



RD_FASE2 – Introduction

Preparation of the Meetings with INFN Referees

Vidyo

12 September 2014

G. Darbo – INFN / Genova

Indico agenda:

- <https://agenda.infn.it/conferenceDisplay.py?confId=8565>

- 👤 *Innanzitutto **Grazie per la fiducia** ripostami come coordinatore delle attività di RD_FASE2 dei Pixel di ATLAS*
 - Farò del mio meglio per coordinare le attività di R&D con Clara, Anna e Bob e con il vostro supporto.
 - Manterrò i contatti con la componente Italiana di CMS, cercando, ove possibile, sinergie tra i 2 esperimenti – Questo era lo spirito di ACTIVE, e credo che dove ciò succeda sia un vantaggio per entrambi – La CSN1 ci spinge in tale direzione
 - Anche con Attilio, lavoreremo insieme, per mantenere uno stretto legame con il progetto HVR_CCPD presentato in CSN5
- 👤 *Ho creato una mailing list:*
 - RD_FASE2-ATLPIX@CERN.CH (interna ad ATLAS Pixel – Subscribe if interested)
- 👤 *Altre mailing list rilevanti:*
 - ACTIVE-GEN@CERN.CH (all ATLAS & CMS – usata, al momento per attività sui 3D @ FBK)
- 👤 *SharePoint – utilizziamo quello creato per ACTIVE.*
 - <http://cern.ch/INFN-PixelRD>

Agenda

RD_FASE2

Friday, 12 September 2014 from **09:00** to **10:30** (Europe/Rome)
at **Vidyo**

Manage ▼

Description Room name: ATLAS_CMS_INFN

Extension: 9340022

Meeting PIN: 0000

Auto-join URL: <http://vidyoportal.cern.ch/flex.html?roomdirect.html&key=E5DdQXGW4v5I>

Material

Richieste 2015 

Friday, 12 September 2014

- | | | |
|---------------|---|---|
| 09:00 - 09:15 | Introduzione 15'
Speakers: Giovanni Darbo (GE), Clara Troncon (MI) | ▼ |
| 09:15 - 09:25 | BO: Attività 2015, Supporto a Richieste Finanziarie 10'
<i>Multi-module Pixel R/O</i>
Speakers: Dr. Carla Sbarra (BO), Alessandro Gabrielli (BO), Paolo Morettini (GE) | ▼ |
| 09:25 - 09:40 | GE: Attività 2015, Supporto a Richieste Finanziarie 15'
<i>BB for 3D sensor test, Module assembly and irradiation, RD on flex Upgarde R/O Systems (CS, GE, MI)</i>
Speakers: Claudia Gemme (GE), Giovanni Darbo (GE) | ▼ |
| 09:40 - 09:55 | MI: Attività 2015, Supporto a Richieste Finanziarie 15'
<i>6" dummy wafers - test deposition on 6" and high-density bumps (150 k-bumps/chip)</i>
Speakers: Gianluca Alimonti (MI), Attilio Andreazza (MI), Clara Troncon (MI) | ▼ |
| 09:55 - 10:10 | TN: Attività 2015, Supporto a Richieste Finanziarie 15'
<i>6" Wafer procurement (SOI, wafer bonding, epi)</i>
<i>PicoScope 6407 Digitizer with 1.5 GHz probes and accessories.</i>
Speaker: Prof. Gian Franco Dalla Betta (University of Trento) | ▼ |

🕒 3D – Common with CMS

- Assigned 3 batches at FBK: 1st in process, 2nd layout completed, mask ordered, 3rd in design (Gian-Franco)
- Bought 25 (100 μm , 6") and 30 (130 μm , 6") SiSi wafers from Icmos – wafers received end of July

🕒 HV/HR-CMOS – work in progress at Genova (money spent)

- First results presented at ITk week

🕒 CO₂ cooling – work in progress at Milano together with LHCb for a CO₂ cooling plant

SUMMARY OF RECEIVED FUNDS IN 2014

Date	Sezione	Category	ATLAS/COMMON	Assigned	Committed	Description
Feb 2014	GE	3D	COMMON	€ 21 000	€ 15 000	Wafer for 3D sensors (common with CMS) -
Apr 2014	GE	3D	COMMON	€ 44 000	€ 19 800	3 processes at FBK - 2 committed
May 2014	GE	HV	ATLAS	€ 13 000		HV-CMOS Hybridization - 3 FE-I4B wafers
May 2014	MI	BB	ATLAS	€ 27 000		BB of 3D (IBL design on 6") + BB high density + 3 FE-I4B wafers
May 2014	MI	CO ₂ /μ-CH	ATLAS	€ 20 000		TRACI - co-funded with LHCb
				<u>€ 125 000</u>		

🕒 Prepare a progress report (slides) to show to the referees

Richieste Finanziarie 2015

Richieste CSN1 - 2015: ATLAS + 1/2 COMMON (no travel/metabolismo)

Attività	Descrizione	BO	CS	GE	MI	TN	UD	Nota
3D.1	6" Wafer procurement (SOI, wafer bonding, epi)	k€ -	k€ -	k€ -	k€ -	k€ 10.0	k€ -	Substrates for 2nd 3D batch (batch 5)
3D.2	PicoScope 6407 Digitizer with 1.5 GHz probes and accessories.	k€ -	k€ -	k€ -	k€ -	k€ 8.5	k€ -	Dynamic test on 3D structures for comparison with TCAD
BB.1	6" dummy wafers - test deposition on 6" and high-density bumps (150 k-bumps/chip)	k€ -	k€ -	k€ -	k€ 20.0	k€ -	k€ -	6k€ for dummy wafer with resistive chains, mask for In deposition, bump deposition (3W).
BB.2	BB for 3D sensor test	k€ -	k€ -	k€ 24.0	k€ -	k€ -	k€ -	To be done at Selex or IZM, when FBK 3D
MOD.1	Upgrade R/O Systems	k€ -	k€ 2.0	k€ 2.0	k€ 2.0	k€ -	k€ 2.0	USBpix3 + HV-CMOS R/O - 3 units
MOD.2	Module assembly and irradiation, RD on flex	k€ -	k€ -	k€ 10.0	k€ -	k€ -	k€ -	FlexHybrids and PCB for module test. Flex RD.
M-R/O	Multi module R/O	k€ 15.0	k€ -	k€ -	k€ -	k€ -	k€ -	Prototype boards, componets
O2/μCH.1	Develop μ-channel cooling	k€ -	k€ -	k€ -	k€ 10.0	k€ -	k€ -	μ-channel demonstrator
Total requested by ATLAS		k€ 15.0	k€ 2.0	k€ 36.0	k€ 32.0	k€ 18.5	k€ 2.0	

Travel (test-beam)			
Bologna	k€ 15.0	k€ -	
Cosenza	k€ 2.0	k€ -	
Genova	k€ 36.0	k€ -	
Milano	k€ 32.0	k€ -	
Trento	k€ 18.5	k€ 4.0	
Udine	k€ 2.0	k€ -	
k€ 105.5			

Spending profile - May 2014

	2015	Cut 2014
ATLAS (excluded HV-CMOS)	k€ 55.0	k€ 16.0
CMS	k€ 101.0	k€ 16.0
COMMON	k€ 68.0	

Total: ATLAS 2015 + Cut 2014 + 1/2 COMMON **k€ 105.0**

- We need to support request with*
 - Details of the scientific program
 - How we collaborate in ATLAS
 - If synergy with CNM INFN
 - Motivation for the costs
- Will be part of the homework from different Sezioni.*

FTE in ATLAS Upgrade RD's

N°	Sezione	Nome	Cognome	Ruolo	RD_FASE	HVR_CCI	CPIC65	Upgrad
1	BO	Davide	Falchieri	Tecn.Cat.D	20%			x
2	BO	Alessandro	Gabrielli	RIC	20%	10%		x
3	BO	Matteo	Negrini	RIC	20%			x
4	BO	Carla	Sbarra	RIC		20%		x
5	BO	Antonio	Sidoti	RIC	20%			x
6	BO	Maximiliano	Sioli	PA	20%			x
7	BO	Mauro	Villa	PA		10%		x
10	CS	Anna	Mastroberardino	RU	30%			x
11	CS	Antonio	Policicchio	Assegnista	30%			x
12	CS	Daniela	Salvatore	Assegnista	30%			x
13	GE	Michele	Biasotti	Assegnista		10%		x
14	GE	Valentina	Ceriale	Dott.		20%		x
15	GE	Giovanni	Darbo	DR	55%	30%		x
17	GE	Andrea	Gaudiello	Dott.	30%	30%		x
18	GE	Claudia	Gemme	RIC	30%	10%		x
19	GE	Elisa	Guido	Assegnista	10%			x
20	GE	Paolo	Morettini	1-RIC	60%	20%		x
21	GE	Leonardo	Rossi	DR		20%		x
22	GE	Mario	Sannino	PA	30%	20%		x
23	MI	Gianluca	Alimonti	RIC	50%			x
24	MI	Attilio	Andreazza	PA		30%		x
26	MI	Mauro	Citterio	DTEC		15%		x
27	MI	Simone	Coelli	TEC	30%			x
29	MI	Valentino	Liberati	PA		20%	40%	x
30	MI	Chiara	Meroni	DR	20%	30%		x
31	MI	Francesco	Ragusa	PO	20%	30%		x
32	MI	Shojaii	Syedruhollah	Dott.			30%	x
33	MI	Hitesh	Shrimali	Assegnista		50%		x
34	MI	Alberto	Stabile	Assegnista		30%	30%	x
35	MI	Clara	Troncon	1-RIC	20%			x
36	TN	Gian-Franco	Dalla Betta	PA	40%			x
38	TN	David	Macii	Dott.	50%			x
39	TN	Roberto	Mendicino	Dott.	50%			x
40	TN	DMS	Sultan	Dott.	100%			x
41	TN	Giovanni	Verzellesi	PO	40%			x
42	UD	Marina	Cobal	PA	20%			x
44	UD	Mario Paolo	Giordani	RU	30%			x
Total		37			875%	405%	100%	

Progress report of 2014 activities – to adapt for referee

SPARE SLIDES



Sensors at FBK



From Gian-Franco

CCPD Hybridization

- *Develop a technique to insert uniform, well defined thickness of dielectric between R/O and HV/HR-CMOS chips*
 - Use spacers to keep well defined distance between the two facing chips.
 - SU8 is a good candidate for such spacers
 - Find suitable glue, rad-hard, low-viscosity, without air-bubbles.
- *Test program in progress – progress report in the next slides*
 - First look at glue candidates
 - Results with SU8: spinning, thickness
 - Simulation of coupling capacitance
- *Most of material received before holidays.*
 - Some very preliminary experience reported in here

Spin SU-8 photoresist
Pattern pillars by mask



Glue deposition



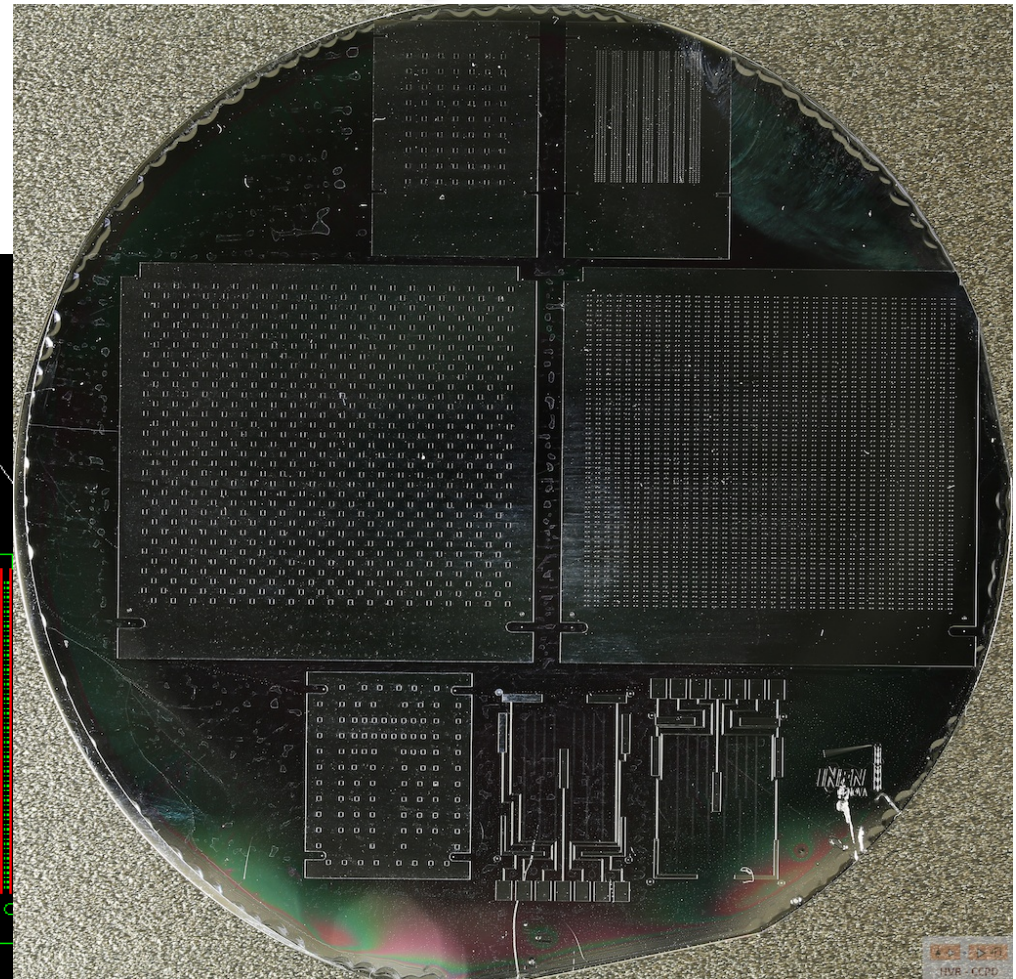
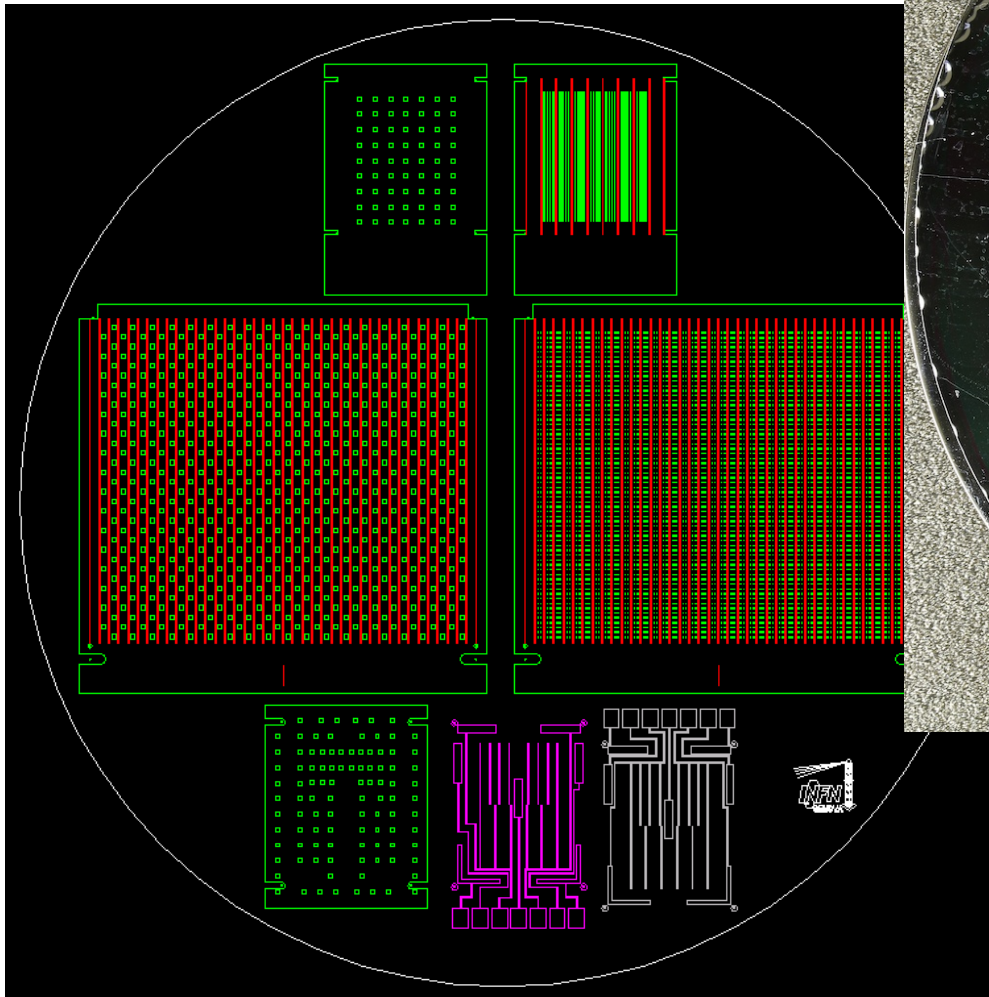
Align & pressure



Deposition of Pillars (spacers)

2-inch mask below with different
Densities of spacers – FE-I4/FE-I3
Structures.

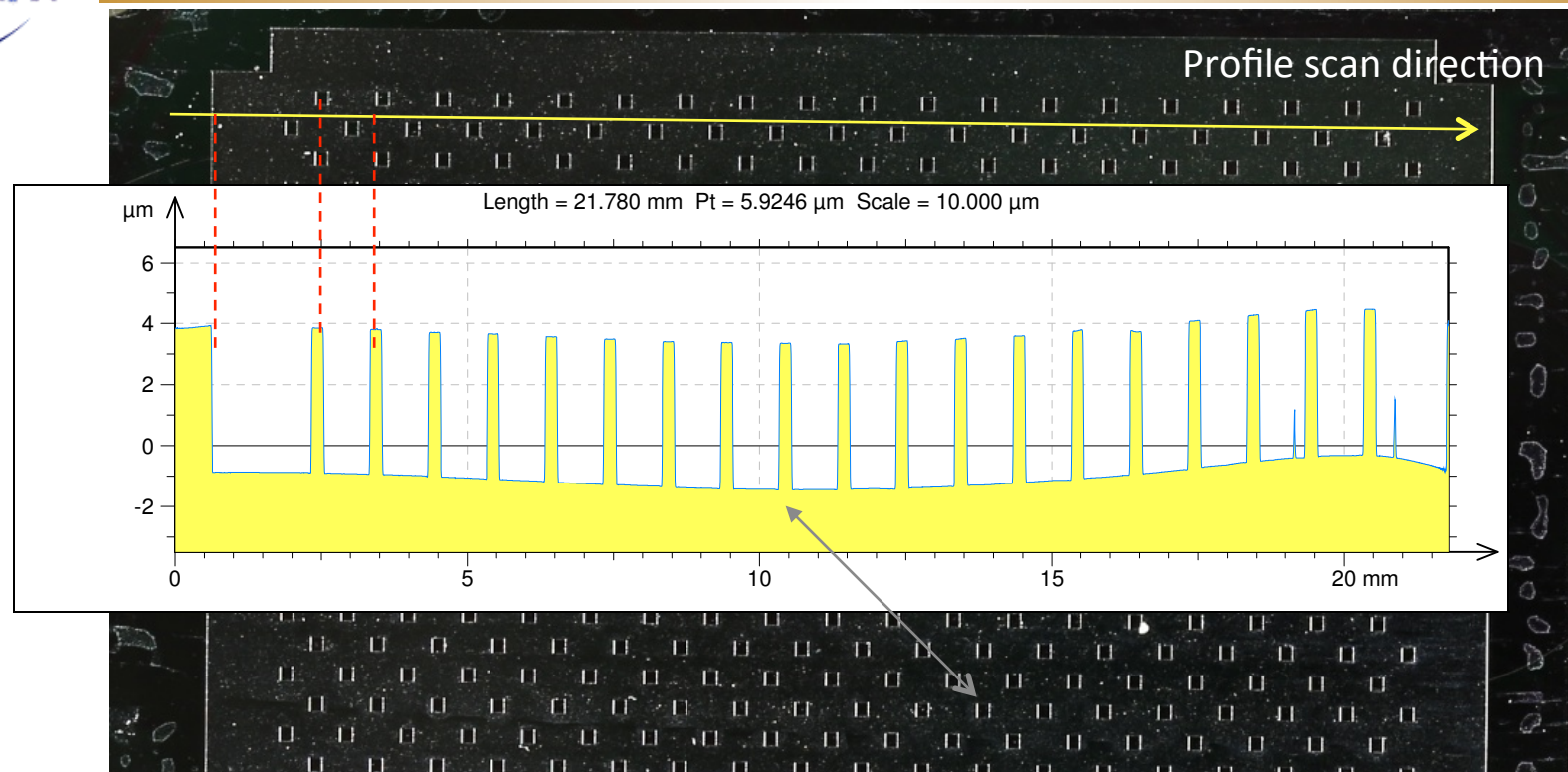
Credits A. Rovani



*SU8-2005 deposited on 2-inch wafer
from Siegert*

Credits: V. Ceriale

SU8-2005 Results



- 1.26 μm of bow. Column highs are very uniform: 4.7 μm over 2 cm
- Results obtained with a spinning rotation of 2500 rpm and SU8-2005

CO₂ Cooling

 *From Attilio, Simone*