

# RD51 Mini Week – April 2013

- F.Ravotti: The New Irradiation Facility in the CERN PS East Area
- P.Thuiner: SWPC for monitoring, stability and aging tests.
- Y. Tsipolitis: The Neutron Facility at Demokritos
- Y. Tsipolitis and E.Oliveri: GDD/RD51 CERN Laboratory

# GDD/RD51 lab

- Beams...
- Extension in progress. Completed (probably) in June 2013
- Instrumentation:
  - H. Muller Group: High Voltage (powering/monitoring) Modules stand alone and for the SRS.
  - CAEN: Support/Collaboration. Possibility to test commercial CAEN Modules in the lab and synergy to find solution for specific application.
  - High Cleanness SWPC (with PH-DT-DI Detector Infrastructure Group) to perform monitoring, gain stability and aging measurements.
  - Restored/New Equipment rd51-users-available: Vacuum system
  - Environmental/Gas System Parameter monitoring and lab DCS
- Gaseous Detector Exposition (permanent Lab Exposition & CERN Open Days 2013)
- Summer Students 2013: One official CERN Summer Student (X-Ray Imaging) and two not-official from external institutes

*Talks on wg7 (Patrik and Eraldo)*

# Test Beam @ PS/SPS

current schedules for the injector on the BE department web page:

[https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector\\_Schedule\\_2014.pdf](https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector_Schedule_2014.pdf)

[https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector\\_Schedule\\_2015.pdf](https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector_Schedule_2015.pdf)

## 2014

Start East hall physics (**PS test beams**) is scheduled **July 15th 2014**

Start North Area physics (**SPS test beams**) is scheduled on **Oct 13th 2014**

**End PS/SPS December 15th.**

## 2015

**PS restart May 4th,**

**SPS around June 15th,**

**End December 7th.**

A call for **beam requests** will be sent in the **4th quarter of 2013.**

**PS: July 15th 2014**  
**SPS: Oct 13th 2014**

# Test Beam @ Desy

If you are planning to use the DESY test beam facility in 2014 please send before **April 12th 2013** following information to

[testbeam-2013@desy.de](mailto:testbeam-2013@desy.de):

**April 12th 2013**

- **project name**
- **number of requested weeks**
- **preferred month(s)**
- **preferred infrastructure (beam telescope, magnetic field, Š)**

This is **not yet the official** test beam request! The official test beam booking for 2014 will follow in summer.

You can find information of the DESY test beam on [testbeam.desy.de](http://testbeam.desy.de). Groups from European institutions can apply for funding via AIDA (<http://aida.web.cern.ch>).

# Neutron Test Beam @ Demokritos

- Neutron energies up to 25 MeV depending on the initial reaction
- Neutrons of 5.5 MeV with fluxes up to  $1.5 \times 10^6$  n/cm<sup>2</sup> s
- used to test ATLAS MDT's
- for the upgrade of the ATLAS NSW TGC's & Micromegas were (and will be) tested
- GEM detectors were tested

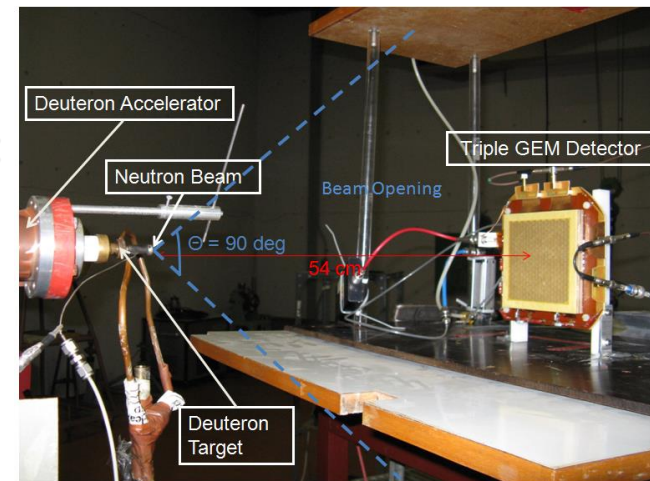
Nuclear Reaction	Proton/Deuteron Energy Range (MeV)	Neutron Energy Range (MeV)
${}^7\text{Li}(p,n){}^7\text{Be}$	1.9 to 8.4	0.1 to 6.7*
${}^2\text{H}(d,n){}^3\text{He}$	0.8 to 8.4	3.9 to 11.5**
${}^3\text{H}(d,n){}^4\text{He}$	0.8 to 8.4	16.4 to 25.7***

Neutron fluencies can reach  $\sim 5 \times 10^6$  neutrons/cm<sup>2</sup> s but for d-<sup>3</sup>H is lower an order of magnitude compared to the d-<sup>2</sup>H reaction due to cross section energy dependence

MAMMA  
neutron  
Beam Test  
at  
Demokritos



GEM  
neutron  
Beam Test at  
Demokritos



# GDD/RD51 lab - Extension



Platform for Air Conditioning Installed



Old Workshop cleaned, painted and ready for the installation of the new mechanical and electrical/electronics workshop

The extension will be completed (presumably/hopefully) in June.

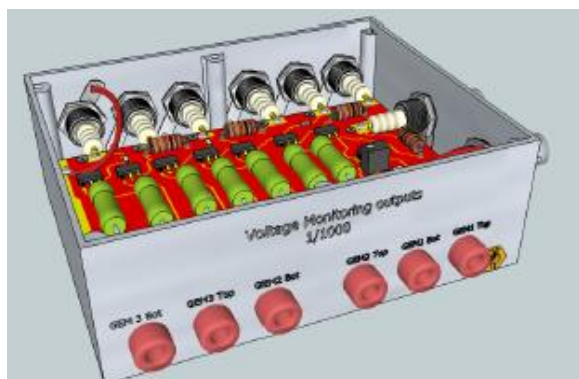
Requests from the users concerning the new available spaces:

1. Cosmic Stand (MAMMA)
2. Working station to perform test of new devices and components for the LHC's gas systems (PH-DT-DI Gas Group)

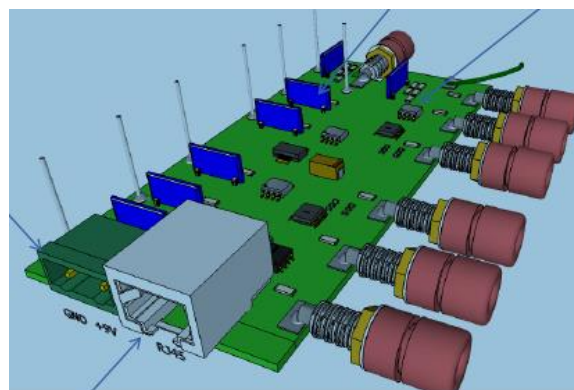
# GDD/RD51 lab - Instrumentation

## H. Muller Group (H.Muller, A. Rusu, A.T. Martinez)

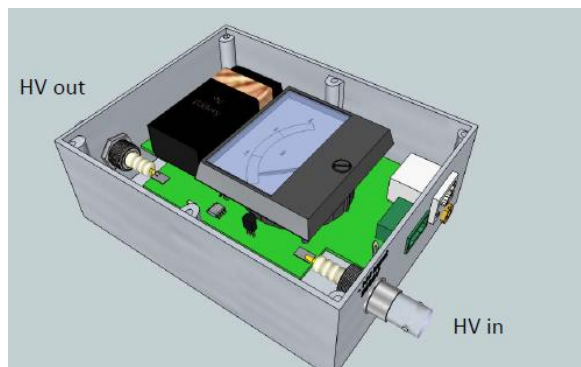
Active Voltage Divider for GEM's



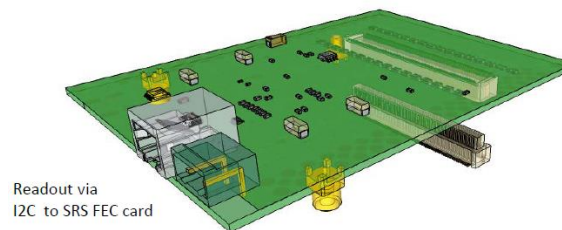
High Voltage Monitoring



High Voltage pAmmeter



Readout pAmmeter





## CAEN: Support & Synergy

- Opportunity to test commercial CAEN Modules in the laboratory.
- Synergy to find solution for specific applications.
- Possibility to make electronics pool requests.
- Any requests/suggestion from the RD51 community is really welcome

CAEN Contacts: S. Petrucci, A. Iovene, C. Tintori

### CAEN Support Service:

[Support.frontend@caen.it](mailto:Support.frontend@caen.it) P.Barba  
[Support.computing@caen.it](mailto:Support.computing@caen.it) A.Lucchesi  
[Support.nuclear@caen.it](mailto:Support.nuclear@caen.it)

Front End e DAQ HW and FW Support  
Software  
HV and Generic Support



## CAEN: Support & Synergy

Subjects of our interest (can be extended according to users requests)

- High Current Resolution HV Modules: possibility to extract signal information directly from the power supply for zero-polarization-current systems (SWPC, mm, multi-channels-powered GEMs)
- Digitizers: signal processing for charge and timing measurements (two already available in the lab: DT5751, DT5724)
- MCA with Integrated High Voltage: stand alone system with parallel measurements of spectrum and currents.
- Preamplifier & Protection

# GDD/RD51 lab - Instrumentation

## High Current Resolution HV Modules

### N1471H

4 Channel 5.5 kV Programmable HV Power Supply



- 4 channels in 1U NIM module (2 & 1 channel versions also available)
- 5.5 kV / 20  $\mu$ A output ranges
- Channels with individually selectable positive or negative polarity
- SHV coaxial output connectors
- Common floating return
- Low Ripple (Typ: < 5mVpp)
- 100 mV Vset resolution
- 1 nA Iset resolution (Imon-Zoom: 50 pA)

Soon available in the lab for tests.

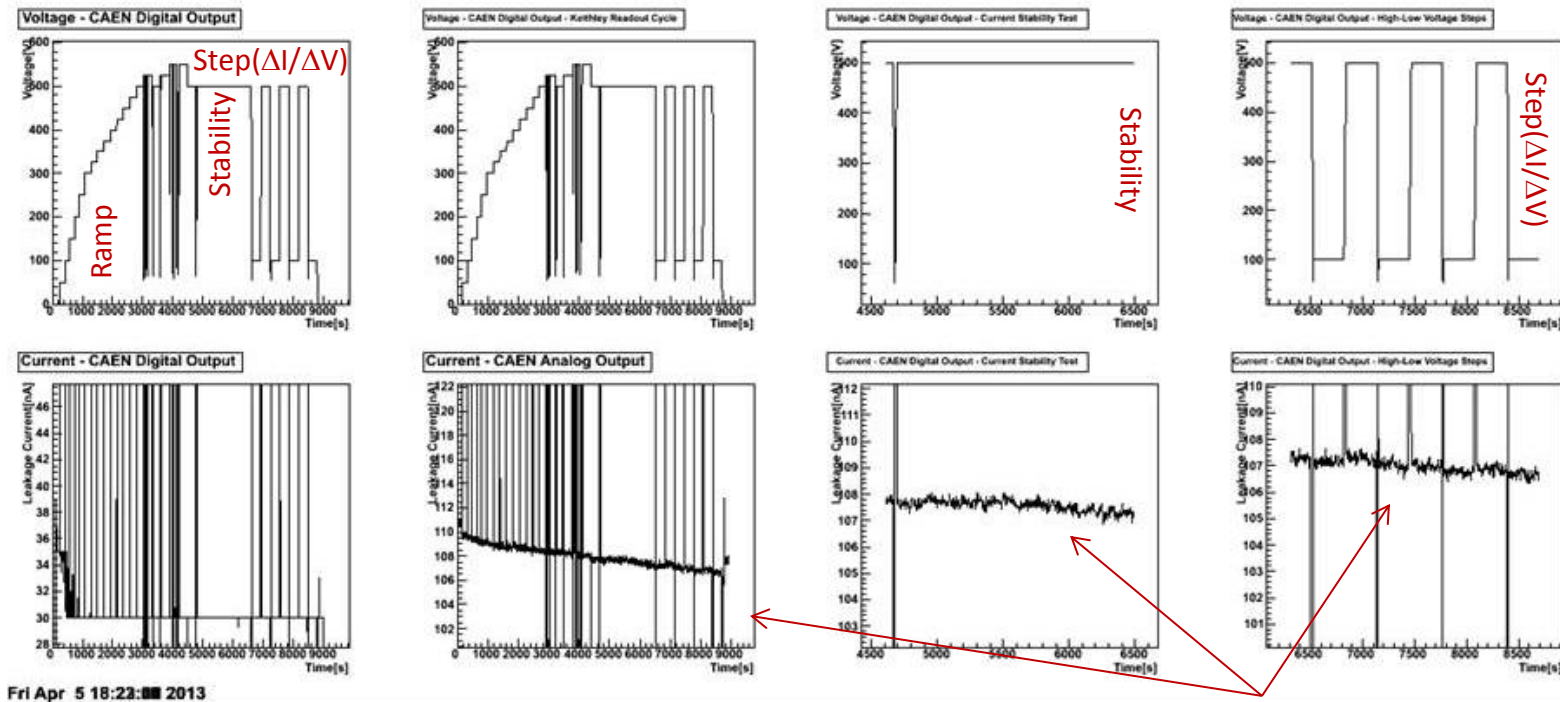
If satisfied, we will requests to the Electronics pool to get some modules

### Planned Tests:

- GEM Foil Leakage Current Test for QA
- Multi-Channel-Triple GEM Powering (ALICE set up for Ions feedback)
- mm Powering (detector characterization and “performance vs rate” measurements)

# GDD/RD51 lab - Instrumentation

## Automated Measurement of GEM Leakage Current with CAEN N1471



- Leakage Current test fully programmable (voltages, current limits, steps time-duration).
- Number of admitted discharges per voltage step programmable.
- Step backward in case of a selectable number of discharges reached
- Accurate, operator free and independent,...
- Test Procedure (High/Low Current limit chosen by the user)

Current Analog Output monitored with a Keithley. We plan to check if in the N1471H the digital output is sufficiently accurate

Software Available if needed (debugging ongoing – needs to be implemented for multiple sector and to be optimized)

# GDD/RD51 lab - Instrumentation

## Stand Alone – Complete – Measurement Set Up with MCA

### DT5780

#### Digital Multi Channel Analyzer



+ Image



- Dual Digital MCA based on 14 bit 100 MS/s Flash ADC
- Suited for high resolution X-ray and Gamma-ray Spectroscopy
- Selectable Input Dynamic Range and adjustable Fine Gain
- 2 channels HV power supply (  $\pm 5$  kV/300  $\mu$ A)
- 2 DB9 connectors for preamplifier power supply
- HV Inhibit input
- Features DPP-PHA firmware for energy and time stamp calculation
- Digital oscilloscope function for an easy setup and signal

If it can be moved down to 50pA, spectrums, currents, rates can be measured by a single device (+ ext preamp).

Good Solution for monitoring systems, calibration,...

SWPC, mm,...

#### Power Output

HV for detector's supply:

- 2 channels, 5 kV/300  $\mu$ A (SHV connectors)
- Programmable on/off ramp : 1 to 500 V/s in steps of 1 V/s
- Negative, Positive or Mixed polarity by ordering options
- Vset / Vmon resolution: 100 mV

- Iset / Imon resolution: 5 nA

- Voltage ripple < 5 mVpp

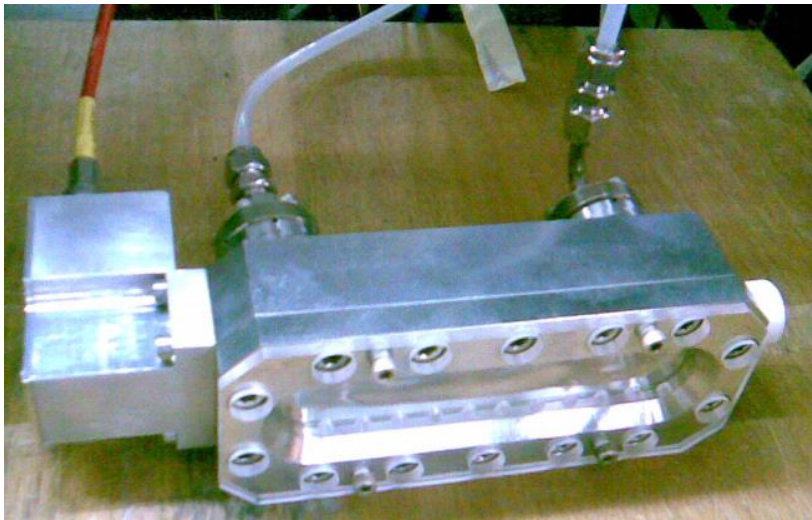
LV for Preamps supply:

- 2 channels,  $\pm 24$  V @50 mA or  $\pm 12$  V @100 mA (9-pin female D-type connectors)
- Voltage ripple: < 5 mVpp

# High Cleanness SWPC

[See Patri k's Talk](#)

In collaboration with PH-DT-DI Detector Infrastructure Group



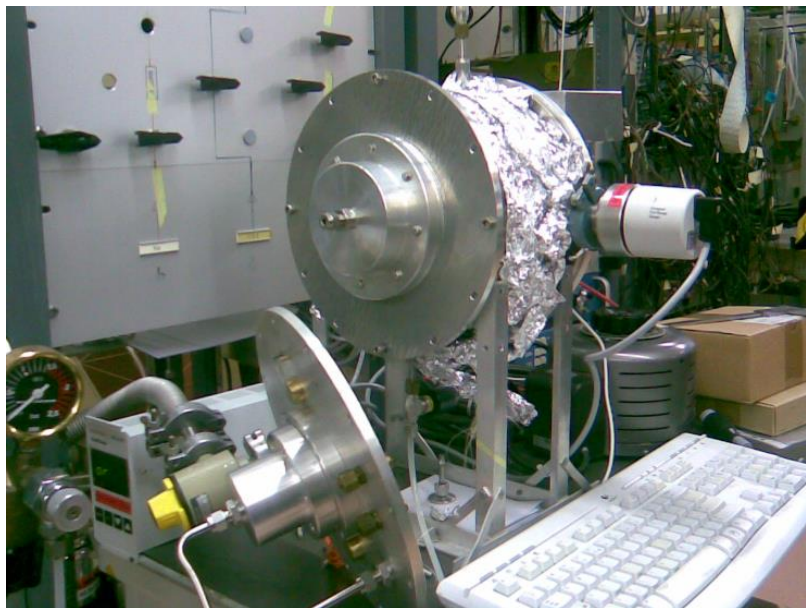
- Ten new detectors in production.
- Possibility to produce more if needed.
- Available for the users (cost based on the materials/components).
  
- Control, Monitoring and DAQ software already available or implementable.

## Applications:

- Monitoring System with SW [PH-DT-DI gas group – R.Guida, B.Mandelli - for LHCb gas system]
- Stability Measurements with different technology respect with the detector tested (GEMs, mm, ...) [ALICE – V. Peskov]
- Aging Studies [CMS – J. Merlin]

# Laboratory Vacuum System

Restored and available for the RD51 community



Application:

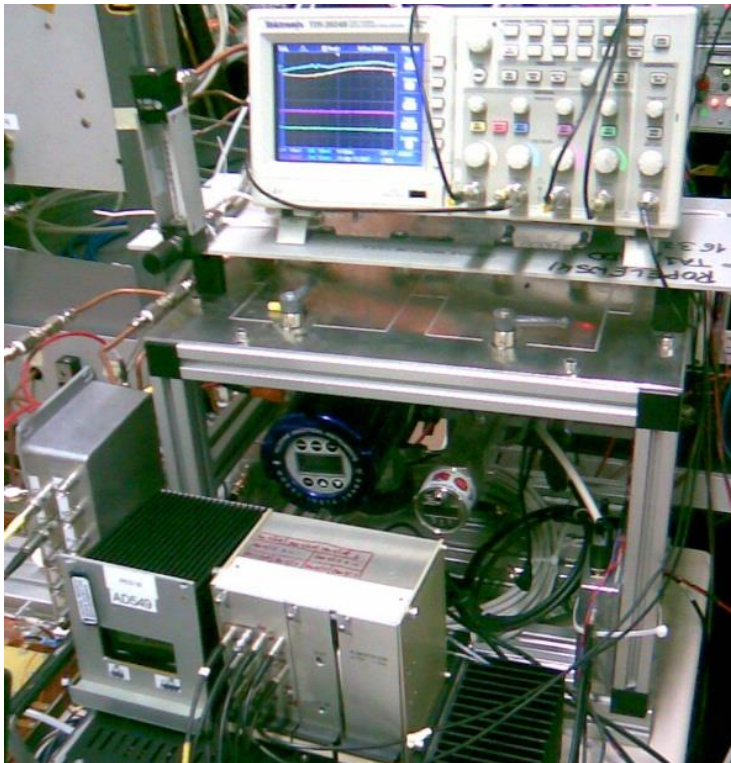
- GEM foils resistivity measurements in controlled environment (humidity) – R. Veenhof
- GEMs in pure Noble Gas – J.Veloso group and GDD
- CsI studies



# GDD/RD51 lab - Instrumentation

## Environmental/Gas System Parameter monitoring and lab DCS

Portable System for gas system monitoring (humidity, O2, Pressure)



**See Patri k's Talk**

Support/Advice from the CERN gas group concerning the sensor

Replacement of actual NI daq board ( used for the data logging of the various sensors) with Arduino. Cheap solution easily duplicable by the users. Versatile.

Arduino Mega



Implementation into PVSS under investigation.

Application:  
Laboratory and Test beam DCS  
(GDD and K.Karakostas)



# GDD/RD51 lab – Gaseous Detector Exposition

...from the early stage of proportional detection in gas to the prototypes for the LHC's experiments. Principle of operation and specific history of the available prototypes...

- Permanent Exposition in the Lab
- CERN Open Days 2013

We will ask support from people that worked in the Charpak's Group and in our lab. A stage of two weeks of a young student will be foreseen by DT in July. Support from the CERN outreach /visit/education group will be provided.

Anyone who wants to be directly involved or wants to provide detectors for the exposition is welcome.

## Summer Students 2013

One official CERN Summer Student  
Two non-official from external institutes

Topic: X-Ray Imaging.  
Topics: X-Ray Imaging, SRS, DCS,...

# Test Beam Questionnaire

## ... just a reminder

**From:** Yorgos Tsipolitis <[yorgos.tsipolitis@cern.ch](mailto:yorgos.tsipolitis@cern.ch)>

**Date:** 09 Απριλίου 2013 21:05:18 μ.μ. GMT+0300

**To:** rd51-all

**Cc:** Yorgos Tsipolitis <[yorgos.tsipolitis@cern.ch](mailto:yorgos.tsipolitis@cern.ch)>

**Subject:** WG7 questionnaire

Dear colleagues,

as you all know we will not have any beam this year at CERN.  
We would like to take the opportunity to review our test beam setup and everything else related to the test beam periods.  
It would be very helpful if you could fill the **following questionnaire and return it to us by the next RD51 mini-week (21st April)**

Best regards  
Eraldo and Yorgos