

Preventivi 2016

Gruppo 1

Dot 1: Anagrafica (FTE)

Sigla		Calls	Tot
ATLAS	11.5		11.5
CMS	10.7	1.4 + 0.1 Chipix+Aida	12.2
RD_2	0.2 + 2.1 Atlas + CMS		2.3
MEG	2.5		2.5
Totale	27	1.5	28.5

L'anno scorso: 28.7 2.9 32.6

Dot 1: Richieste k€

Missioni	19.0
Consumi	12.5
Pubblicazioni	2.0
Seminari	2.0
Inventariabile	22.0

	57.5

- Per il 2015: richiesto 85.5, assegnato 54

Preventivi 2015 ATLAS-Pavia

Anagrafica

	Qualifica	ATLAS	RD Phase 2	tot
Dondero Paolo	Dottorando	1		1
Ferrari Roberto	DR	0.8	0.2	1
Fraternali Marco	PA	1		1
Gaudio Gabriella	Ric	1		1
Introzzi Gianluca	RU	1		1
Livan Michele	PO	1		1
Negri Andrea	RU	1		1
Polesello Giacomo	PR	1		1
Rebuzzi Daniela	PA	1		1
Rimoldi Adele	PA	0.8		0.8
Vercesi Valerio	DR	0.8		0.8
De Vecchi Carlo	Tecnologo	0.3		0.3
Lanza Agostino	DT	0.8		0.8
Total		11.5	0.2	11.7

2.3 FTE persi
Rispetto a 2015:
Conta
Grossi
0.3 De Vecchi
(ma +1 Carrà)

Sonia Carrà (borsista post laurea) non inclusa nel conteggio perche' non ancora associata INFN

Attività

- New Small Wheel -Micromegas:
 - Costruzione pannelli di Readout of the Micromegas detector for ATLAS NSW
- FTK
 - Integrazione hardware e installazione servizi
 - Integrazione in ATLAS DAQ
- Run 2
 - Turni
 - Monitoring e manutenzione MDT system
 - ATLAS DAQ: manutenzione e ottimizzazioni
 - Analisi: SUSY e Higgs

Richieste finanziarie (in kE)

Missioni	Metabolismo: 11.7FTE _x (3.7kE estero+1kE interno)	55.5
	Responsabilita' (20mu)	74
	Turni	20.5
	Manutenzione MDT: 1 mu	3.5
	NSW: 2mu test M0 CERN+4kE missioni LNF incluso 6 trasporti pannelli RO	11.5
	FTK: 2mu installazione	7.5
Consumi	Metabolismo: 11.7FTE _x 1.5kE	17.5
	Consumi camera pulita NSW+tooling	7.0
Licenze SW	Licenza annuale Ansys icepack simulazioni Termiche FTK	3.0
Totale		200.

(approx a 0.5 kE)

+ 65 kEu core alimentazioni LV NSW

Richieste servizi

- 24mu meccanico costruzione MicroMegas (MM)
- 2mu meccanico supporto integrazione FTK
- 2mu elettronico costruzione MM
- 2mu elettronico QA/QC MM
- 4mu elettronico integrazione FTK
- Totale: 26mu meccanico + 8mu elettronico

Alessandro Braghieri	Ric. INFN	0.2	0.5			MUON
Daniele Comotti	Dottorando	0.3				TRACKER
Francesco De Canio	Assegnista	0.7		0.3		TRACKER
Lorenzo Fabris	Dottorando	0.4		0.2		TRACKER
Luigi Gaioni	Assegnista	1.0				TRACKER
Alice Magnani	Dottoranda	0.8	0.2			MUON
Massimo Manghisoni	RU	0.5		0.2		TRACKER
Paolo Montagna	RU	0.5	0.2			MUON
Roberto Nardò	Tecnologo					MUON
Benedetta Nodari	Dottorando	0.8		0.2		TRACKER
Lodovico Ratti	PA	0.2				TRACKER
Valerio Re	PO	0.7		0.1	0.1	TRACKER
Cristina Riccardi	RU	0.6	0.3			MUON
Elisa Riceputi	Dottorando	1.0				TRACKER
Paola Salvini	Ric. INFN	0.8	0.2			MUON
Gianluca Traversi	RU	0.6		0.2		TRACKER
Carla Vacchi	RU	0.4		0.2		TRACKER
Ilaria Vai	Dottoranda	0.7	0.3			MUON
Paolo Vitulo	RU	0.5	0.4			MUON

totale FTE **10.7** **2.1** **1.4** **0.1** = **14.3**

Activity foreseen for the Tracker Pavia group

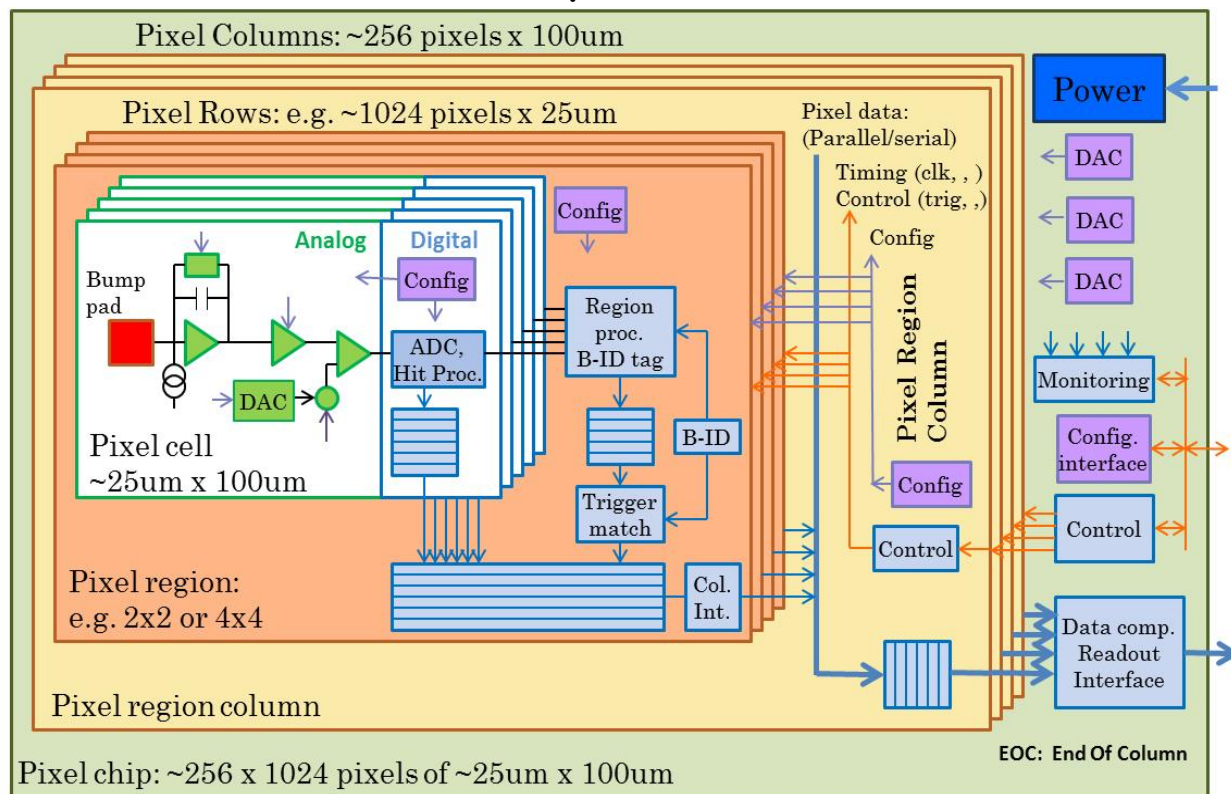
Design, development and test of electronics circuits for the CMS phase II

- ✓ Characterization of the first version of the MPA chip
 - ✓ Irradiation of the SLVS links
 - ✓ Design of behavioral model of the SLVS links
 - ✓ Design of the final version of the SLVS links

- ✓ Radiation hardness characterization of IP blocks (BGR, SLVS links)
 - ✓ Radiation hardness characterization of MOS transistors from the standpoint of static, signal and noise measurements
 - ✓ Characterization of the hybrid-pixel readout chip
 - ✓ Design of a new analog front-end channel (together with FNAL group)
 - ✓ Design of IP Blocks: BGR, SLVS links (second version)
 - ✓ Design (together with RD53 members) of a common engineering run with full sized pixel array chip (area > 1 cm²)

Full Sized Pixel Array Chip

Global architecture of the chip



Common design for ATLAS and CMS

- Small pixels: 50x50 μm^2 (or 25x100 μm^2)
- Large chips: > 2cm x 2cm (~1 billion transistors)
- Hit rates: ~3 GHz/cm²
- Radiation: 1 Grad, 10¹⁶ n/cm² (unprecedented)
- Trigger: 1 MHz, 10 ms (~100x buffering and readout)
- Total power budget: ≤ 1 W/cm²
- Minimum threshold: 1000 electrons
- 95% digital, Charge digitization
- ~256k pixel channels per chip
- Pixel regions with buffering
- Data compression in End Of Column
- Chip must work with large pixels for outer layers

Synergies and Responsibilities

Strong synergy with AIDA 2020 WP4 (microelectronics and interconnections)

WP Coordinators: Christophe de la Taille, **Valerio Re**

Goal: provide chips and interconnections to detectors developed by other WPs

Task 1: Scientific Coordination (CNRS-OMEGA, INFN-UNIBG)

Task 2: 65 nm chips for Trackers (CERN)

Fine pitch, Low power, Advanced digital processing

Task 3: SiGe 130nm for calorimeters/Gaseous (IN2P3)

Highly integrated charge and time measurement

Task 4: interconnections between 65 nm chips and pixel sensors (INFN)

TSVs in 65 nm CMOS wafers, bonding of 65 nm chips to sensors, exploration of fine pitch bonding processes

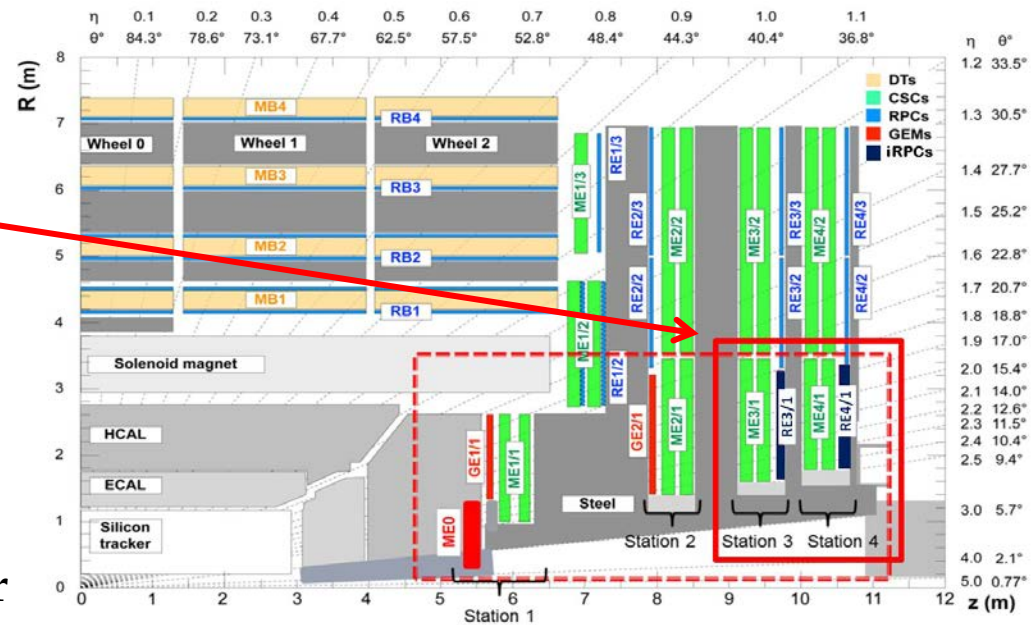
Responsabilities:

- Valerio Re: responsable of the RD53 Analog Working Group
- Gianluca Traversi: analog design reference person of the IP blocks WG

R&D Phase 2 for CMS Muon System

RPC and iRPC

- Goals: consolidation, improved RPC : RE3-1 , RE4-1 chambers for the muon system
- Measurements:
 - Consolidation study: 4 endcap chambers + some spare gaps (test in GIF++ since summer 2015)
 - Upgrade: iRPC (lower r, thinner gaps, GRPC, MGRPC) → Plan to perform beam test on first prototypes in **October 2015**
 - New gas mixture (to start tests **beginning 2016.**)
- Sinergies: Bari, Frascati, Napoli, Cern, Ghent, Mexico
- Facilities: GIF++

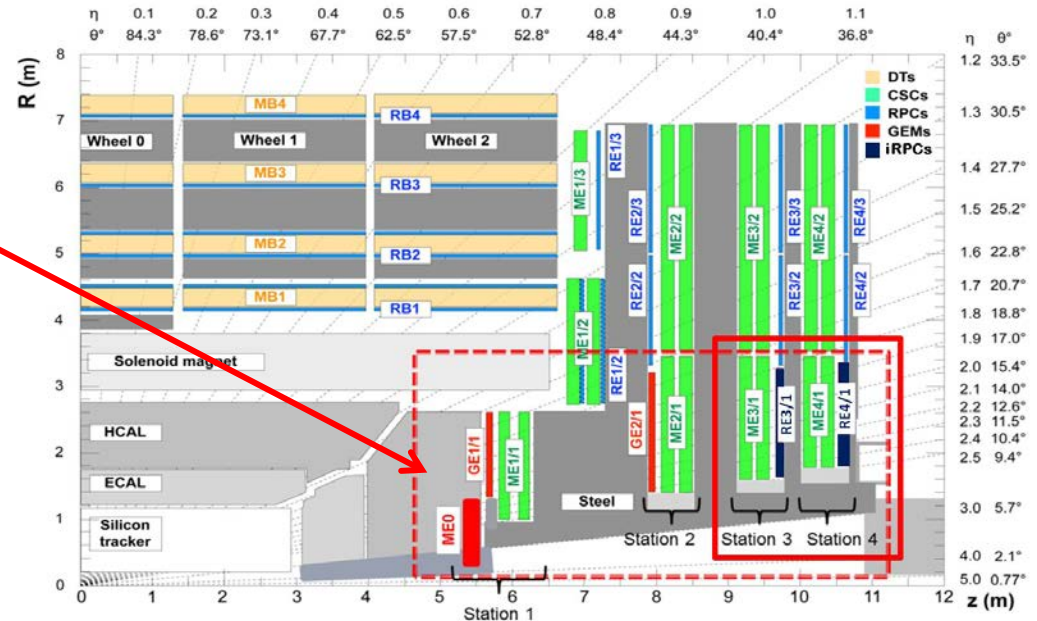


- Requests: only ME → see Bari

R&D Phase 2 for CMS Muon System

GEM and/or MPGD

- **Goals:** ME0 and GE2-1 chambers for the muon system
- **Measurements:**
 - Currents, gain, charge and rates measurements at different energies
 - Rate vs HV (HV Scan) → For the SENSITIVITY estimation
 - Test of the new HV Caen module for GEM
 - Simulation : GEANT4, Garfield,...
- **Sinergies:** Bari, Cern, n-TOF
- **Facilities:** TIF x-ray, n-TOF, Louvain la Neuve



- **Requests:** 2 prototypes, setup at Cern (readout, DAQ, travel) for neutron tests (14KE+ 7KE)
- **Responsability:** P. Vitulo : R&D Phase 2 Coordinator for the GEM project

Attività

- **Servizi EPR, turni+ 2 resp L2:** Controllo performance del rivelatore RPC: background monitor , correnti e misure resistività (44,5mu +8 mu)
- **Fase I GEM:** test con cosmici e preparazione slice test GE1-1(3mu+1 mu tecnici)
- **Upgrade fase II TRACKER:** test beam (1mu)
- **Upgrade fase II GEM:** tests at TIF and neutron facilities (3mu+1mu tecnici)
- **Upgrade fase II RPC:** tests at GIF++ for consolidation and iRPC (1mu+1mu tecnici)
- **Analisi dati e simulazioni:**
 - Analisi di Higgs carico $H^+ \rightarrow cb$ (analisi a 8 TeV e 13 TeV)
 - Simulazione Geant4 e Garfield per GEM R&D fase 2

Richieste CMS

Missioni	EPR (1,5mu/autore) + Responsabilità per GEM-TRACKER	74,5 k€
	Metabolismo ME+MI	(3,7+1)k€ x 14,3 FTE = 67 k€
	CMS 10.7 FTE	
	RD_fase2 2.1 FTE	
	AIDA2020 0.1 FTE	
	CHPIX65 1.4 FTE	
	TOTALE 14.3 FTE	
	Fase I	11 k€
	Fase II	18,5 k€
	Tecnici: Fase I -GE1-1 e R&D faseII	3mu x 3,7 k€ = 11 k€
Consumo	Metabolismo	1,5 k€ x 14,3 FTE = 21.5 k€
	Auto Cern	8 k€
Totale		211,5 K€

Richieste Servizi: Officina Meccanica 3mu - Elettronica 3mu

Richieste RD_Fase2

	Nome		Qualifica	RD_FASE2
1	Braghieri Alessandro	CMS	Ricercatore	50
2	Ferrari Roberto	ATLAS	Dirigente di Ricerca	20
3	Magnani Alice	CMS	Dottorando	20
4	Montagna Paolo Maria	CMS	Ricercatore	20
5	Riccardi Cristina	CMS	Ricercatore	30
6	Salvini Paola	CMS	Ricercatore	20
8	Vai Ilaria	CMS	Dottorando	30
9	Vitulo Paolo	CMS	Ricercatore	40

Missioni **Metabolismo e altro (totale 2.1 FTE)**

→ **Sigla CMS**

Consumo **Metabolismo**

→ **Sigla CMS**

2 prototipi per GEM

14 k€

Setup CERN (readout , DAQ, trasporti)

7 k€

Richiesta comune per RPC

→ Sezione di Bari

Totale

21 K€

MEG Pavia: Attivita' 2016

- Meeting collaborazione
- Incontri costruzione TC a Genova
- MEGII engineering run
- Commissioning TC al PSI
- Commissioning sistema calibrazione laser del TC
- Analisi dati MEG I
- Analisi data beam test 2013/2014
- Sviluppo software MEG2 per nuovo TC

MEG Persone 2016

Paolo W. Cattaneo	1 Ric INFN	50%
Gianluigi Boca	Ric. Uni.	50%
Antonio De Bari	Ric. Uni.	20%
Massimo Rossella	Tec. INFN	30%
Marcello Simonetta	Ass. Ricerca	100%
Lab. Elettronica		6 m.u.
Lab. Meccanica		3 m.u.
Totale	FTE	2.5

MEG Pavia: Preventivo di spesa 2016

MI

Incontri coll.	$2.5 \text{ FTE} \times 0.5\text{mu/FTE} \times 3\text{ke/mu} =$	4.0ke
Lavorazione a Genova	$2.5 \text{ FTE} \times 0.5\text{mu/FTE} \times 3\text{ke/mu} =$	4.0ke

ME

Incontri coll.	$2.5 \text{ FTE} \times 1.0\text{mu/FTE} \times 5\text{ke/mu} =$	12.5ke
Run	$2.5 \text{ FTE} \times 2.0\text{mu/FTE} \times 5\text{ke/mu} =$	25.0ke
Montaggio TC al PSI	$2.5 \text{ FTE} \times 1.0\text{mu/FTE} \times 5\text{ke/mu} =$	12.5ke

Totale missioni **58.0ke**

Consumo

Metabolismo	$2.5 \text{ FTE} \times 1.5 \text{ ke}$	4.0ke
Consumo PSI per costruzione TC		10.0ke

Totale consumo **14.0ke**

Inventariabile

Fotodiode+Ampl 10GHz Trg ottico	2.0ke
Sistema misura lunghezza ottica fibre	4.0ke
Calcolo per analisi	8.0ke

Totale inventariabile **14.0ke**

Totale **86.0ke**