Status of IBL MoU

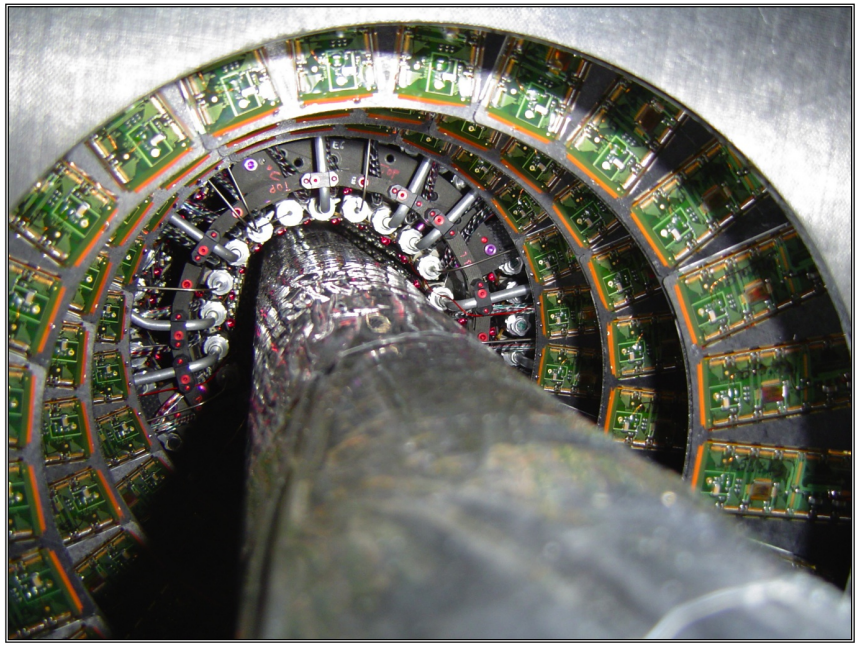
Roma, February 2nd, 2010

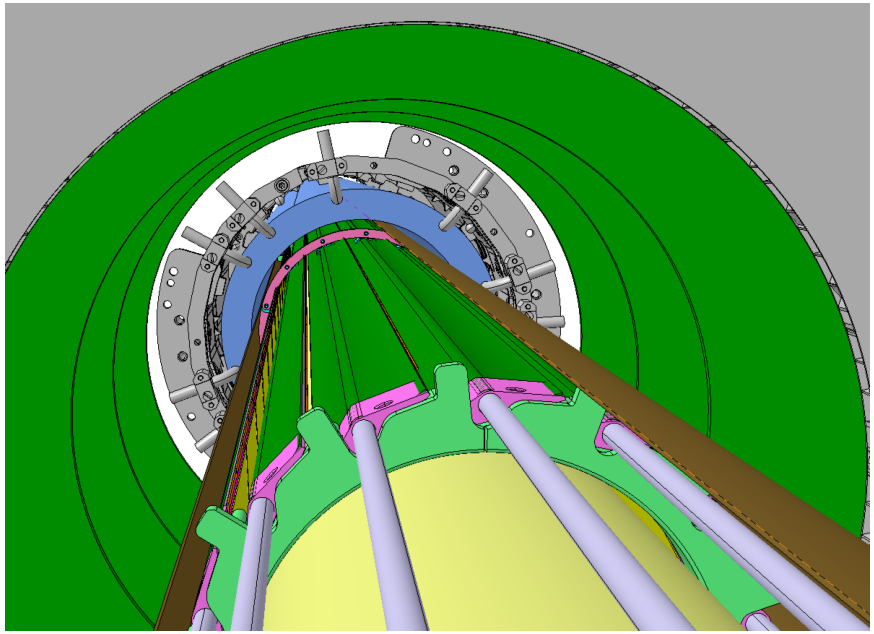
G. Darbo - INFN / Genova

Agenda Page:

http://agenda.infn.it/conferenceDisplay.py?confId=2120

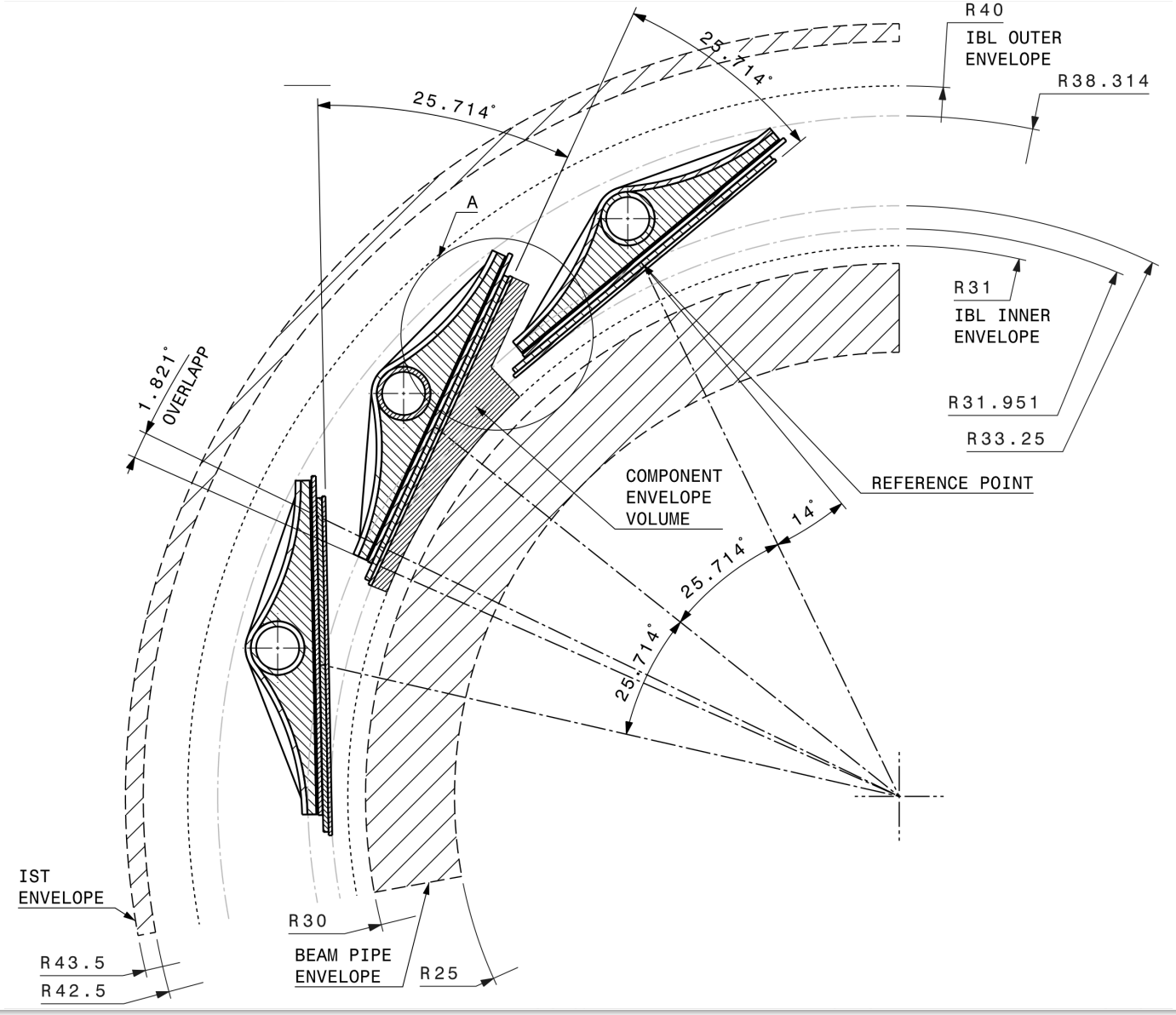
Pixel → IBL





- Mission impossible… fit an additional layer in between Pixel and beam-pipe:
  - Reduce beam-pipe by 4 mm in radius… and then make it possible!

Pixel → IBL


R40
IBL OUTER
ENVELOPE
R38.314
25.714°
25.714°
A
R31
IBL INNER
ENVELOPE
R31.951
R33.25
1.821°
OVERLAPP
COMPONENT
ENVELOPE
VOLUME
REFERENCE POINT
14°
25.714°
25.714°
IST
ENVELOPE
R30
BEAM PIPE
ENVELOPE
R25
R43.5
R42.5

MoU Steps

- First IBL Institute Meeting Meeting in Thoiry:
  - *31 Institutes represented, 35÷40 Institutes interested*
  - *They are represented by a total of 16 Funding Agencies*
  - *22 institutes interested in a sensor technology – for some of them the contribution to the project is conditional to the sensor option*
- Decided to go to an interim-MoU:
  - *Decision on sensor technology (end 2010 – early 2011)*
  - *Consolidate interest of Institutes and availability of funds*
- Draft i-MoU (Markus/Nanni)
  - *Text document prepared by M. Nordberg*
    - Discussed with Marzio, Claus (IB Chair), Heinz (IBL TC)
    - Will be discussed by Markus with NCP's
  - *Annexes tables prepared by G. Darbo*
    - Distributed to IBL Contacts (Institute Leaders or their Proxies)
- Institute Board discussion of IBL MoU:
  - *March 1st …*

IBL MoU

- **Interim Memorandum of Understanding for the IBL**
  - ***Between*** *The ATLAS COLLABORATION,* ***and*** *Funding Agency/Institution of the ATLAS Collaboration*
- Purpose…
  - *…The iMoU comprises all of the actions needed to construct and commission the IBL. The operation and maintenance of IBL is not a part of the present iMoU and will be included, following its completion, within the M&O MoU framework.*
  - *The iMoU proceeds in two steps. First, to organize and distribute the work among the participating institutes related to choosing from the available sensor technology options and specifying the sensor technology for series production. Second, to agree on the detailed work and funding for the series production. Following the latter stage, the iMoU will become final.*
- Duration…
  - *The initial period of validity of this iMoU covers the construction phase of the IBL for the ATLAS detector. Based on the present Phase 1 planning given by the CERN Management, it takes effect from 1 March 2010 to 31 December 2017.*
  - *Any Funding Agency/Institute may withdraw its support from the IBL construction project before December 2010 by giving notice in writing to the ATLAS Management and, thereafter, by giving not less than eighteen months notice in writing. In the latter event, reasonable compensation to the IBL construction project will be negotiated through ATLAS Management and endorsed by the RRB.*

Way of funding the project

…following guidelines are agreed for the sharing of IBL costs :

- For Common Infrastructure Items, the costs are to be shared amongst the ATLAS Funding Agencies or Institutes in proportion to the number of their scientific staff holding PhD or equivalent qualifications who are entitled to be named as authors of scientific publications of the Collaboration. These costs shall be charged to the **M&O Category A**. Institutes can also provide these items as in-kind contributions, in accordance with the approval mechanism described in the M&O MoU.
- For items included in 2002 in the **M&O Category B** for the so-called b-layer replacement, the costs are initially to be shared by the Funding Agencies who participated in the construction of the Pixel sub-system. The initial sharing shall be based on their contributions made to Pixel, which was used as the sharing mechanism for M&O Category B at that time. The participating Institutes can also provide these items as in-kind contributions, in accordance with the approval mechanism described in the M&O MoU.
- For items added later on to the original concept of the b-layer, which are also related to the available options for choosing the sensor technology, the costs are to be shared by the Institutes based on expressed interest. The participating institutes can also provide these items as in-kind contributions, and approved by the RRB. The related funding will be new, upgrade project money.

Annex 4 – Money Matrix

ANNEX 4		MoU items													
		1	2	3	4	5	6	7	8	9	10	11			
	Funding Agency	Sensor	FE-I4	Bump-bonding	Stave	Mod.Load	R/O Chain	PS Chain	Integration	Cooling plant	BP & Interfaces	Installation	Present Total	Reference to RRB	Technology Options
Project	Canada	35	-	-	-	-	-	-	-	-	-	-	35		375
	Germany BMBF														597
	Germany DESY	-	-	-	-	-	72	-	-	-	-	-	72		
	Italy	106	165	94	140	95	381	66	-	-	-	-	1 047		
	Japan	27	-	98	-	-	-	-	-	-	-	-	125		155
	Netherlands	-	211	-	-	-	-	-	-	-	-	-	211		89
	Norway	52	-	-	-	21	-	-	-	-	-	-	73		227
	Slovenia	28	-	-	-	-	-	-	-	-	-	-	28		122
	Spain	52	-	80	-	-	-	-	-	-	-	-	132		168
	Switzerland	-	159	-	-	75	-	-	182	-	300	-	715		
	United Kingdom	106	-	-	-	-	-	-	-	-	-	-	106		215
	US DOE & NSF	62	261	-	-	161	185	32	-	-	80	-	780		
	CERN	65	-	98	47	18	-	-	311	-	-	-	538		(38)
	Unknown											-	-		
	Total	**534**	**796**	**370**	**187**	**369**	**638**	**98**	**492**	**-**	**380**	**-**	**3 863**	**1 289**	**1 910**
M&O-B	Czech Republic	27	-	-	-	-	-	-	-	-	-	-	27	54	
	France IN2P3	120	233	-	140	43	-	-	-	-	40	-	576	572	
	Germay BMBF	70	302	356	140	25	160	74	-	-	-	-	1 128	1 203	
	Italy												-	1 328	
	Taipei	-	-	-	-	-	41	-	-	-	-	-	41	164	
	US DOE & NSF		41										41	1 066	
	Unknown	-	-	-	-	-	-	-	-	-	-	-	-		
	Total	***218***	***576***	***356***	***280***	***68***	***201***	***74***	***-***	***-***	***40***	***-***	***1 812***	***4 387***	
M&O-A	Italy (in-kind)						187	189					376		
	Total	**-**	**-**	**-**	**-**	**-**			**-**	**-**	**-**	**-**	**4 065**	**4 065**	
Total		**752**	**1 372**	**726**	**467**	**436**	**839**	**172**	**492**	**-**	**420**	**-**	**9 741**	**9 741**	**1 910**
Notes															
Technology options refer to supplementary costs which are sensor technology specific and will be known before the formal MoU takes effect															
Unknown Funding Agencies refer to costs where corresponding work packages are not yet distributed															

Annex 4 – Money Matrix

	Funding Agency	1 Sensor	2 FE-I4	3 Bump-bonding	4 Stave	5 Mod.Load	6 R/O Chain	7 PS Chain	8 Integration	Present Total	Reference to RRB	Technology Options
Project	Italy	106	165	94	140	95	381	66	-	1 047		
	Total	**534**	**796**	**370**	**187**	**369**	**638**	**98**	**492**	**3 863**	**1 289**	**1 910**
M&O-B	***Total***	***218***	***576***	***356***	***280***	***68***	***201***	***74***	***-***	***1 812***	***4 387***	
M&O-A	Italy (in-kind)						187	189		376		
	Total	**-**	**-**	**-**	**-**	**-**			**-**	**4 065**	**4 065**	
Total		**752**	**1 372**	**726**	**467**	**436**	**839**	**172**	**492**	**9 741**	**9 741**	**1 910**

- INFN Contribution: 1047 M&O-B+ 376 M&O-A
  - *To INFN referee was proposed (23/7/09) 1075 + M&O-A pro-rata (~360kCH).*
  - *The "reference to RRB" is 1328 kCH of M&O-B*
  - *INFN reviewers indication: 1328 kCH with M&O-A*
- INFN going to contribute in-kind to the project (deliverables)
  - *Contributions are considered out of the M&O-B (i.e. in the project) since money will not go to M&O-B account. Central order will be pledged by Markus.*

	Netherlands	-	211	-	-	-	-	-	-	-	-	-	211	89
	Norway												73	227
	Slovenia												28	122
	Spain												132	168
	Switzerland												715	
	United Kingdom												106	215
	US DOE & NSF												780	
	CERN												538	(38)
	Unknown												-	
	Total												**3 863**	**1 289**	**1 910**
M&O-B	Czech Republic												27	54	
	France IN2P3												576	572	
	Germay BMBF												1 128	1 203	
	Italy												-	1 328	
	Taipei												41	164	
	US DOE & NSF												41	1 066	
	Unknown												-		
	Total												***1 812***	***4 387***	
M&O-A	Italy (in-kind)												376		
	Total												**4 065**	**4 065**	
Total													**9 741**	**9 741**	**1 910**
Notes															
Technology options refer to supple															
Unknown Funding Agencies refer to costs where corresponding work packages are not yet distributed															

MoU: Item# 1 - Sensors

MoU Item	**1**					*Annex 1*
WBS Items:	1	***Sensors: prototype & procurement***				
Description:	Sensor prototype:					
	Batch of sensors (30 wafers/technology) with FE-I4 footprint (3D, Planar, Diamond), dicing, processing for bump-bonding (UBM and bump deposition), flip-chip (~10% of total IBL/sensor technology = 48 single-chip or 24 two-chip modules), irradiation, test-beam measurements.					
	Sensor production:					
	Production (up to 1500 single-chip or 750 two-chip good tiles) and QC of selected technology sensors.					
Total Cost:						
WBS	kCH					
1.2	210	Sensor prototype				
1.3	542	Sensor production				
	752	Total				
Work Responsibility						
Udine(/Trento)		Prototype: 3D, Planar				

Cost Sharing:	Prototype	Production	Total
	%	%	%
Udine (I)	12%	15%	14%
Unassigned	-	-	-
Total	100%	100%	100%

Note:

Responsibilities for production will be updated in a MoU addendum at the end of 2010 early 2011 when technology will be selected.

No. of tiles estimated from Pixel B-Layer quality after bump-bonding (40% yield). Need re-evaluation.

MoU: Item# 1 - Sensors

MoU Item	**1**					*Annex 1*
WBS Items:	1	***Sensors: prototype & procurement***				
Description:	Sensor prototype:					
	Batch of sensors (30 dicing, processing fo total IBL/sensor tech test-beam measurer					
	Sensor production:					
	Production (up to 15 technology sensors.					
Total Cost:						
WBS	kCH					
1.2	210	Sensor				
1.3	542	Sensor				
	752	Total				

- 18 Institutes on sensor prototype
  - *3D (11 Inst.) and Planar (11 Inst.) production is covered, Diamond (4 Inst) is only partially.*
  - *Production responsibilities will defined in 2011 (Addendum to MoU).*
- WBS cost for prototype only partially covers real cost:
  - *Prototype sensor production & bump-bonding*

INFN

- Large fraction of prototype contribution to 3D sensor (in 2009 paid: blank wafers, 1 run of double-side 3D at FBK – GE/UD) we need to pay for a fraction of sensor bump-bonding.
- *A second batch of 3D sensor (single side active edge) at FBK will be paid by Trento (GR.V)*
- *The WBS prototype cost recognised to INFN will be used to bump sensors prototypes (sensor production already covered) .*

MoU: Item# 2 – FE-I4

MoU Item	**2**					*Annex 1*
WBS Items:	2.1	***FE-I4 Design, Production and Wafer Testing***				
Description:	Design of the front-end chip FE-I4. Two engineering runs: FE-I4.v1 (16 wafers) and FE-I4.v2 (12 wafers). Production (3 batches x 24 wafers) of FE-I4.v2. Testing of one diced wafer with single chip card and USBPix hardware from each engineering and production batches. Radiation hard qualification. Wafer probing of engineering and production wafers.					
Total Cost:						
WBS	kCH					
2.1.1	504	FE-I4.v1: enginering run and testing				
2.7	42	FE-I4.v1: Hardware (USBPix) for single FE-I4 test (on wafer and on PCB)				
2.1.2, 2.1.3	826	FE-I4.v2: enginering + production run and testing				
	1372	Total				
Work Responsibility						
Genova	Deliver all relevant views, stand-alone verification and simulation, documentation of:					
FE-I4 v1:	CMD (Command Decoder)					
	Bench testing of CMD block and scan chain test patterns.					
FE-I4 v2:	Update of their design blocks.					

Cost Sharing:	FE-I4 v1	FE-I4 v2	Total
	%	%	%
Genova (I)	12%	12%	12%
Unassigned	-	-	-
Total	100%	100%	100%

MoU: Item# 2 – FE-I4

MoU Item	**2**					*Annex 1*
WBS Items:	2.1	***FE-I4 Design, Production and Wafer Testing***				
Description:	Design of the front-end I4.v2 (12 wafers). Produ wafer with single chip ca batches. Radiation hard wafers.					
Total Cost:						
WBS	kCH					
2.1.1	504	FE-I4.v1:				
2.7	42	FE-I4.v1:				
2.1.2, 2.1.3	826	FE-I4.v2:				
	1372	Total				
Work Responsibility						
Genova	Deliver all relevant views, stand-alone verification and simulation, documentation of:					
FE-I4 v1:	CMD (Command Decoder)					
	Bench testing of CMD block and scan chain test patterns.					
FE-I4 v2:	Update of their design blocks.					

Cost Sharing:	FE-I4 v1	FE-I4 v2	Total
	%	%	%
Genova (I)	12%	12%	12%
Unassigned	-	-	-
Total	100%	100%	100%

- 7 Institutes in this work package
  - *Bonn (Gottingen), Genova, (Ginevra), LBNL, Nikhef, Marseille*
- Status
  - *Readiness Review in November.*
  - *Submission 27 March.*

MoU: Item# 2 – FE-I4

MoU Item	**2**					*Annex 1*
WBS Items:	2.1	***FE-I4 Design, Production and Wafer Testing***				
Description:	Design of the front-end chip FE-I4. Two engineering runs: FE-I4.v1 (16 wafers) and FE-I4.v2 (12 wafers). Production (3 batches x 24 wafers) of FE-I4.v2. Testing of one diced wafer with single chip card and USBPix hardware from each engineering and production batches. Radiation hard qualification. Wafer probing of engineering and production wafers.					
Total Cost:						
WBS	kCH					
2.1.1	504	FE-I4.v1: enginering run and testing				
2.7	42	FE-I4.v1: Hardware (USBPix) for single FE-I4 test (on wafer and on PCB)				
2.1.2, 2.1.3	826	FE-I4.v2: enginering + production run and testing				
	1372	Total				
Work Responsibility						
Genova	Deliver all relevant views, stand-alone verification and simulation, documentation of:					
FE-I4 v1:	CMD (Command Decoder)					
	Bench testing of CMD block and scan chain test patterns.					
FE-I4 v2:	Update of their design blocks.					

Cost Sharing:	FE-I4 v1	FE-I4 v2	Total
	%	%	%
Genova (I)	12%	12%	12%
Unassigned	-	-	-
Total	100%	100%	100%

MoU: Item# 3 – Bump-Bonding

MoU Item 3 *Annex 1*

WBS Items: 3.1

Description: Prototy
Deve
flip c
I4.v2
Product
FE-I4
wafe

- Prototype (MI):
  - *Qualify the two vendors used by ATLAS Pixel - baseline AgSn - Technology backup Indium.*
  - *Indium bump qualification with Selex: Recognise 40% of prototype cost*
- Production:
  - *Cost contribution: 10%*
- Comment:
  - *Some money already invested (GE)*
  - *Strategic for IBL to keep a second source (technology backup and cost control),*
  - *Strategic to INFN for having a role in the Module: Sensor/ Bump-bonding/FE-I4/FlexHybrid.*

Total Cost:

WBS	kC
3.1.1	
3.1.2	
3.1	

Work Responsibility

Barcelona	
Bonn	
KEK	
CERN	Measurements on prototypes, production procurement (part)
Milano	Indium vendor qualification, production procurement (part)

Cost Sharing:

	Prototype %	Production %	Total %
Milano (I)	40%	10%	13%
Unasssigned	-	-	-
Total	100%	100%	100%

MoU: Item# 3 – Bump-Bonding

MoU Item **3** *Annex 1*

WBS Items: 3.1 ***Bump-bonding***

Description: Prototype

Development of bump-bonding for FE-I4. Dummy FE-I4/Sensor bump deposition and flip chip. Prototype FE-I4 thinning, bump-deposition, dicing (14 FE-I4.v1 wafers, 2 FE-I4.v2 wafers). Qualification of ≥2 vendors.

Production

FE-I4 wafer thinnnig, UBM & bump-deposition for FE-I4 (72 wafers) and Sensor (200 wafers) wafers, flip-chip (1500). Production QC.

Total Cost:

WBS	kCH	
3.1.1	73	Prototypes and vendor qualification
3.1.2	653	Bump-bonding production
3.1	*726*	Total

Work Responsibility

Barcelona	Prototype: dummy sensor, production procurement (part)
Bonn	AgSn vendor qualification, production procurement (part)
KEK	production procurement (part)
CERN	Measurements on prototypes, production procurement (part)
Milano	Indium vendor qualification, production procurement (part)

Cost Sharing:

	Prototype %	Production %	Total %
Milano (I)	40%	10%	13%
Unassssigned	-	-	-
Total	100%	100%	100%

MoU: Item# 4 – Stave

MoU Item	**4**					*Annex 1*
WBS Items:	4.1, 5.2, 9.1.1					
Description:	Stave prototype with (2, 3 & 4mm OD), pi to PP1. Thermal man measuring thermal p to PP1 (14 + 6 spare					
Total Cost:						
WBS	kCH					
4.1.1	242	Stave				
4.1.2	100	Stave				
5.2	95	Intern				
9.1.1	30	Coolin				
	467	*Total*				
Work Responsibility						
Annecy	Design and QC Ti-to-Ti fittings, Ti-brazing					
CERN	Thermo-mechanical prototype & QA					
LPNHE	Material budget (software activity)					
Marseille	Ti-pipes, stave prototype, TM qualification					
Milano	CF pipe, CF-Ti joint, TM qualification, bakeout mockup, material irradiation					
Nikhef	CO2 test on stave, test of Ti-weld					
SLAC	Contribution to CO2 test on stave					
Wuppertal	CF pipe prototype, stave prototype, CF pipe QC					
Cost Sharing:				Prototype	Production	Total
				%	%	%
Milano (I)				30%	30%	30%
Unassigned				-	-	-
Total				100%	100%	100%
Note:						
Propose to recognize 40kCH for D, 40kCH for F and 40kCH for I in the WBS for all the stave related expense to date						

- **Prototype:**
  - *D, F & I (+CERN) contribution of 30% each (10%)*
  - *Substantial cost covered of the 242kCH of prototyping: ~50 k€ each.*
  - *Propose to recognize a contribution of 40kCH each – worries that mechanical items get cost increase.*
- **Production:**
  - *We should secure the cost for production – maybe reduce prototype options.*

MoU: Item# 5 – Module & Stave loading, Module to PP1 connections

MoU Item	**5**					*Annex 1*
WBS Items:	2.2, 3.2, 3.3, 4.2, 4.3, 5.1, 5.3	***Module & Stave loading, Module to PP1 connections***				
Description:	Flex module (300/600 pc, module technology depndent), module loading on stave, stave flex production (24 pc) and put on stave, EoS patch panel (20 pc), internal services to PP1. Stave-0 prototype. Flex module and loaded stave QC.					
Total Cost:						
WBS	kCH					
2.2	21	EoS card (patch panel)				
3.2	70	HDI (FE-I4 to EOS) - replacement of Flex + Type 0 cables				
3.3	50	Flex module production & QC/QA				
4.2	125	Loaded Stave				
4.3	20	Stave-0				
5.1	50	Internal Cables (ex. Type 1)				
5.3	100	PP1 (cables, cooling)				
	436	*Total*				
Work Responsibility						
Bonn		Flex module production (50%)				
CERN		Loaded stave QC, stave-0				
Geneva		Jig & procedure for module loading on stave, loaded stave QC				
Genova		Flex module poduction (50%), module & stave flex hybrid				
Marseille		Jig & procedure for module loading on stave, reworking.				
Oslo		EoS.				
SLAC (/Santa Cruz)		Internal electrical services from EoS to PP1				
Cost Sharing:				Mod. Load		Total
				%		%
Genova (I)				22%		22%
Unassigned				-		-
Total				100%		100%

MoU: Item# 5 – Module & Stave loading, Module to PP1 connections

MoU Item	**5**					*Annex 1*
WBS Items:	2.2, 3.2, 3.3, 4.2, 4.3, 5.1, 5.3	***Module & Stave loading, Module to PP1 connections***				
Description:	Flex module (300/600 pc, module technology depndent), module loading on stave, stave flex production (24 pc) and put on stave, EoS patch panel (20 pc), internal services to PP1. Stave-0 prototype. Flex module and loaded stave QC.					
Total Cost:						
WBS	kCH					
2.2	21	EoS card (patch pa				
3.2	70	HDI (FE-I4 to EOS				
3.3	50	Flex module produ				
4.2	125	Loaded Stave				
4.3	20	Stave-0				
5.1	50	Internal Cables (ex				
5.3	100	PP1 (cables, coolin				
	436	*Total*				
Work Responsibility						
Bonn		Flex module production (50%)				
CERN		Loaded stave QC, stave-0				
Geneva		Jig & procedure for module loading on stave, loaded stave QC				
Genova		Flex module poduction (50%), module & stave flex hybrid				
Marseille		Jig & procedure for module loading on stave, reworking.				
Oslo		EoS.				
SLAC (/Santa Cruz)		Internal electrical services from EoS to PP1				
Cost Sharing:				Mod. Load		Total
				%		%
Genova (I)				22%		22%
Unassigned				-		-
Total				100%		100%

- INFN Contribution on this MoU item (GE):
  - *Flex Hybrid deliverable 100% of the cost, work in collaboration with Bonn*
  - *Module Loading with flex (Flex Modules) – Production, burn-in, QC: sharing 50% of cost and work with Bonn.*

MoU: Item# 6 – R/O Chain

MoU Item	**6**					*Annex 1*
WBS Items:	2.3, 2.4, 2.5, 8.2, 8.4.1, 11.1		***R/O Chain***			
Description:	Opto-boards (64 + 20 spares) & opto-box (2) on ID end-plate, optofibers & optocables (16 + 4 spare), RX/TX plugins (64+10 spares each), BOC/ROD (64 if existing tech or 32 if new + 4 spares) or +4, S-link source/destination cards and fibers (64 + 4 spares), crates for ROD with backplanes (4 or 2 + 1 spare), SBC, ROS, TIM.					
Total Cost:						
WBS	kCH					
2.3	129	Opto-board (VCSEL, PIN, opto-package), DORIC/VDC				
2.4	236	BOC, TX/RX-plugin, S-link (source) + fiber				
2.5	381	ROD				
8.2	20	Opto-box on ID end-plate				
8.4.1	72	Opto-fibers				
11.1	MOA 187	DAQ hardware (ROD crates/racks, TIM, ROS), S-link destination card				
	1025	*Total*				
Work Responsibility						
Bologna	New ROD design, production, test (VME without DSP). Contribution to ROD software.					
DESY	Fiber-optics procurement and QC.					
Genova	ROD (TDAQ) & test. DAQ hardware procurement (in kind M&O-A).					
Göttingen	Contribution to ROD Software					
LBNL	ROD (present design opt.) board production & FPGA programming. Contribution to new ROD design.					
Ohio SU	Procurement of PIN-diode and VCSELS with QC. Optopackage design, production & QC. Optoboard design and loading with opto-package, DORIC and VDC. Design, procurement of RX-plugin. Optoboard and RX-plugin test with Siegen. Contribution to opto-box design.					
Siegen	Optoboard and RX-plugin test with Ohio SU.					
Oklahoma, Oklahoma SU	Opto-box design, production, QC.					
Taiwan	TX-plugin procurement (same as the present Pixel detector)					
Wuppertal/ Heidelberg	BOC design, production and test.					

MoU: Item# 6 – R/O Chain

MoU Item	6					Annex 1
WBS Items:	2.3, 2.4, 2.5, 8.2, 8.4.1, 11.1	*R/O Chain*				
Description:						
Total Cost:						
WBS						
2.3						
2.4						
2.5						
8.2						
8.4.1						
11.1						
Work Respons						
Bologna						
DESY						
Genova						
Göttingen						
LBNL						

- INFN Contribution on this MoU item (BO/GE):
  - *Baseline for R/O is VME BOC (Wuppertal/Heidelberg) + ROD (BO/GE)*
  - *ROD cost (deliverable) assigned to Bologna*
  - *In-kind (M&O-A) of TDAQ off-shelf components*
- Comment (to watch tightly next weeks):
  - *ROD deliverable is in competition with SLAC (ACTA system). Need to converge into a finalised design soon.*
  - *Alternative design to reduce ROD functionality and put into the BOC*

Cost Sharing:	R/O chain		Total
	M&O-A (*)		%
Bologna, Genova (I)	100%	45%	55%
Unassigned	-	-	-
Total	100%	100%	100%

Note:

(*) Proposed M&O-A in kind

MoU: Item# 7 – Power Chain

MoU Item	**7**					*Annex 1*
WBS Items:	2.6, 8.3, 8.4.2, 8.4.3, 8.4.4, 11.3, 11.4		***LV & HV Power supply chain***			
Description:	PP2 regulators (32) with crates (4) and patch panel. Cables for power and DCS from PP1/PP2 to USA15 (type 2, 3 & 4). LV-PP4, HV-PP4. LV and HV power supplies. DCS: BBIM, BBM, PP1 Box (Laser + DDS), BOX-I-Box, BOC Mon.					
Total Cost:						
WBS	kCH					
2.6	36	PP2 power regulation (active elements)				
8.3	30	PP2 boxes (crates/patch panels)				
8.4.2-4	MOA 144	Type 2, 3 & 4 cables				
11.3	106	DCS hardware (monitoring, control and interlock), LV-PP4.				
11.4	MOA 189	LV & HV power supplies, HV-PP4				
	505	*Total*				
Work Responsibility						
Barcelona	Contribution to the design of the LV power chain with Milano. Type3-LV and Type3/4-DCS cable procurement. Type 2 cables. Radiation test (cable & PP2 components). Commisioning of LV power chain.					
DESY	HV-PP4 design, production & test. Commissioning of HV chain.					
Genova	Type 3 and 4 HV cables. HV PS procurement (in-kind contribution to M&O-A)					
Iowa	LV-PP4 (crates, inter-board, opto-isolator boards, ELMB) design, production test. Contribution in testing DCS cards with Wuppertal.					
Milano	PP2 regulator + boxes: design, production, test. LV procurement (in-kind contribution to M&O-A). LV chain commissioning with Barcellona.					
Wuppertal	DCS hardware: BBIM, Logic Unit, IDB, BOB, OH-Ibox, PIM (Pixel Interlock Matrix), PP1 Box (Laser + DSS), BOC-I-Box, SCOL, BBM, BOC Mon, PP2 aux PS (Wiener), CAN aux PS, PCs and Kvaser CAN interface cards, PP3. Commissioning of DCS.					

Cost Sharing:	PW chain		Total
	M&O-A (*)		%
Genova, Milano (I)	50%	38%	46%
Unassigned		-	-
Total	100%	100%	100%

MoU: Item# 7 – Power Chain

MoU Item	**7**					*Annex 1*
WBS Items:	2.6, 8.3, 8.4.2, 8.4.3, 8.4.4, 11.3, 11.4		***LV & HV Power supply chain***			
Description:	PP2 regulators (32) with crates (4) and patch panel. Cables for power and DCS from PP1/PP2 to USA15 (type 2, 3 & 4). LV-PP4, HV-PP4. LV and HV power supplies. DCS: BBI					
Total Cost:						
WBS						
2.6						
8.3						
8.4.2-4	MO					
11.3						
11.4	MO					
Work Responsibili						
Barcelona	Con DCS Com					
DESY	HV-PP4 design, production & test. Commissioning of HV chain.					
Genova	Type 3 and 4 HV cables. HV PS procurement (in-kind contribution to M&O-A)					
Iowa	LV-PP4 (crates, inter-board, opto-isolator boards, ELMB) design, production test. Contribution in testing DCS cards with Wuppertal.					
Milano	PP2 regulator + boxes: design, production, test. LV procurement (in-kind contribution to M&O-A). LV chain commissioning with Barcellona.					
Wuppertal	DCS hardware: BBIM, Logic Unit, IDB, BOB, OH-Ibox, PIM (Pixel Interlock Matrix), PP1 Box (Laser + DSS), BOC-I-Box, SCOL, BBM, BOC Mon, PP2 aux PS (Wiener), CAN aux PS, PCs and Kvaser CAN interface cards, PP3. Commissioning of DCS.					

Cost Sharing:	PW chain		Total
	M&O-A (*)		%
Genova, Milano (I)	50%	38%	46%
Unassigned		-	-
Total	100%	100%	100%

INFN Contribution on this MoU item (GE/MI):

- *PP2 & PP2 boxes (MI). Define collaboration with Barcelona on LV chain (Barcelona in kind contribution to LV and DCS cables)*
- *HV PS (GE) e LV PS (MI) in-kind M&O-A contribution*
- *HV cables procurement and test (GE): M&O-A item.*
- *HV chain in collaboration with Desy,*

Conclusions

- MoU moving fast:
  - *CORE model is taking over M&O model for funding*
  - *Big open option is sensor technology*
  - *INFN contribution (1.05 MCH, slightly higher than INFN proposed) matches the 4 institutes role in the project.*
  - *Recognize some paid contribution: Stave, FE-I4, Sensors… use as contingency.*
  - *Few item are strategic for INFN: ROD, Bump-bonding*
  - *Extra contributions available from institutes in "Technology Option"*
- MoU in discussion:
  - *Round of phone conferences with Institutes (Dec and Jan)*
  - *Annexes to Institute representatives, contact NCP's (feedback from FA's)*
  - *Institute Board discussion with IBL Institutes: March 1st.*

		1	2	3	4	5	6	7	8			
	Funding Agency	Sensor	FE-I4	Bump-bonding	Stave	Mod.Load	R/O Chain	PS Chain	Integration	Present Total	Reference to RRB	Technology Options
Project	Italy	106	165	94	140	95	381	66	-	1 047		
	Total	**534**	**796**	**370**	**187**	**369**	**638**	**98**	**492**	**3 863**	**1 289**	**1 910**
M&O-B	***Total***	***218***	***576***	***356***	***280***	***68***	***201***	***74***	***-***	***1 812***	***4 387***	
M&O-A	Italy (in-kind)						187	189		376		
	Total	**-**	**-**	**-**	**-**	**-**			**-**	**4 065**	**4 065**	
Total		**752**	**1 372**	**726**	**467**	**436**	**839**	**172**	**492**	**9 741**	**9 741**	**1 910**

TDR – Release sj from CSN1

- TDR in preparation
  - *Last revision has 120 pages*
  - *Goal to have a "readable" version for February 5th (more realistic 2 or 3 weeks delay)*
  - *Selected ~10 readers to get first round of comment before public release*
- Last compiled TDR version on EDMS:
  - *TDR: https://edms.cern.ch/document/1011962/11*
- INFN money in 2010 for IBL
  - *127 k€ sj in 2010 (out of 900k€ for the whole project)*
  - *Release of money need iMoU and TDR*
  - *Next CSN1 meetings:*
    - 30-31/3/2010 – preferred for (partial) release of funds (but TDR not ready for distribution yet, MoU (?))
    - 17-19/5/2010 – some funds for prototyping come too late

BACKUP SLIDES

IBL Institutes/Institutions

Institutes / Institutions Participating in the IBL Construction				
Institution	**Country**	**Funding Agency**	**Institute Representative**	**National Contact Physicist**
Toronto	Canada	Canada	Krieger, Peter; Orr, Robert	McPherson, Robert
CERN	Switzerland	CERN	Fassnacht, Patrick	Fassnacht, Patrick
Prague AS	Czech Republic	Czech Republic	Vrba, Vaclav	Vrba, Vaclav
Annecy LAPP			Di Ciaccio, Lucia	Fournier, Daniel
Grenoble LPSC			Malek, Fairouz	Fournier, Daniel
LPNHE Paris IV			Schwemling, Philippe	Fournier, Daniel
Marseille CPPM			Talby, Mossadek	Fournier, Daniel
Orsay LAL	France	France - IN2P3	Schaffer, Arthur	Fournier, Daniel
Berlin HU			Lacker, Heiko	Mättig, Peter
Bonn			Wermes, Norbert	Mättig, Peter
Dortmund			Gößling, Claus	Mättig, Peter
Goettingen			Quadt, Arnulf	Mättig, Peter
Siegen			Buchholz, Peter	Mättig, Peter
Wuppertal		Germany - BMBF	Mättig, Peter	Mättig, Peter
DESY		Germany - DESY	Mönig, Klaus	Mönig, Klaus
Munich MPI	Germany	Germany - MPI	von der Schmitt, Hans; Bethke, Siegfried	Mättig, Peter
Bologna			Zoccoli, Antonio; Bruni, Graziano	Rossi, Leonardo
Genova			Morettini, Paolo	Rossi, Leonardo
Milano			Meroni, Chiara	Rossi, Leonardo
Udine	Italy	Italy	Cobal, Marina	Rossi, Leonardo
KEK	Japan	Japan	Tokushuku, Katsuo	Tokushuku, Katsuo; Kobayashi, Tomio
Nikhef	Netherlands	Netherlands	Bentvelsen, Stan	Bentvelsen, Stan
Bergen			Lipniacka, Anna; Bjarne Stugu	Stugu, Bjarne
Oslo	Norway	Norway	Ould-Saada, Farid	Stugu, Bjarne
Ljubljana	Slovenia	Slovenia	Mikuz, Marko	Mikuz, Marko
Barcelona	Spain	Spain	Bosman, Martine	Higon-Rodriguez, Emilio
Geneva	Switzerland	Switzerland	Clark, Allan	Clark, Allan
Taipei AS	Taiwan	Taiwan	Lee, Shih-Chang	Lee, Shih-Chang
Liverpool			Allport, Phillip	Butterworth, Jonathan
Manchester	United Kingdom	United Kingdom	Loebinger, Fred	Butterworth, Jonathan
Berkeley LBNL			Hinchliffe, Ian	Gordon, Howard; Tuts, Michael
Brandeis			Bensinger, James R.	Gordon, Howard; Tuts, Michael
Iowa			Mallik, Usha	Gordon, Howard; Tuts, Michael
New Messico			Seidel, Sally	Gordon, Howard; Tuts, Michael
Ohio State University			Gan, KK	Gordon, Howard; Tuts, Michael
Oklahoma			Skubic, Patrick	Gordon, Howard; Tuts, Michael
Oklahoma SU			Rizatdinova, Flera	Gordon, Howard; Tuts, Michael
Santa Cruz UC			Seiden, Abraham	Gordon, Howard; Tuts, Michael
SLAC			Dong, Su	Gordon, Howard; Tuts, Michael
Stony Brook	United States of America	United States of America	Rijssenbeek, Michael	Gordon, Howard; Tuts, Michael

IBL MoU Items and Costs

List of IBL Sub-units

MoU Item	Description
1	Sensor - prototype (including bumping to FE-I4), production, procurement & QC
2	FE-I4 prototype (v1), production (v2), test
3	Bump-bonding, thinning, bare module - prototype, production & QC
4	Local support (stave): CF structure, TM, pipe - prototype, production & QC
5	Module assembly, stave loading, flex-hybrid, internal electrical services - design, production & QC
6	R/O chain: opto-board, opto-fiber, TX/RX, BOC, ROD, TDAQ (S-link, TIM, SBC, ROS, crate)
7	Power chain: HV/LV PS, PP2 regulators, type2, 3 & 4 cables, interlock, DCS
8	Integration in SR1 & System test
9	Cooling plant & cooling services to PP1
10	Beampipe & mechancal interfaces (to staves, to type 1 services, IST)
11	Installation in the pit: beampipe extraction, IBL+beampipe insertion, services installation

List of IBL Sub-units

MoU Item	Description	Total	MO-A	MO-B/ New Proj
1	Sensor - prototype (including bumping to FE-I4), production, procurement & QC	752	-	752
2	FE-I4 prototype (v1), production (v2), test	1 372	-	1 372
3	Bump-bonding, thinning, bare module - prototype, production & QC	726	-	726
4	Local support (stave): CF structure, TM, pipe - prototype, production & QC	467	-	467
5	Module assembly, stave loading, flex-hybrid, internal electrical services - design, production	436	-	436
6	R/O chain: opto-board, opto-fiber, TX/RX, BOC, ROD, TDAQ (S-link, TIM, SBC, ROS, crate)	1 025	187	839
7	Power chain: HV/LV PS, PP2 regulators, type2, 3 & 4 cables, interlock, DCS	505	333	172
8	Integration in SR1 & System test	492	-	492
9	Cooling plant & cooling services to PP1	461	461	-
10	Beampipe & mechancal interfaces (to staves, to type 1 services, IST)	1 990	1 570	420
11	Installation in the pit: beampipe extraction, IBL+beampipe insertion, services installation	1 515	1 515	-
		9 741	**4 065**	**5 676**