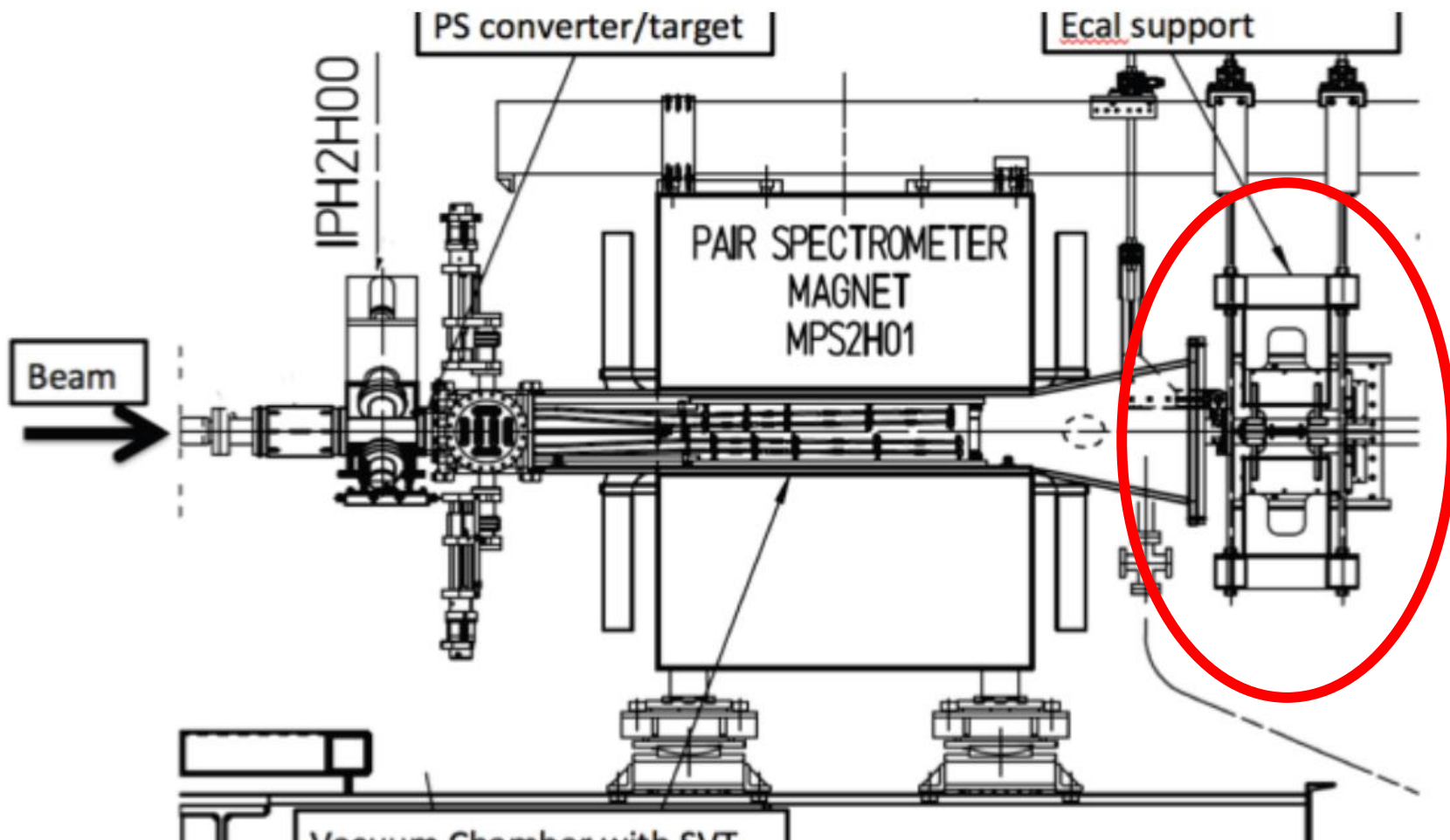
Ph. Rosier (Mechanical and thermal engineering and project manager) = **0.15 FTE**

E. Rindel (Mechanical and integration designer and assembly leader) = **0.4 FTE**

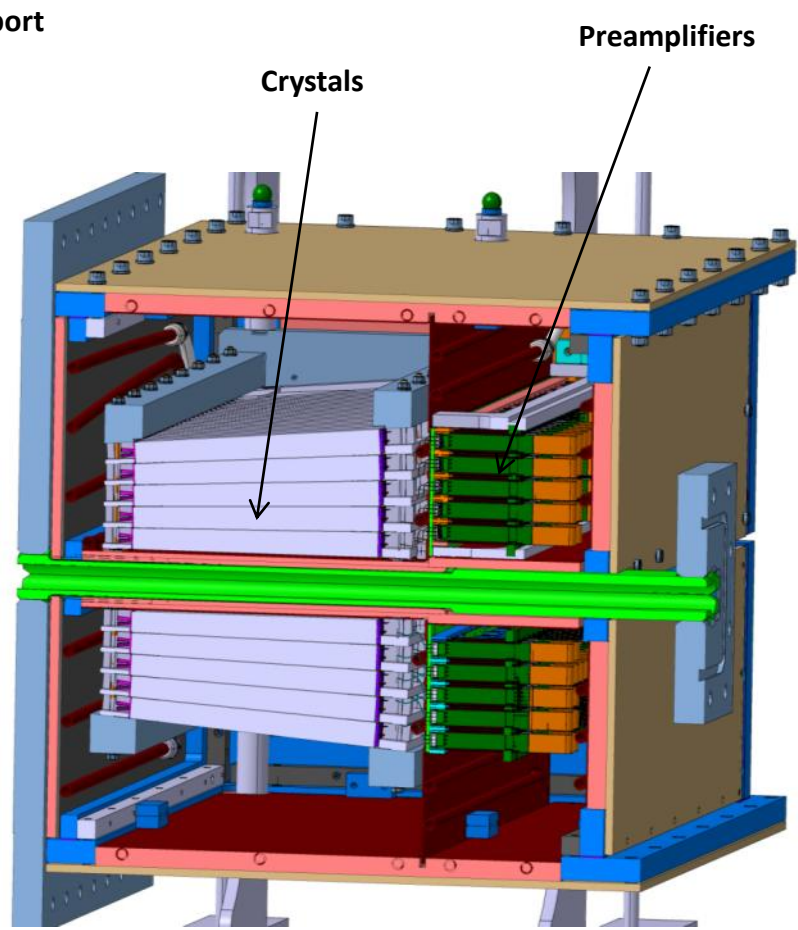
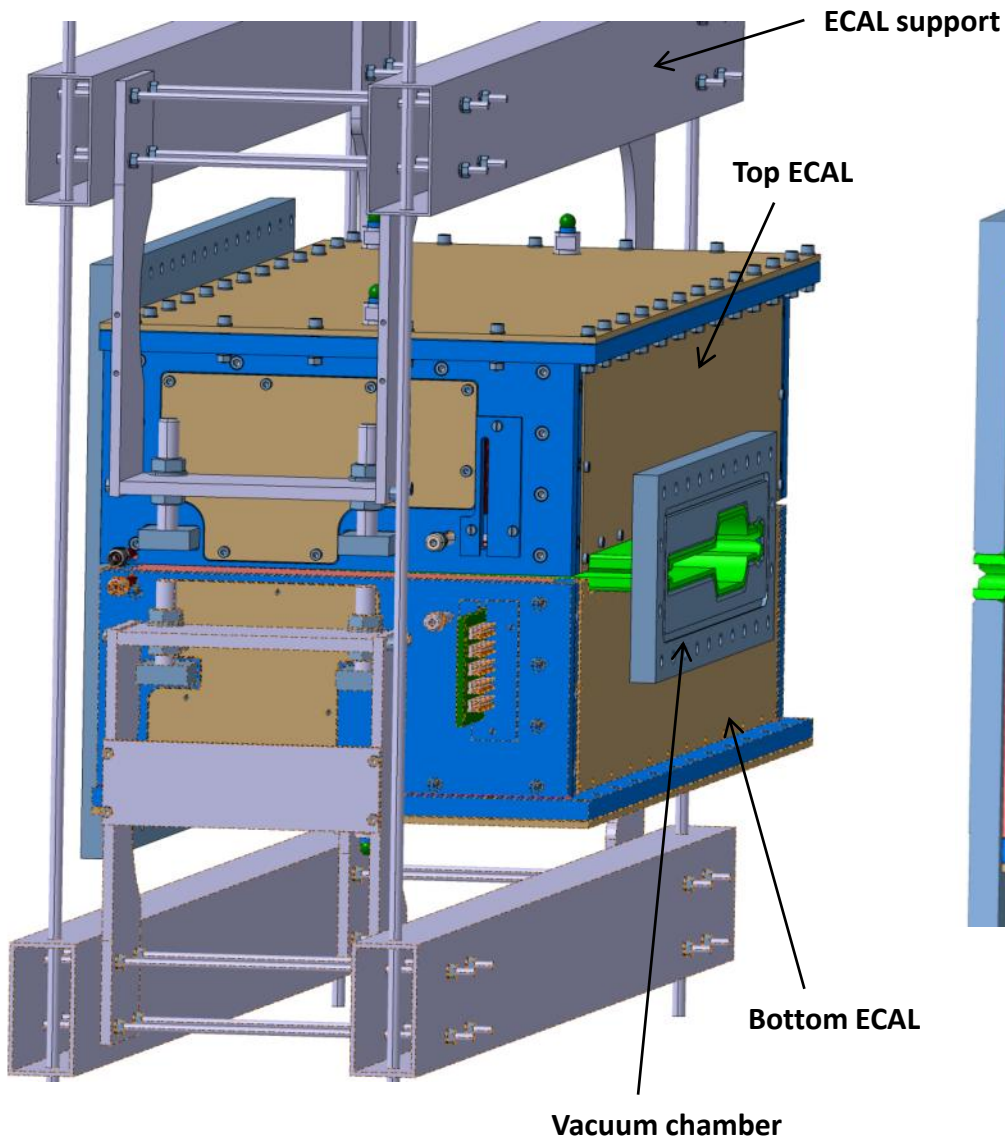
M. Imre (Technical workshop staff) Pre-assembly in Orsay and Participation in the mounting at JLAB = **0.2 FTE**

L. Seminor (Technical workshop staff) specialized in cooling circuit manufacturing and rail production = **0.1 FTE**

Ecal test run setup

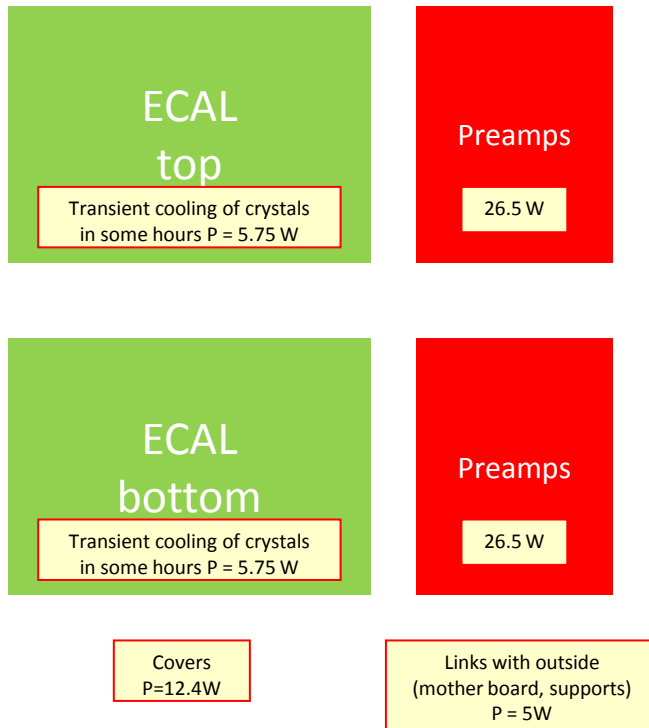


Ecal for the test run



Based on the DVCS experiment ... it uses the same chiller set at 16°C

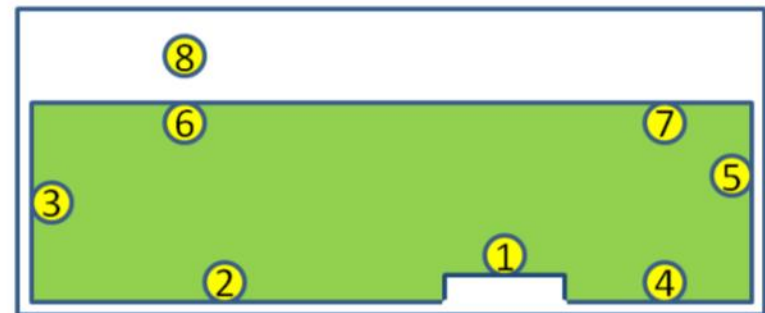
Power summary for the HPS ECAL



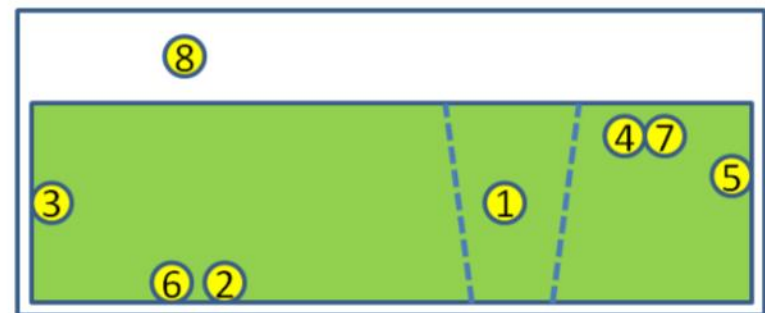
Total ~89W for the HPS ECAL

Thermal sensors positions

FRONT view



TOP view



⇒ measures in 2012 show stable temperature at 18+/-0.1°C

ECAL test run (2011-2012)

Crystal frames

Support structure

-space for front light injection

-space to double number of crystals

Thermal box

Cooling circuit

Alignment tool

Motherboard KIV

Connection board

Preamp rail system

ECAL support system

Pre-assembly at Orsay

Transport

Mounting at JLAB

Vacuum chamber

ECAL C1 preparation (2013-2014)

Crystal dismounting

Laapd integration

Motherboard KIV

Led integration

Cooling circuit modif.

Thermal box modif.

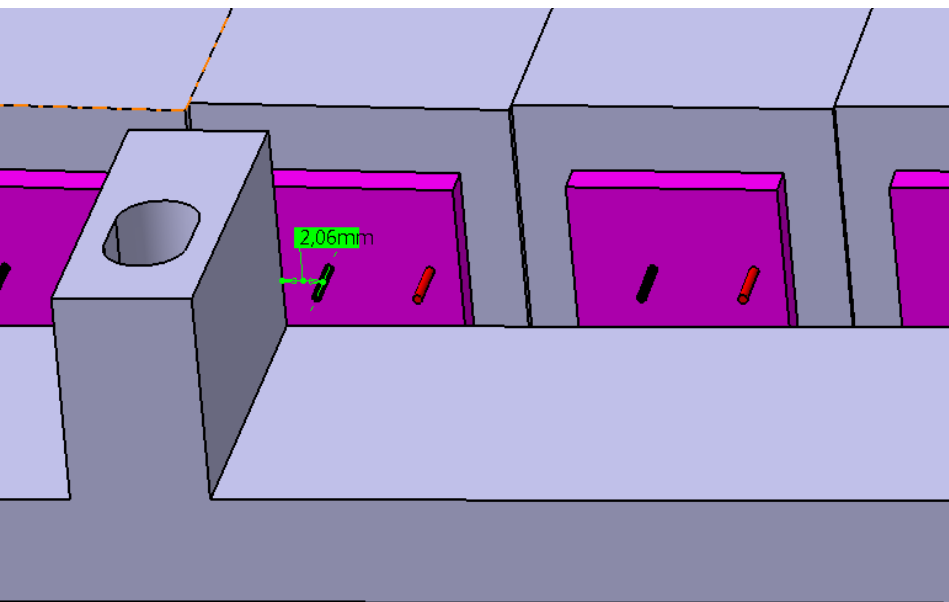
ECAL support system

Mounting & assembly

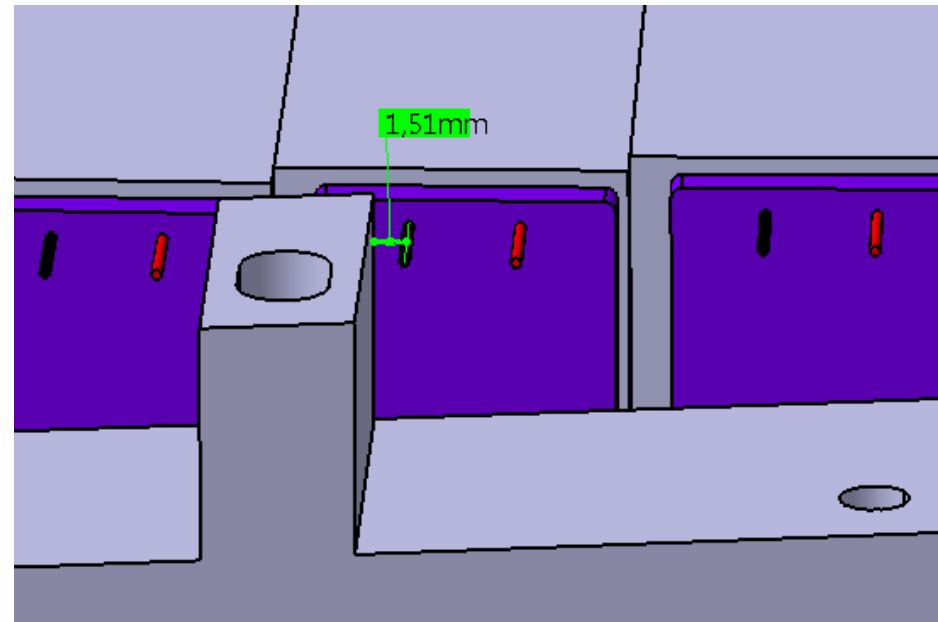
Orsay will participate in the dismounting of ECAL in nov 2013
and on the mounting (after APD change) in 2014



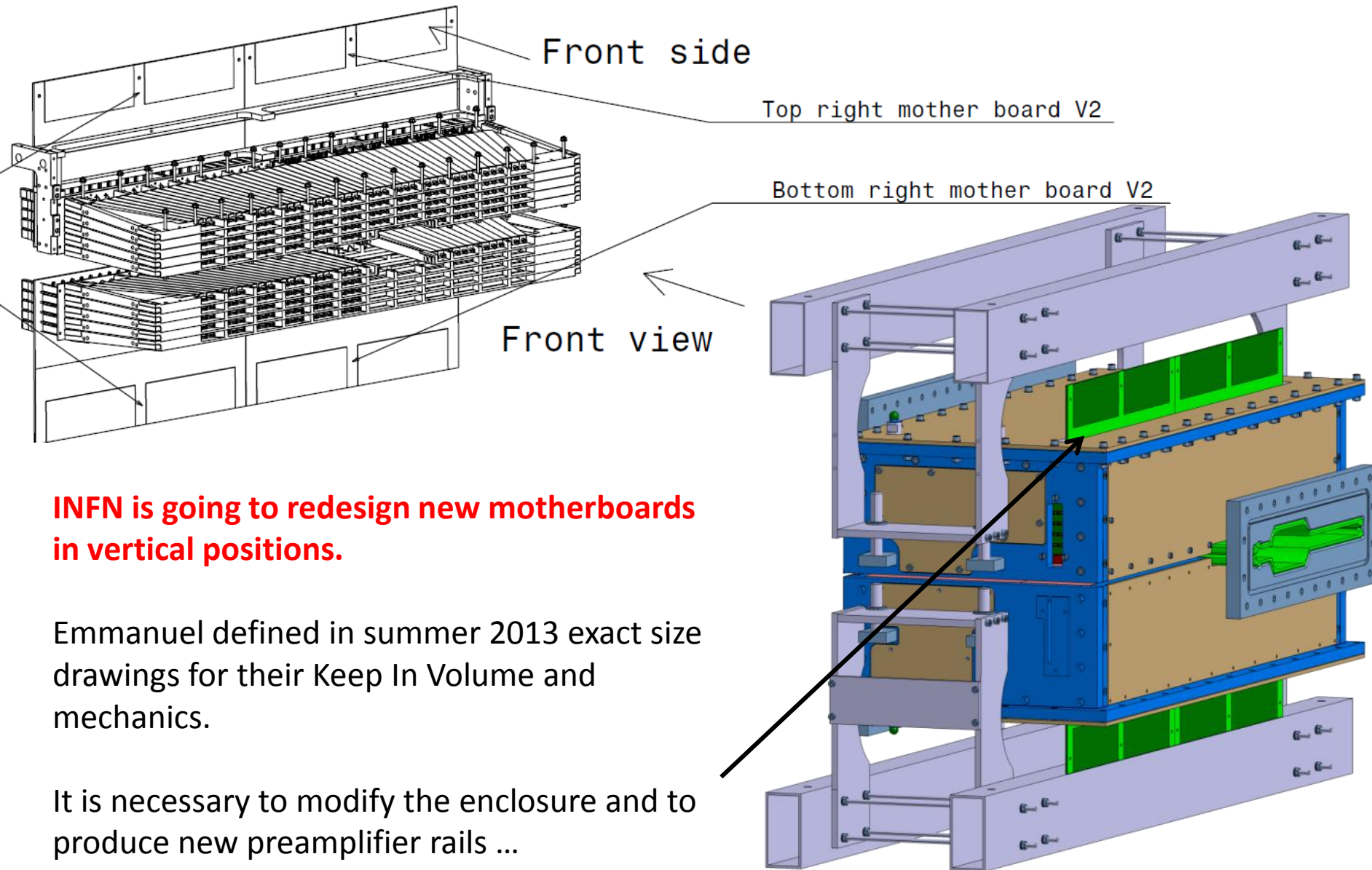
ECAL test run = APD 5x5



ECAL C1 = APD 10x10



During the crystal dismounting in nov 2013, we'll check the LAAPD mounting



LED system integration baseline

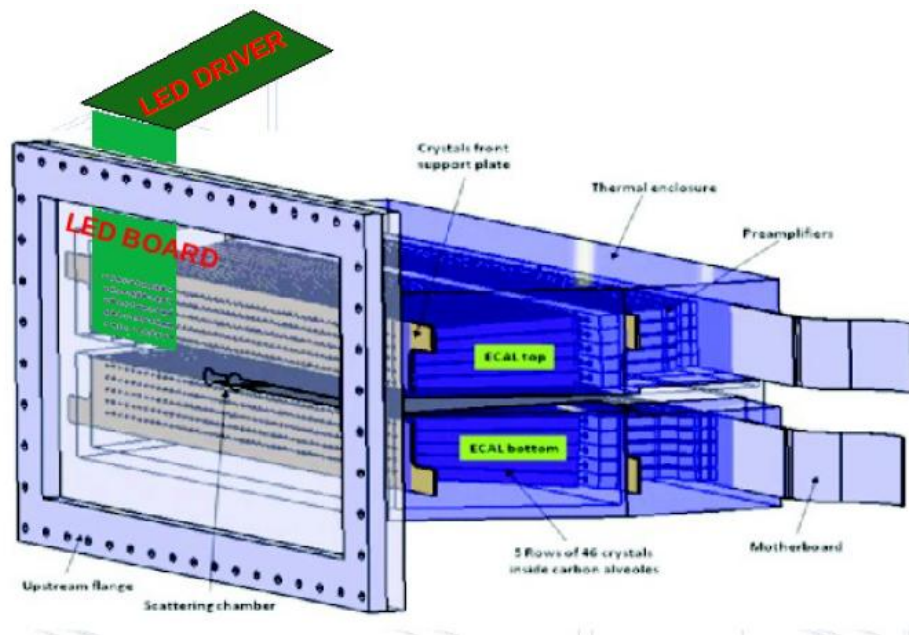
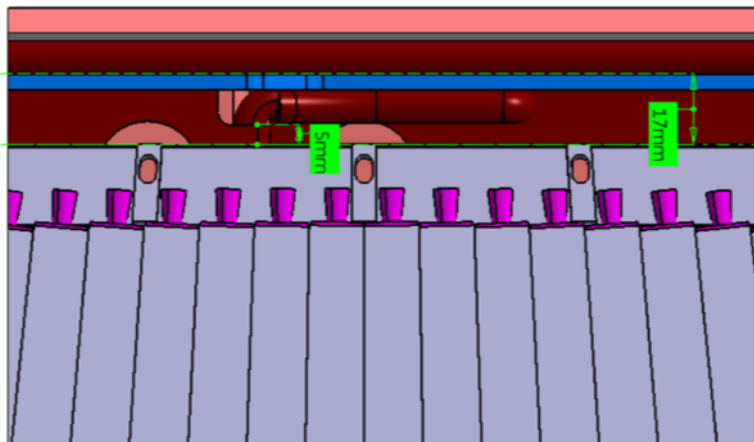
On the 18/09/2013, we had a phone meeting to fix the baseline of the LED system integration

The conclusion is:

- A mechanical study between INFN and Orsay is undergoing.

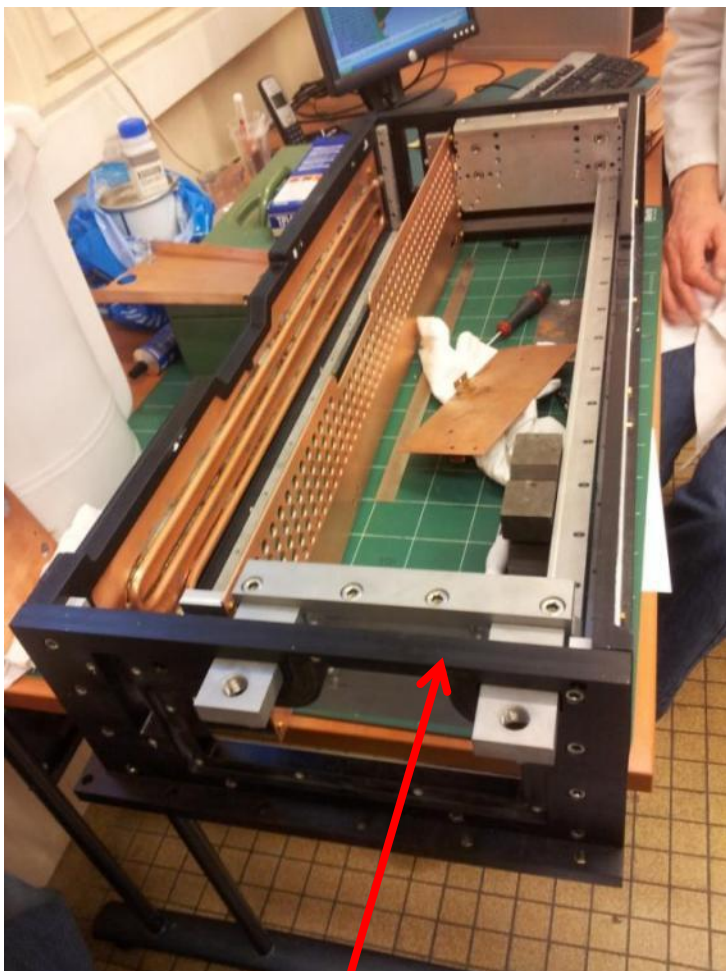
The idea is to replace the ferule support in front of crystals by a new one comprising the LED.

- The LED driver will stay outside of the ECAL for high power reason . It can be fixed on top of the ECAL. It is linked by a flat cable through the ECAL enclosure (also to modify).



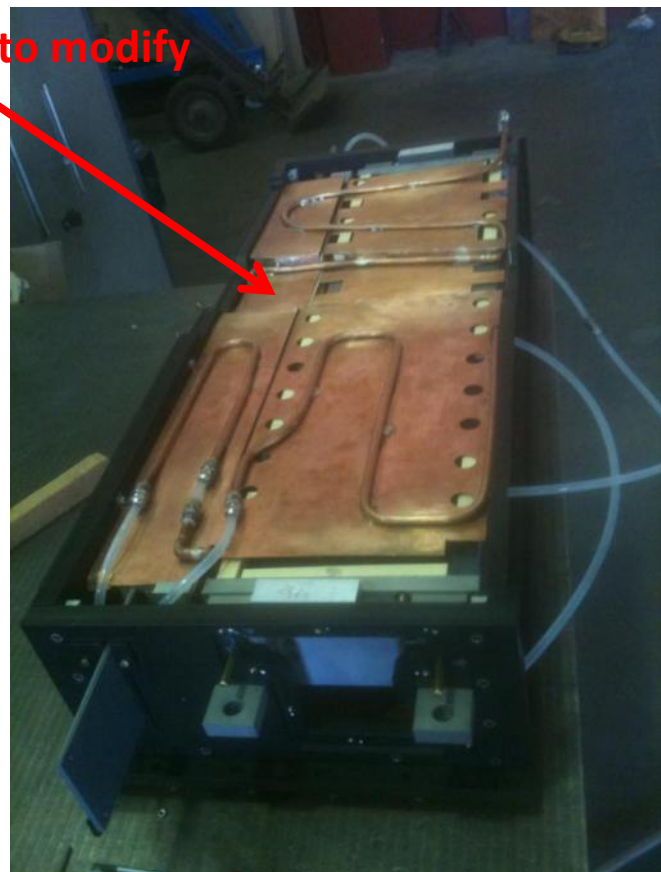
From Celentano presentation of the 9th september

Insulated box and cooling circuit modification



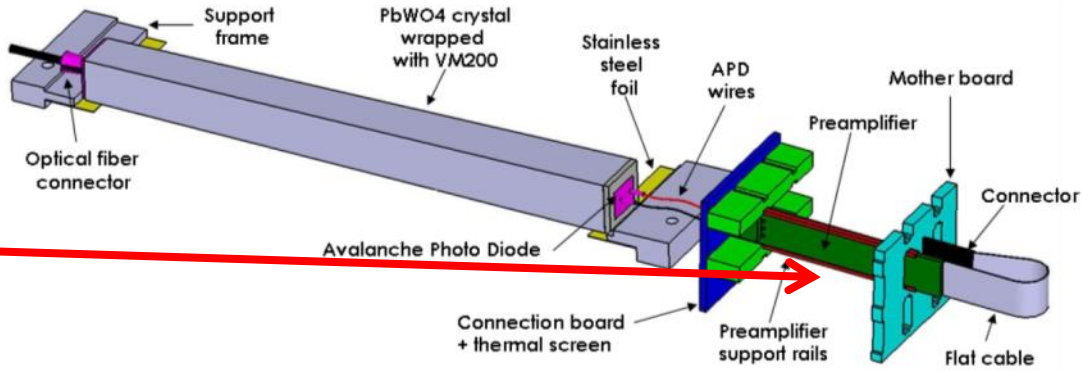
Thermal box to modify

Cooling circuit to modify



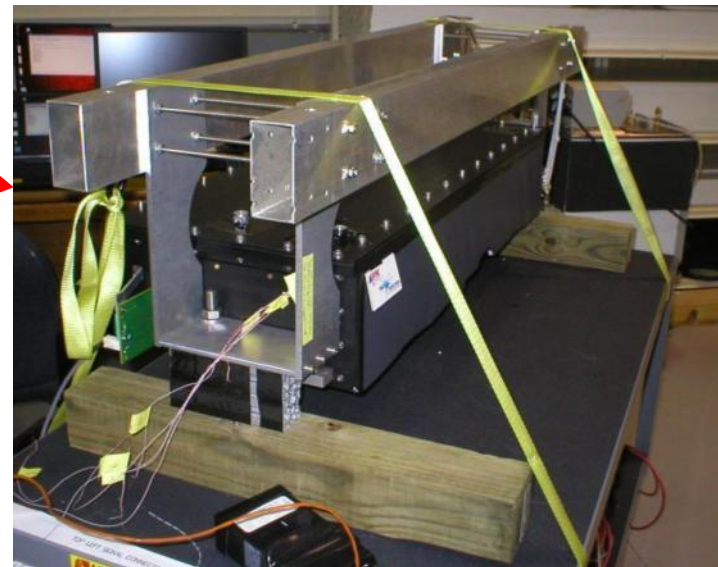
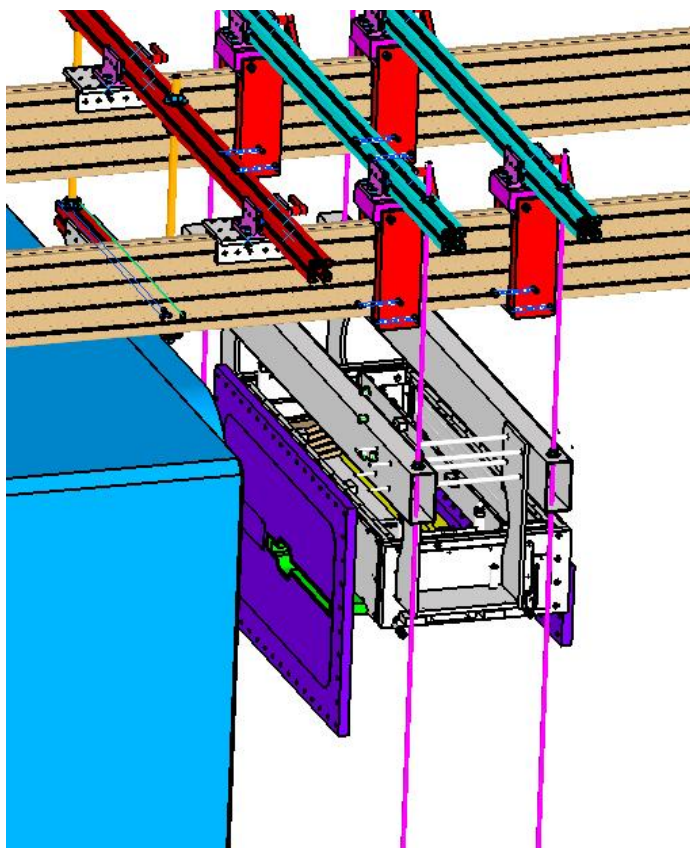
Precise design and construction to be done beginning of 2014.

Preamplifier rail and motherboard soldering



800 copper rails to manufacture and soldering of the new motherboards @ JLAB

Due to a misunderstanding in the responsibilities and a lack of information in 2011, the existing support must be redesigned.



From the Mike Zarecky CAD (here left), the design of a new support is foreseen beginning of 2014.

Made of NORCAN profile, it will be adjustable, easy to align and stable after alignment.

NORCAN profil support = 2500 euros
Cooling circuit modif. = 1000 euros
Rail tool + rails = 500 euros
Thermal box plastic = 500 euros
Transport and customs = 1500 euros (to confirm)

TOTAL around 6000 euros ...

Schedule

ECAL Mechanical and integration															
	Task	2013						2014						Responsibility	
		July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		
ECAL design	Integration of LAAPD and LED													Orsay	
	Thermal enclosure modification													Orsay	
	Electronic boards		KIV	KIV										INFN Genova	
	ECAL support on magnet													Orsay	
ECAL construction	ECAL support construction													Orsay	
	Structural parts Machining													Orsay	
	Thermics	Thermal screens manufacturing													Orsay
		Thermal enclosure manufacturing													Orsay
	Electronics side	Preamps rails production												Orsay	
	Shipment	Shipment to Jlab									●			Orsay ?	
ECAL assembly	Crystals mounting in frames													?+Orsay	
	Electronic boards mechanical mounting													Orsay	
	ECAL assembly													?+Orsay	