

WP2: Detector development Summary

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Description of the WP2 Goal

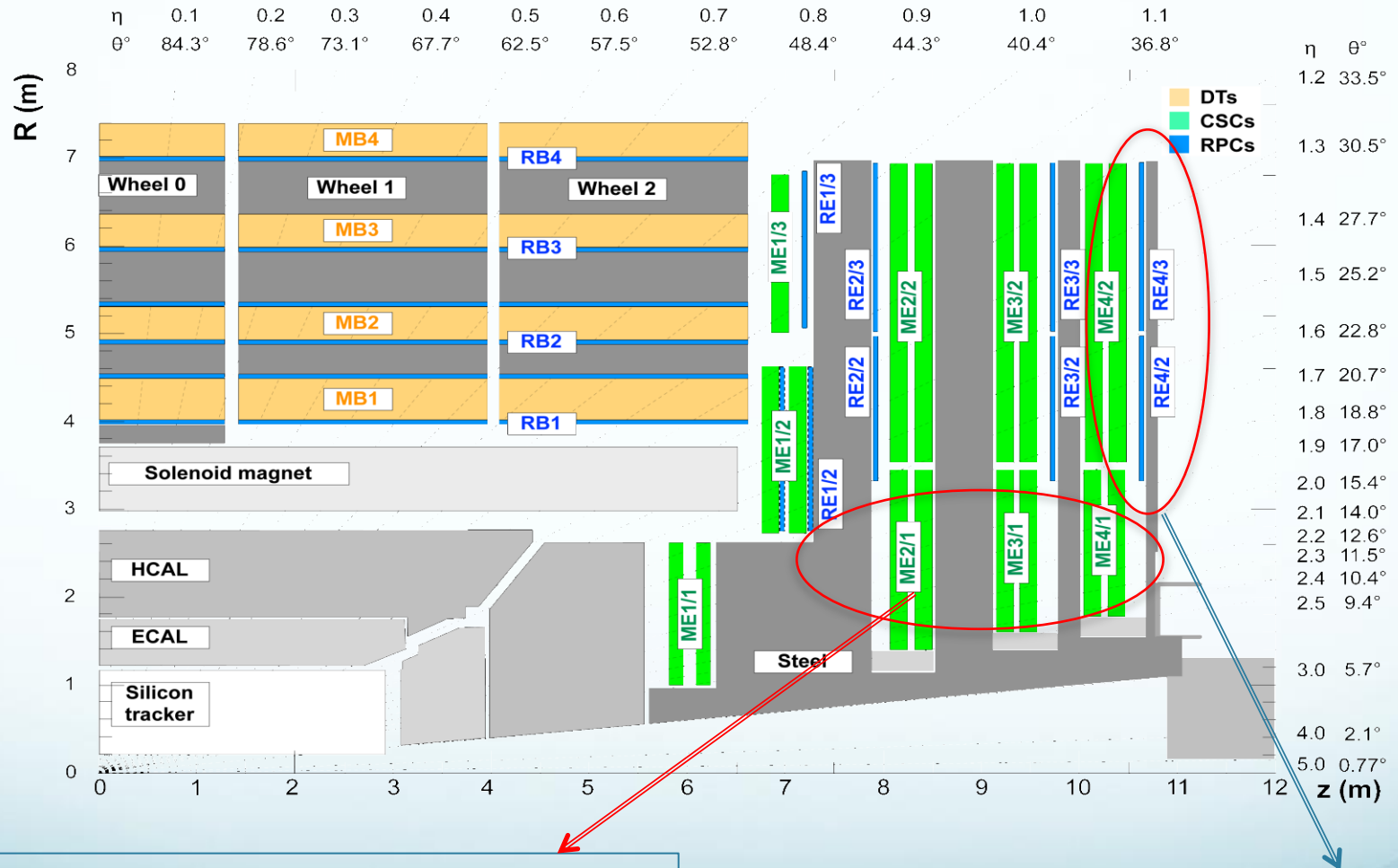
Study innovate particle detectors (with gaseous and silicon technologies) to cope with future high background experiments. Important R&D is still necessary to bring the detector technology at the required level of sustainability for this challenge.

Task 2.1: *New gaseous detectors for high rate environment*

Task 2.2: *New high radiation tolerance silicon detectors*

Task 2.3: *Set up of a gas-detector laboratory at HELWAN*

Gas detectors for CMS upgrade



iRPC in Phase 2: Bari is involved in the R&D program aiming to identify the most suitable detector

RE4 in LS1: Bari is involved in RE4 chamber construction and test

Task 2.1 & 2.3

2.1: *New gaseous detectors for high rate environment*

Deliverables: Assembly and test of MRPC/GEM detectors

Delivering date: **March 2014 (month 15)**

Milestones: **March 2014:** First small size MRPC and GEM prototypes validated. Performance measurements with cosmic rays of first small size MRPC and GEM prototypes

2.3: *Set up of a gas-detector laboratory at HELWAN*

Deliverables: Detector laboratory infrastructure at Helwan

Delivering date: **August 2016 (month 44)**

Milestones:

- **Dec 2014:** Advancement on infra-structure preparation for the gas lab at HELWAN: Installation of power system and gas system for gaseous detector test.
- **Sept. 2016:** Completion of HELWAN infrastructure and test of large size MRPC/GEM: HELWAN gas lab ready and fully functioning. Validation with cosmic rays of the large size gas detector.

2013-14 activities @ CERN

Secondments:

Early-Stage: 2 Researchers from Helwan to Poliba, Sept '13 – March '14
Sheeren and Ahmed arrived in Bari on 3th of Sep '13. Then moved to Cern.

Sheeren: study of the muon trigger and reconstruction capability in the high eta region vs detector performance

Ahmed: 904 activities (construction and test of RE4) and analysis tool development for cosmic test data

Yasser: set-up of the hardware and software needed for RPC test at GIF (in preparation for the Helwan telescope)

GIF activities

After several years of inactivity @ GIF, a new RPC R&D programme started last year. **Set up** in preparation.

The trolley is equipped with:

- **12 RE4 GAP**
- **1 new RE4 and 1 old RE3 chambers (fully equipped with electronic).**

GOALS:

1. Radiation hardness of materials & electronic components under photon flux.
2. detector's performance under high particle fluxes
3. Long-term monitoring of large muon detectors working under high gamma irradiation.



Excellent opportunity to prepare all hardware and software needed for the telescope in Helwan then move everything to Egypt.

Task 2.2

Task 2.2: New high radiation tolerance silicon detectors

Poliba is involved in the R&D program aiming to identify the most suitable pixel sensors technology to be used in the inner tracker layers for HL-LHC experiments. The sensors, together with the readout electronics, must be capable to work up to the extremely high radiation fluence. The simulation program Fluka estimates, for a CMS inner pixel layer, a fluence of $\sim 2 \times 10^{16} \text{ n}_{\text{eq}} \text{ cm}^{-2}$.

The main aspects of the R&D program are:

- a) the evaluation of two sensor architectures: planar sensor and 3D sensor;
- b) the evaluation of cutting edges technologies: small thickness sensors with thin/active edges, small pixel size and high channel density, miniaturized efficient cooling system

Deliverables D2.2: Characterization of high radiation tolerant silicon detectors

- a) passive characterization in the Poliba laboratory
- b) beam-test measurements of new radiation tolerant silicon detector prototypes in an LHC similar background environment (under definition)

delivering date: November 2015

Secondments:

Early-Stage Researcher from Helwan to Poliba, start August 2014 end April 2015 (9 months)

Early-Stage Researcher from Helwan to Poliba, start January 2015 end August 2015 (8 months)

People interested should send an email to Salvatore My (salvatore.my@ba.infn.it)

Organization

1. Weekly meeting (first meeting on 29 April 2013)

- agenda and minute available on indico page.

2. Twiky page:

[https://twiki.cern.ch/twiki/bin/view/CMSPublic/EENP2.](https://twiki.cern.ch/twiki/bin/view/CMSPublic/EENP2)

2. Mail list: WP2-EENP2@cern.ch

Please if you want to be added please sent me an email

Today WP2 session

Thursday, 23 January 2014

- | | |
|---------------|---|
| 14:30 - 14:45 | Report on WP2: status and perspectives 15'
Speaker: Dr. Gabriella Pugliese (Universita e INFN (IT)) |
| 14:50 - 15:00 | Status work for the RPC lab in Helwan 10'
Speaker: Yasser Assran (The British University in Egypt (EG)) |
| 15:05 - 15:15 | Egyptian activity at the 904 RPC lab 10'
Speaker: Ahmed Ibrahim (The British University in Egypt (EG)) |
| 15:15 - 15:25 | Simulation studies 10'
Speaker: Shereen Aly |

WP2 Secondments

WP2 from EGYPT to POLIBA

Ahmed Ibrahim from Helwan to Bari
from 1 September 2013 to 3 March 2014.
(6.0 months)

Shereen Aly from *Helwan* to Bari
from 1 September 2013 to 3 March 2014.
(6.0 months)

Shereen Aly from *Helwan* to Bari
from 15 May 2014 to 15 July 2014 (3.0 months)

WP2 from EGYPT to ECOLE

Tamer Mohamed El Kafrawy from Ain Sham to ECOLE
From 15 April 2014 to 15 October 2014.
(6.0 months)