



IBL

Stato e Richieste 2013

*Riunione ATLAS / INFN Referee,
5 September 2012*

G. Darbo – INFN / Genova



Indico agenda:

- <https://indico.cern.ch/conferenceDisplay.py?confId=205414>



Production Status: Modules, Staves,...

• *Bare Module:*

- **FE-I4B:** 43 wafers delivered (31 from pre-production and 12 from production), 8 still to be tested – yield > 50% - enough wafer for IBL
- **Sensor production:** production completed from CiS (yield 90% on 150 wafers), CNM and FBK (60 wafers in spec with ≥ 3 good tiles),
- **Bump-bonding at IZM:** UBM completed on 119 planar and 53 3D wafers - 23 FE-I4B wafers – flip-chip of 81 DC and 55 SC modules - ~2 months delay.

• *Dressed modules*

- **Module Flex** (GE, vers.3): 1st batch (150 DC + 125 SC) received from Phoenix and under component loading a Mipot.
- **Dressed modules** (Flex v.3 + FE-I4B): started production in Bonn and Genova

• *Stave*

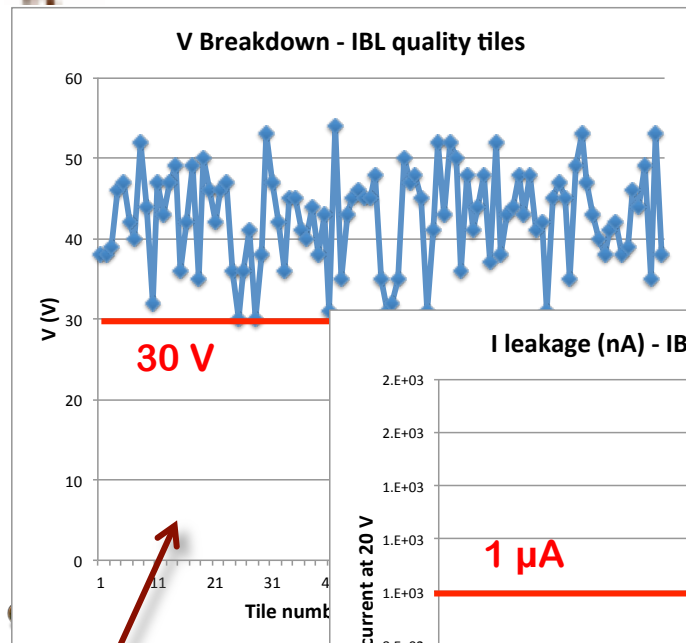
- **Stave Flex** (GE, prod. at CERN): 1st batch lost (over etching), ~2 months delay.
- **Loaded Stave:** Loaded and under system test Stave-0A (use FE-I4A modules) – Stave-0B will be loaded in September – Production stave will start loading in November (delay due to bare modules and stave flex).

IBL Numbers:

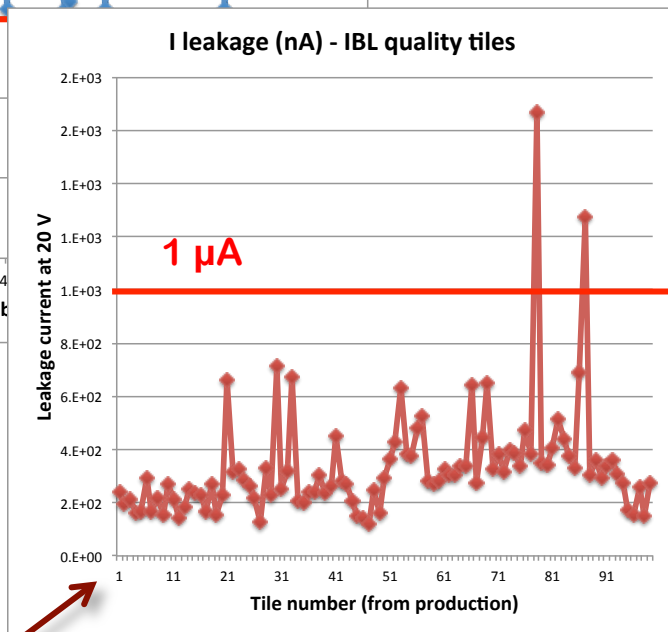
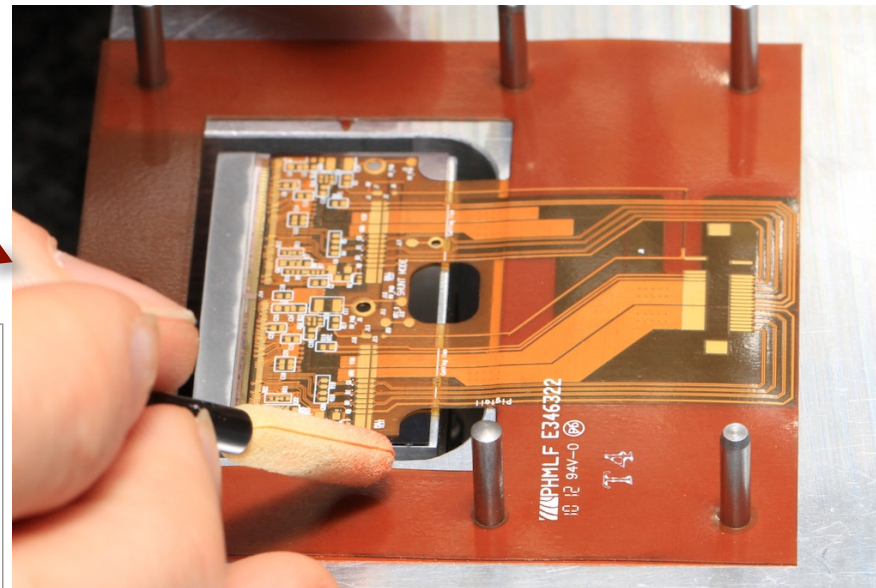
14 Staves, 168 double-chip (DC) planar modules, 112 single-chip 3D modules



Stave 0 : IBL Milestone!



Module Assembly (Genova)



FBK: 3D sensors – V_{BD} for IBL quality modules

FBK: 3D sensors – I_{leak} @ 20V for IBL quality modules (tested by provisional metal)

Stave-0A (Loaded in Geneva)

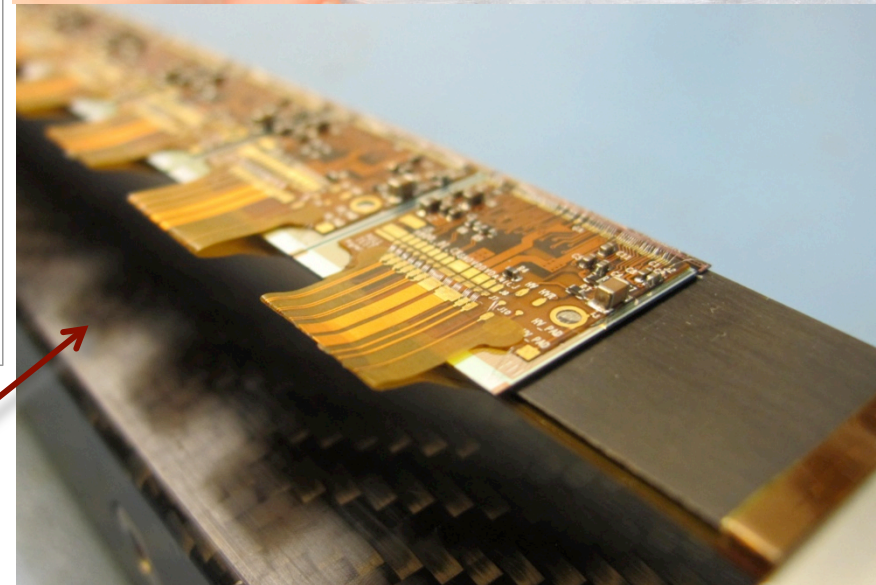


Photo Galleries: <http://dpnc.unige.ch/atlas/upgrade/IBL/StaveLoading/Stave0/index.htm>
<http://www.photoshop.com/users/nannino/albums/e8fb281d2b2b43b988d2a68854fbcab8#page=1>



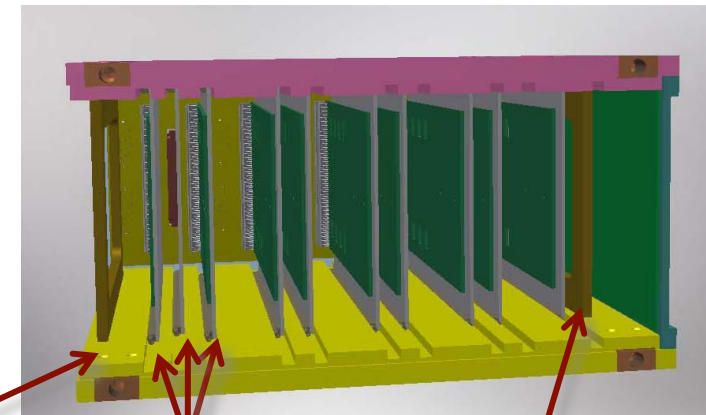
Power (PP2) & R/O (ROD) Chain

PP2

- Electrical and mechanical specifications of boards (3 types) and crate completed – qualification done with patched Pixel old cards and FE-I4.
- Launched production of crates (10 units: 4 IBL + 2 nSQP + IBL tests on surface) – Board prototypes in production.

ROD

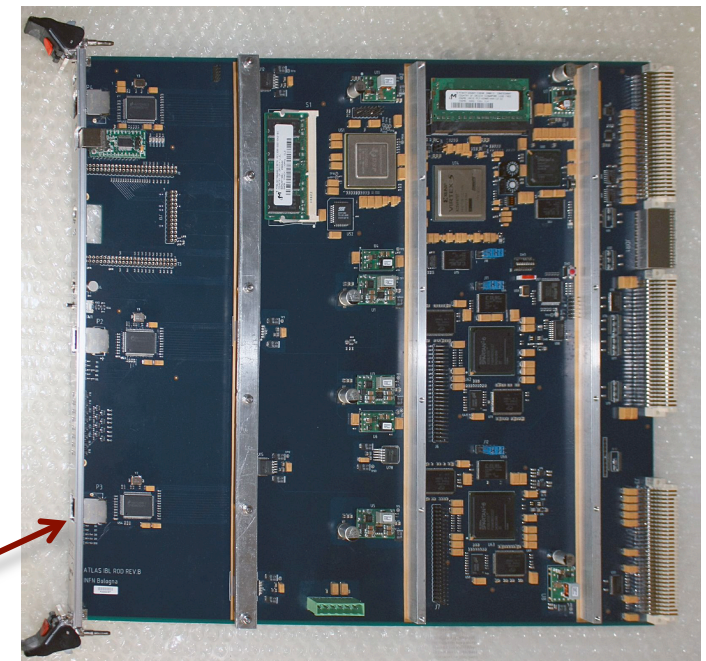
- Version B: 5 boards produced – Presently there are complete setups (BOC + ROD) at Bologna and Wuppertal for firmware developers and at CERN for DAQ and system test development.
- Status: minor hardware fixes individuated for production version (C) – Initial firmware exist and successfully communicates from FE-I4B → BOC → ROD (only electrically at moment).
- Version C: plan to launch pre-production in a few weeks (~1 months for fully assembled/tested cards after PO is raised) – Complete production spring next year.



IBL PP2 regulator

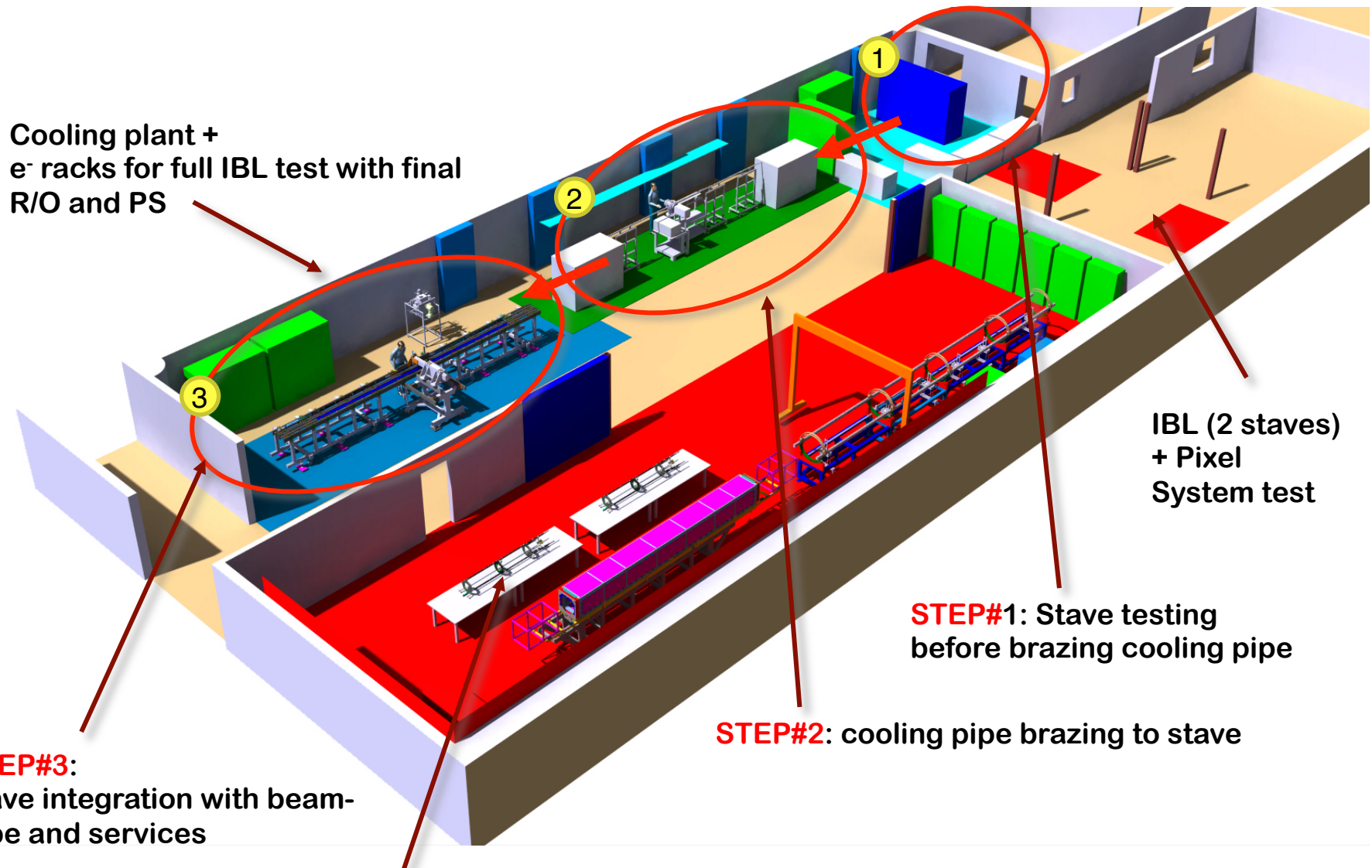
I/O + controller

8 regul. = 8 1/2 staves



ROD Ver.B

IBL & Pixel in SR1 (2013)



Foreseen for PIXEL rework (nSQP) –
limited access for radiation control



Integration & Installation Activities

- *System Test*
 - **When:** now to >12/2013
 - **INFN involved in:** ROD + DAQ (R/O chain) and PP2 (power chain)

- *IBL Integration in SR1 at CERN*
 - **When:** all 2013
 - **INFN involved in:** electrical services (stave flex, cables), full test of IBL (ROD/DAQ/PP2)

- *Installation in the PIT*
 - **When:** starting late spring 2013 (services) to 2014 (IBL)
 - **INFN involved in:** Off-detector commissioning with DAQ and DCS (2013/14), IBL connectivity test (2014).

- *Note: installation scenario depends of extraction of the Pixels. IST (IBL Support Tube) installed in surface if Pixel are extracted, IBL in the pit.*



Richieste Finanziarie IBL e Resp.

Richieste finanziarie 2013 (escluso MI/ME)

Sez.	Capitolo	Descrizione	Rich.	SJ	Totale
BO	-	-	€ -	€ -	€ -
	Cons.	Sistema di burn-in e QC moduli IBL	€ 8.0	€ -	
		Consumi per produzione moduli IBL	€ 10.0	€ -	
		IBL DAQ infrastructure e power supplies (M&O A in kind)	€ 105.0	€ -	
		FEI4B NRE pledge	€ 60.0	€ -	
GE	App.	FEI4B production pledge	€ 7.0	€ -	€ 190.0
	Cons.	IBL - Bump Bonding produzione pledge	€ 51.0	€ -	
		IBL - produzione schede	€ 30.0	€ -	
MI	App.	IBL - HV/DCS patch box	€ 6.0	€ -	€ 87.0
	Cons.	Materiali per laboratorio misure: probecard, PCB, componentistica...	€ 2.5	€ -	
TN	Inv.	Alimentatore alta tensione Kithley 2410	€ 6.5	€ -	€ 9.0
UD	App.	IBL, produzione sensori (pledge)	€ 60.0	€ -	€ 60.0

Totale € 346.0

Responsabilità IBL

Responsabilita' IBL						TOT MU
	nome	dettaglio responsabilita'	Livello	mu	commenti	
BO	Gabrielli	ROD design, prototype prod.	L3	2		
	Polini	ROD DAQ, integration	L3	1.5		
GE	Darbo	IBL Pr. Leader	L1	5		
	Gemme	Coord. flex connectivity	L3	2		
	Morettini	DAQ resp.	L2	2		
						12.5



BACKUP SLIDES IBL



Milestones 2012 e 2013

• *Stato of 2012 milestones (Aug.2012)*

- **Giugno 2012** - produzione ROD (versione finale)
 - **Stato: 70%**. – ROD Vers.B in test (5 schede, 3 setup completi con BOC), Firmware parla con il FE-I4 – Vers.C (produzione, bug-fixes della Vers.B) in poche settimane.
- **Luglio 2012** - Primo stave equipaggiato con moduli e servizi
 - **Stato: 90 %** - (stave 0 versione FE-I4A).
- **Dicembre 2012** – Completamento produzione di (bare moduli)
 - **Stato:** bump-bondati 81 double-chip e 55 single-chip moduli – ritardo ~2mesi

• *Milestones 2013*

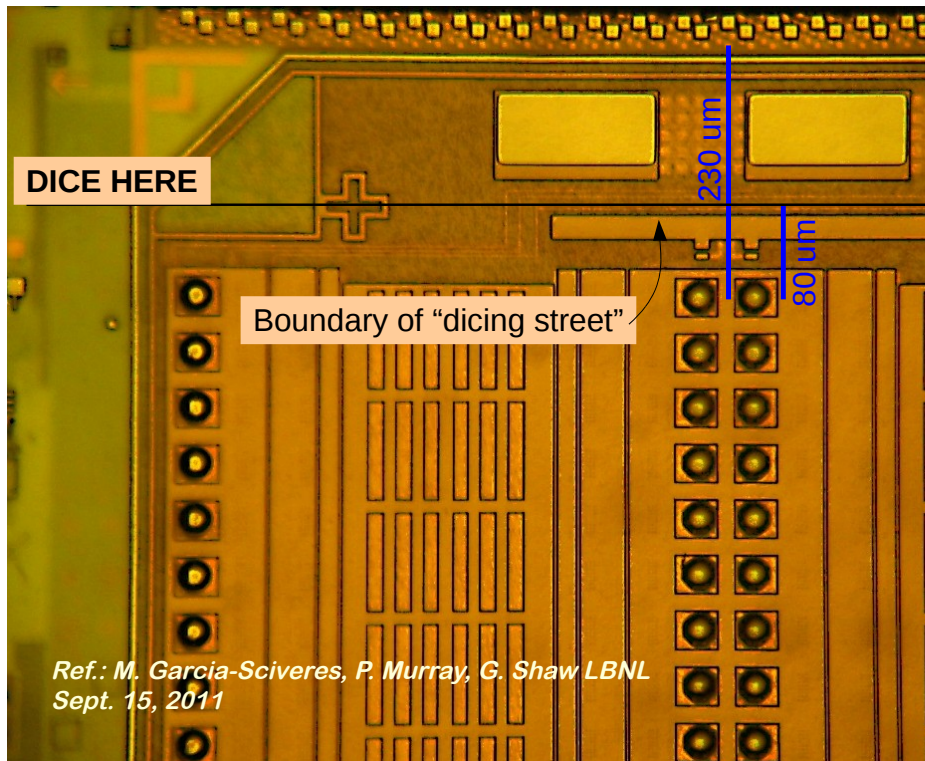
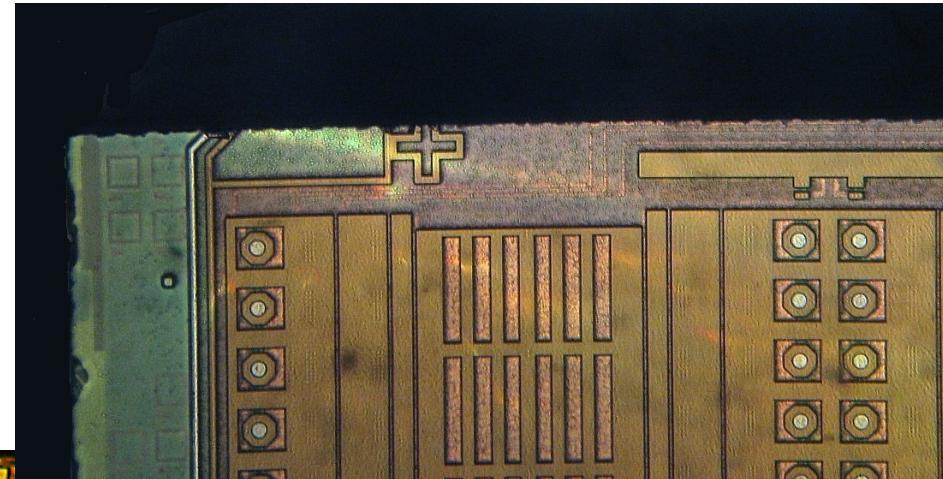
- **Giugno 2013** - Completamento della produzione di Moduli IBL con flex
- **Settembre 2013** - Qualifica della catena completa di R/O (dal FE al ROD)
- **Giugno 2013** - Commissioning del sistema completo di alimentazione LV in SR1



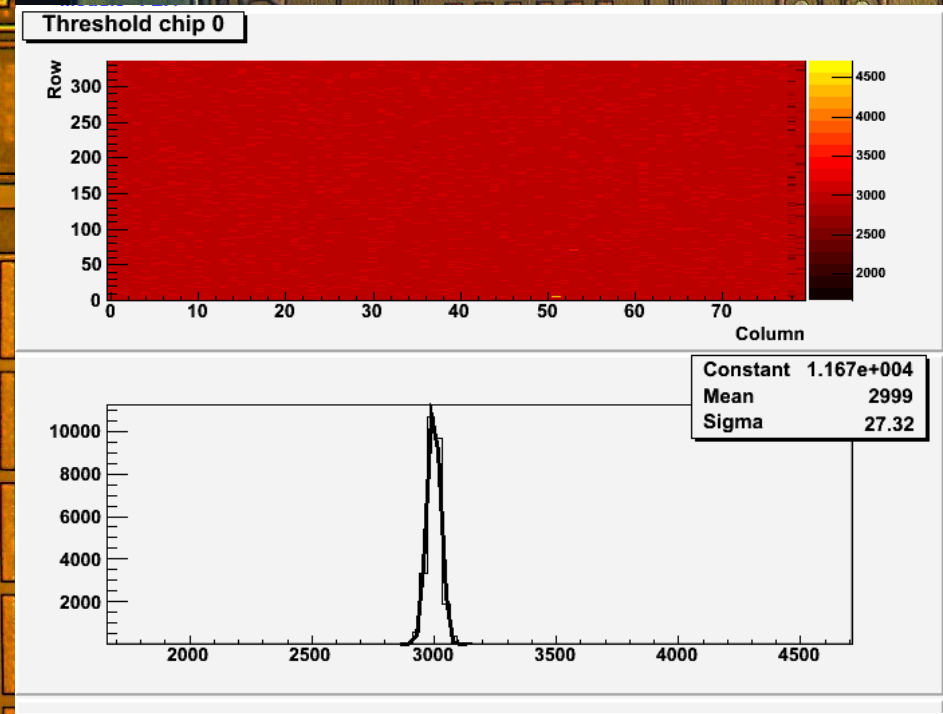
BACKUP SLIDES AFP

FE-I4A Dicing off top pads test

- Test done with FE-I4A. Diced off top pad test ($80\ \mu\text{m}$ instead of $220\ \mu\text{m}$).
- Tested chip shows no damage
 - FE-I4B need to be tested, but $<100\ \mu\text{m}$ should be feasible



Ref.: M. Garcia-Sciveres, P. Murray, G. Shaw LBNL
Sept. 15, 2011



3D FBK Thin Edge

Ref.: G.-Giacomini et al., 6th Trento Workshop,
2-4 March 2011 (<http://tredi.fbk.eu>)

IBL FBK 3D are very suitable for thin(ner) edge. One row of ohmic holes is sufficient to “stop” the depletion region: $\sim 100\mu\text{m}$ edge.

