

# **RD 51 Collaboration News**

**Leszek Ropelewski (CERN), Maxim Titov (CEA Saclay)**



- 73 institutes (2 more applications to be approved by CB in Bari)**
- ~ 450 people involved**
- Representation (Europe, North America, Asia, South America, Africa)**

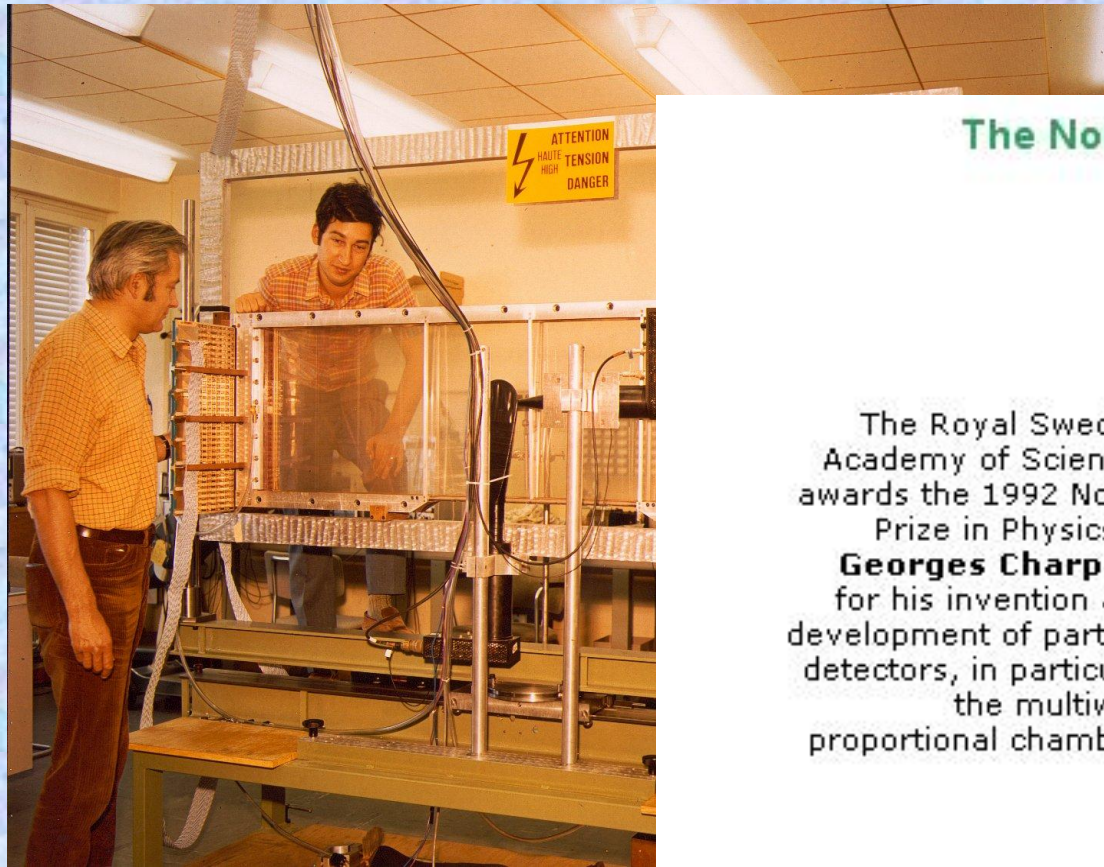
**6<sup>th</sup> RD51 Collaboration Meeting, Bari, Italy, October 7 - 10, 2010**

## **Thursday, October 7: Plenary Session**

- **14:00 « RD51 Collaboration News », Maxim Titov**
- **14:30 « Welcome », Paolo Spinelli**
- **14:50 « Memories of Georges Charpak », Amos Breskin and Ioannis Giomataris**
- **15:20 « RD51 Technology offers and TTN », Hartmut Hillemans**
- **15:50 Coffee Break**
- **16:20 « Large Volume Spherical Detector and its Applications », Ioannis Giomataris**
- **17:05 « Status of GridPix Developments », Harry van der Graaf**

Georges Charpak died on September 29, 2010 ...

**Winner of the 1992 Nobel Prize for Physics for invention of MWPC**



### The Nobel Prize in Physics 1992

The Royal Swedish Academy of Sciences awards the 1992 Nobel Prize in Physics to **Georges Charpak** for his invention and development of particle detectors, in particular the multiwire proportional chamber.

**Georges Charpak**  
CERN, Geneva, Switzerland

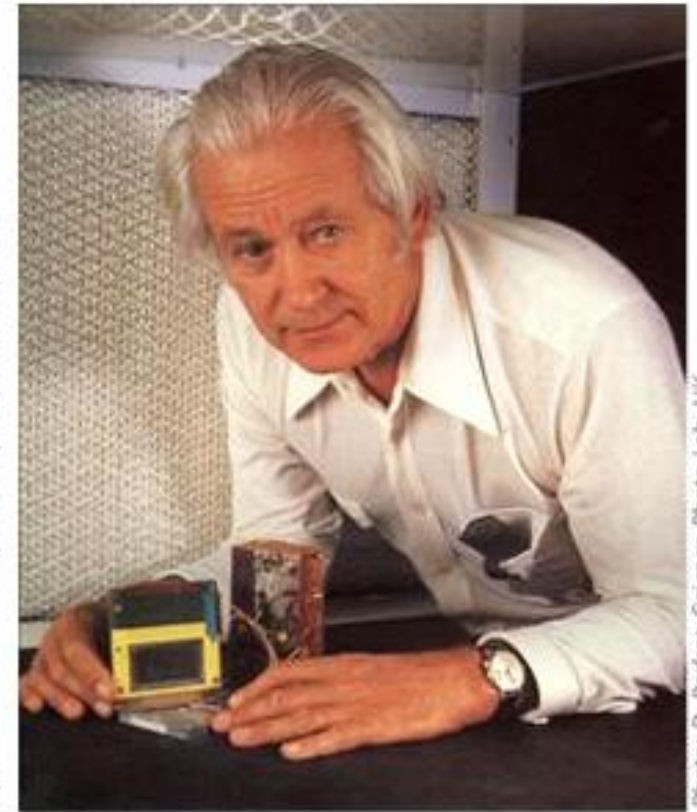


Photo: D. Parker, Science Photo Lab, UK

**“Memories of Georges Charpak” → Talks by Amos Breskin and Ioannis Giomataris in Today’s Plenary Session**

## RD51 Collaboration News since Freiburg Meeting:

- **RD51 mini-week, CERN, July 19-20, 2010:**  
**<http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=98658>**
- **RD51 test-beam periods in June and August 2010**
- **We have a RD51 office for visitors at CERN (Bld. 16-1-77)**
- **There is a progress with setting RD51 VO based on the SINP grid infrastructure (Supratik Mukhopadhyay, RD51 GRID expert) → could be available early 2011**
- **Dates for the RD51 Software School at CERN are fixed (January, 2011)**
- **Dates for the 2011 MPGD Conference in Japan are fixed (September, 2011)**
- **Next report to the LHCC Committee is due in February 2011**

## WG1 and WG2 Meetings

As usually, a lot of interest/talks and full agenda for  
**WG1: “Technological Aspects and Developments of New Structures”** and  
**WG2: “Common Characterization and Physics Issues » Meetings:**

- **New developments towards large-size single mask GEM and Bulk Micromegas and MPGD characterization (WG 1 & 2 & 6)**
- **Progress in the developments of resistive MM and discharge suppression for ATLAS Muon System (MAMMA) upgrade project (WG2)**
- **Progress in large area GEM prototypes (WG1) for sLHC and CMS MPGD Workshop (September, 30)**
- **Growing interest in MPGD operation at low temperature (WG2)**

# WG4: Software and Simulation Tools

**Many recent activities – unclear situation with software developments in 2011:**

## Notes & Publications:

- O. Sahin, I. Tapan, E.N. Ozmutlu, R. Veenhof, “ Penning transfer in argon-based gas mixtures », **2010 JINST 5 P05002**
- Heinrich's avalanche statistics paper accepted for publication
- Kostas' Micromegas mesh transparency paper ready for submission
- Rachel is preparing a note on a detailed comparison of electron transport calculations and measurements in magnetic fields

## Modeling work in progress:

- Understanding of excitation transfers (Micromegas and Alice TPC measurements shed light in the spatial extend of excitation transfer);

## Electron Transport & Gases:

- Molecular-level tracking of electrons implemented for MPGD
- Ne and C<sub>2</sub>H<sub>2</sub>F<sub>4</sub> update in 2010
- Implementation of electron transport tables into Garfield++
- Work functions and Fano factors checked

# WG4: Software and Simulation Tools

## Ionisation:

- first iteration of Heed++ interface with Garfield++

## Fields:

- Extension of finite element field calculation and interfacing of the neBEM method (efficient neBEM elements added for cylinders in the thin-wire limit)
- solid cutting added to enable modeling of GEMs
- enhanced control of the discretisation of neBEM elements
- analytic fields added to Garfield++

## Silicon:

- neBEM field calculations, 2-dimensional and 3-dimensional, are also an attractive way to model the fields in Si-detectors

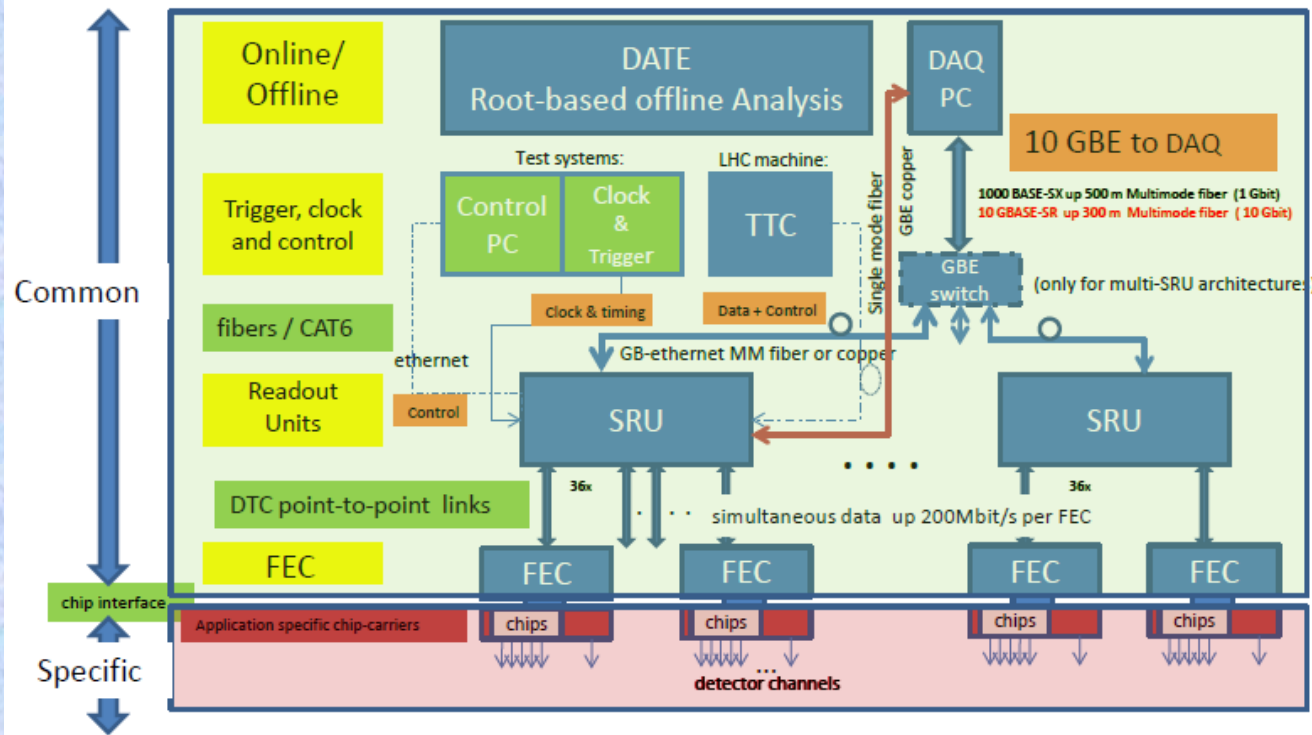
## Neutron Interactions:

- Geant/Garfield interface on neutron interaction with gases

**Discussion about RD51 Software School in 2011 in WG4, Saturday, October 9 (09:00-12:30) → Please encourage young people to attend the school !**

# WG5: RD51 Scalable Readout System (SRS)

**What is RD51 SRS:** <https://espace.cern.ch/rd51-wg5/default.aspx>



**“RD51 Common Project”  
initiated by H. Muller**

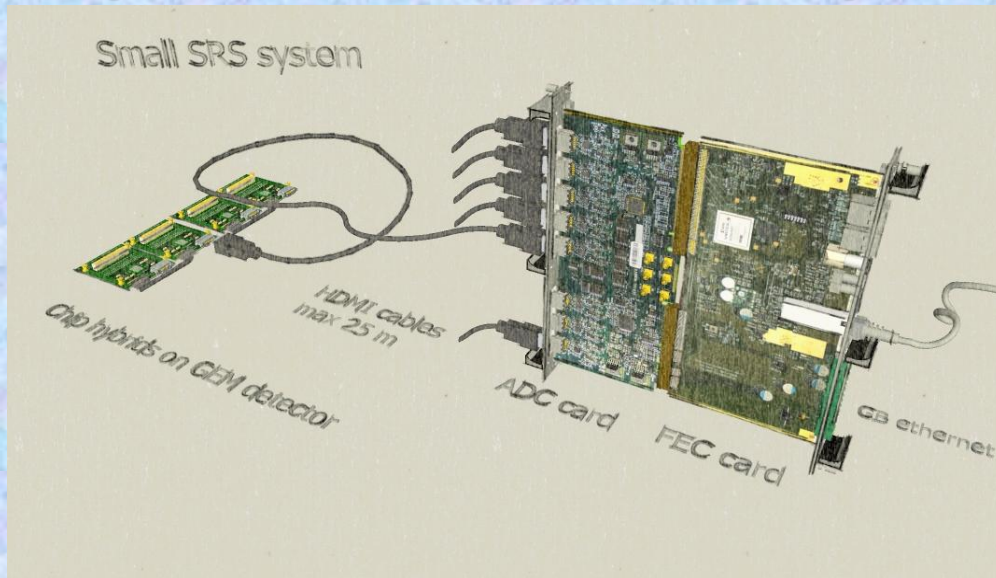
**→ Supported by the  
RD51 Common Fund**

- **Common chip link interface** for a variety of different readout chip
- **Scalability from a small to a large system** based on the a single, common readout backend
- **Integration of commercial standards** for a minimum of custom hardware modules between the chip frontend and the online system
- Default availability of a very **robust and supported data acquisition package**
- SRS allows to implement **different readout architectures and trigger schemes**



# WG5: RD51 Scalable Readout System (SRS)

**September 2010: Small SRS system ( ~ 600 ch.) is already functional**

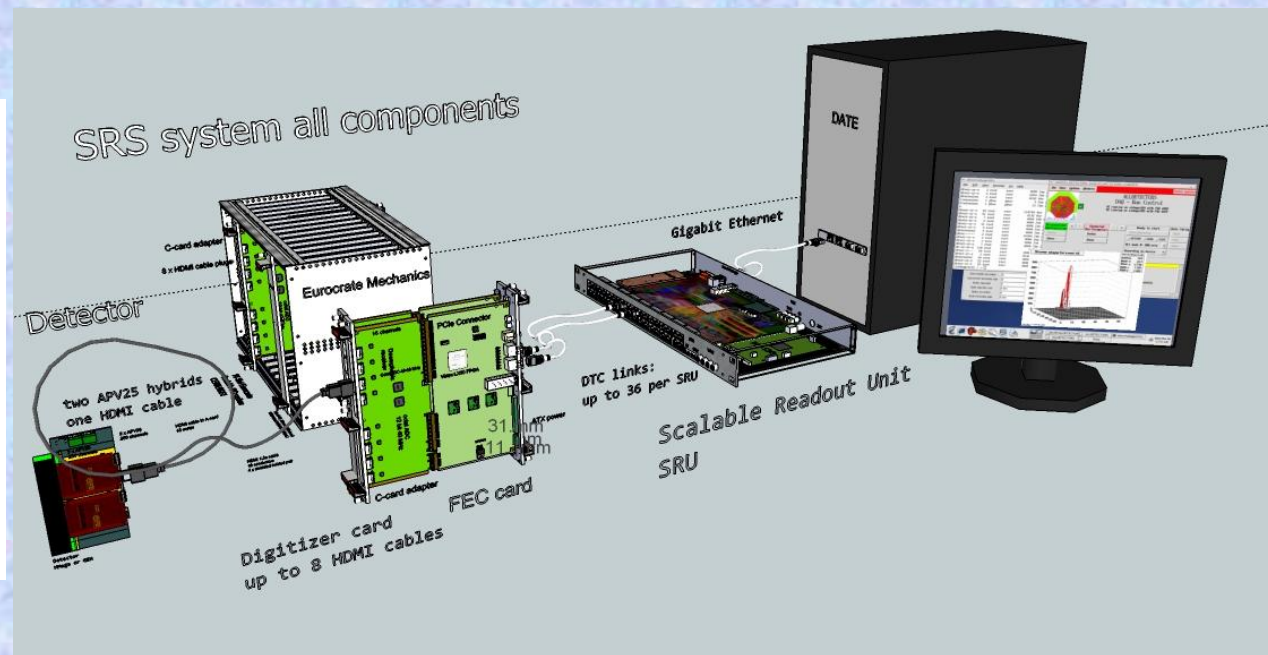


**WG5 meeting, Saturday, October 9 (14:00-18:00):**

- Status of SRS system hardware;
- GEM Readout via DATE & SRS
- ...

## Future efforts:

- Medium-size system (16k channels)
- Large system (100k channels)



# WG5: RD51 Scalable Readout System (SRS)

Experiment/Team	Detector	Activity
DAQ team ALICE	ALICE DAQ upgrade	Extension of DATE to Gigabit Ethernet Slow controls Program for SRS
and	Detector upgrade ALICE (DAQ, CALO etc)	R&D and management of SRS Electronic design SRS hybrids, ADC, SRU, Firmware etc
RD51-CERN	SRS system modules	DTC link protocol and Adapter, Firmware, SRU Electronics Design
ALICE , CCNU Wuhan, CN and	ALICE DCal and PHOS Calorimeters	
ALICE ORNL Oak Ridge, USA	ALICE EMCaL and DCal Calorimeter	
ATLAS Coll, MM, short term, CERN, CH	Micromega (Res. Strip) protos	Hybrid adapter to MM chamber
ATLAS Coll. MM, med. Term, CERN USA	N x MICROMEGA DETECTORS	New Hybrids and Adapters
Bonn and Mainz Uni. DE	TPC	Timepix adapter to SRS FEC
Florida Tech. Univ, USA	GEM for Muon Tomography (MTS)	Offline and Online developments link for DATE users RD51
LIP, Coimbra, PT	micropatterned RPC for s. animal PET upcoming application in Astroparticles	Tester...Can take some technical work (manual soldering, cables,etc)
HELSINKI, HIP, Finland	GEM detector and Si- 3D	Online and Offline
Istituto Superiore di Sanita INFN Roma, IT	GEM TRACKER	share information, common dev.
INP, Novosibirsk, USSR	Triple GEM with small angle stereo readout	?
LAPP, Annecy, Fr	bulk MicroMega	hybrid design for SRS with MICROROC chip
MEXICO, UNAM, MX	TGEM	?
SAHA Inst Nucl Phys,KOLKATA, IN	MICROMEGAS	?
UPV Valencia, NEXT Collaboration, ES	Xe-filled TPC with PMT and SiPM readout via SRS	FEC card design, Firmware modules Online and Offline
USTC Shanghai, CN	GEM and MicroMegas	work on hybrids
USTC Shanghai, CN		
Zaragoza Univ, ES	MicroMegas	test and assembly of MM

**Questionnaire sent out to all RD51 institutes (deadline – Sept. 15):**

→ **Enquire interest & needs;**

→ **Asking for help & support in system integration and commissioning**

**17 groups responded**

**If you are interested in SRS development and are not on the list**

→ **Please contact Hans Muller this week !**

## INCREASING EFFICIENCY OF TECHNOLOGY TRANSFER ACTIVITIES IN MEMBER STATES

REPORT ON THE ACTIVITIES OF THE TECHNOLOGY  
TRANSFER NETWORK WITHIN THE FRAMEWORK OF  
THE EUROPEAN STRATEGY FOR PARTICLE PHYSICS

**CERN-Council-S/049,  
September 7, 2009)**

**CERN-Council-S/068,  
September 7, 2010)**

**2009: RD51 was proposed as a pilot case for the technology pooling  
(MPGD technologies are owned by the organizations, members of the TTN)**

- “One-stop licensing for industry” (bridging the gap between institutes and industry)
- The IP coming from the HEP research community is better identified and more visible

**2010: In collaboration with RD51, TTN conducted an inventory of the  
technologies, expertise, production methods, test facilities and patents used**

**TTN plans to build several technology offers for the RD51/MPGD devices and  
developments (e.g. industrialization of SRS production ...) →**

**« RD51 Technology Offers and TTN» → Hartmut Hillemans, Today's Plenary Session**

# WG6: CERN EN/ICE Workshop Upgrade

- Last year, agreement was reached with CERN management to purchase the subset of machines necessary to carry out R&D on large size GEM (2m x 0.5 m) & Micromegas (2m x 1m) and the associated large size read-out boards in the current CERN EN/ICE facility.
- Additional funds for the workshop will come from the FP7 AIDA proposal

• GEM	market survey	call for tender	order	ready
– -1 continuous polyimide etcher	x	x	x	01/2011
– -1 Cu electro etch line				01/2011
• Micromegas				
– -1 large laminator	x	x	x	01/2011
– -1 large Cu etcher	x			03/2011
– -1 large UV exposure unit	x	x	x	01/2011
– -1 large resist developer	x			03/2011
– -1 large resist stripper		x		03/2011
– -1 large dryer	x	x	x	01/2011

**Machinery should be available in the beginning of 2011 → according to the schedule**

**→ Details in WG6 Meeting (Rui de Oliveira talk) – Friday, October 8 (09:00-12:00)**

# WG6 - Technology Industrialization (potential partners)

## THGEM Technology – ELTOS S.p.A. (Italy)

### GEM Technology

- **New Flex (Korea, Seoul)**
- **Tech-ETCH (USA, Boston)**
- **Scienergy (Japan, Tokyo)**
- **Indian Company**

### Micromegas Technology

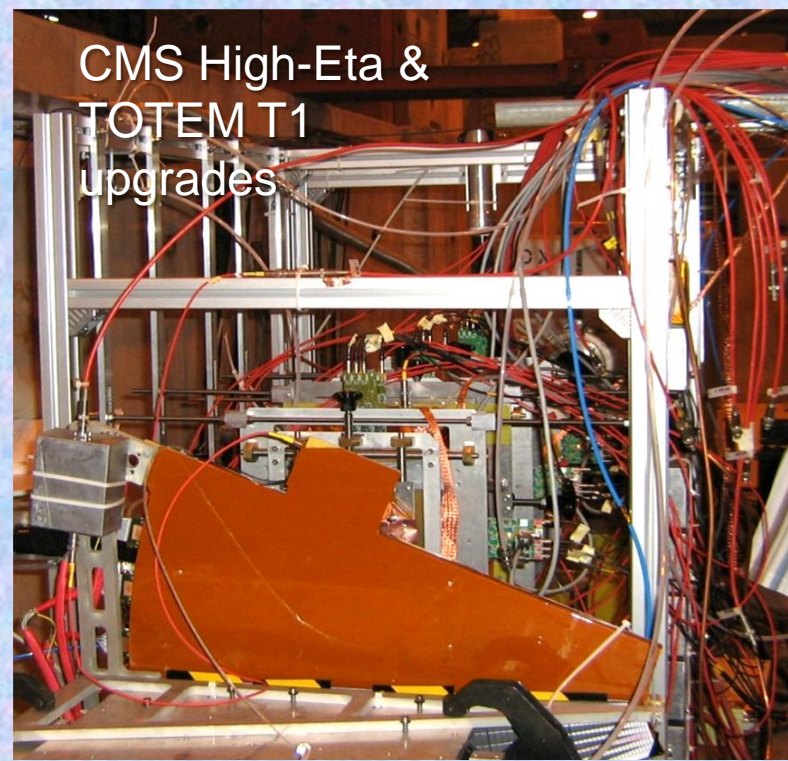
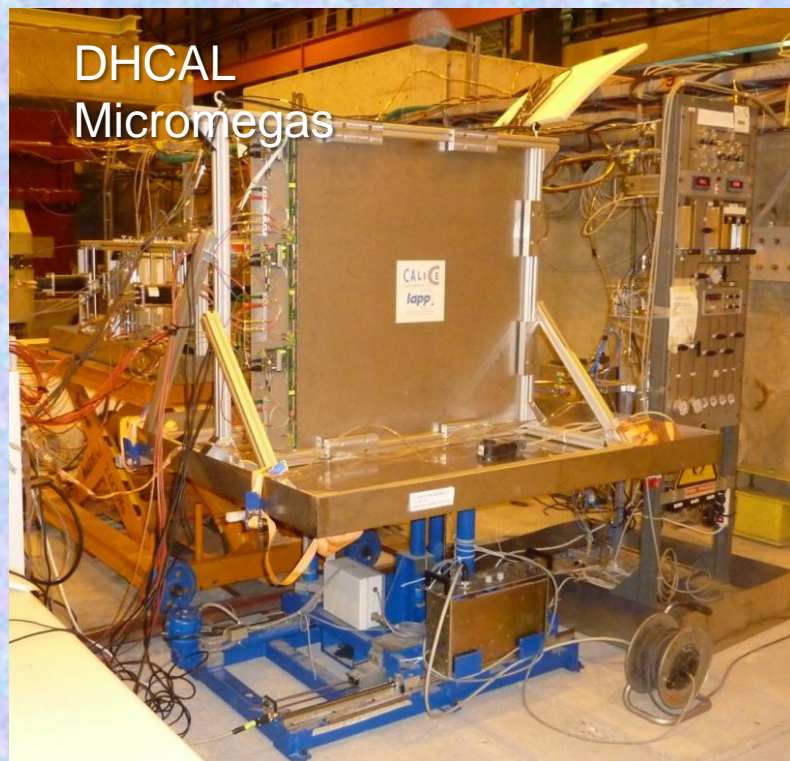
- **TRIANGLE LABS (USA, Nevada)**
- **SOMACIS (Italy, Castelfidardo)**
- **CIREA (France, CHOLET)**

## WG6 Production Meeting – Friday, October 8 (09:00 - 12:00)

- « Micromegas production at CIRE Company » - Jean-Luc Carette  
→ very closely working with CERN and CEA Saclay on Bulk Production
- « GEM production by Indian Industry », Archana Sharma
- “Status of CEA Saclay MPGD Workshop”, Stephan Aune

# WG7: RD51 Teat-Beam in June 2010

- **CMS High-Eta upgrade**
- **TOTEM T1 upgrade**
- **Micromegas TPC for ILC (Saclay)**
- **DHCAL Micromegas (CALICE)**

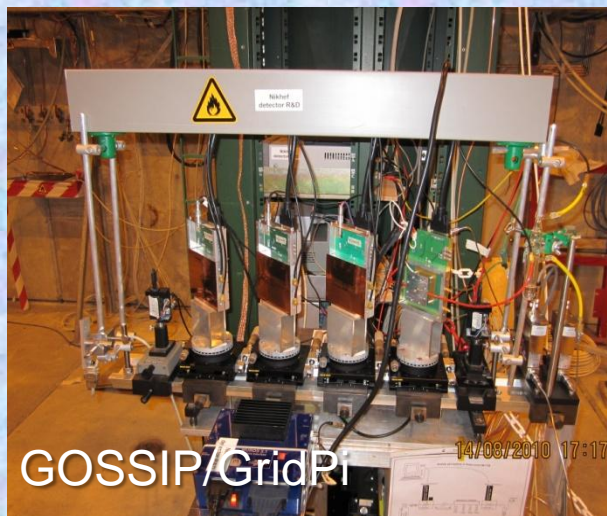


**Reports at the RD51 mini-week, CERN, July 19-20, 2010:**

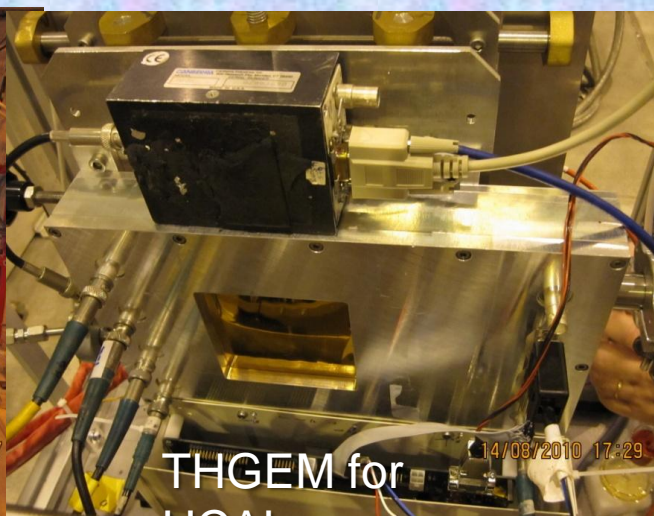
<http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=98658>

# WG7: RD51 Test-Beam in August 2010

- **TOTEM T1 upgrade**
- **THGEM for HCALs (Aveiro/Coimbra/UTA/Weizmann)**
- **THGEM for RICH (upgrade for COMPASS)**
- **GOSSIP/GridPix (NIKHEF)**



GOSSIP/GridPix



THGEM for  
HCAL



THGEM for  
RICH

**→ Reports at WG7 Meeting: Saturday, October 9 (09:00-12:30)**

**Real success of the test-beam periods would be impossible without everyday dedicated efforts and remarkable expertise at all stages of test-beam planning and operation of**

**Matteo Alfonsi and Yorgos Tsipolitis**

## WG7: Next RD51 Test-Beam in October 2010

### Four groups expected:

- **CMS High-Eta upgrade**
- **THGEM for HCALs (Aveiro/Coimbra/UTA/Weizmann)**
- **Resistive Micromegas for JLAB and COMPASS (Saclay)**
- **Micromegas TPC for nuclear physics (Demokritos Athens)**

**Matteo is stepping down as a WG7 convener in October and taking a new job**

**→ Thank you very much for everything you have done for the RD51**

**→ We wish you all the best with your new job and research activities !**

**We (RD51/Yorgos) are planning to apply for the test-beam period(s) next year**

**→ First test-beam period will not be earlier than May 2011**



# RD51 Public Collaboration Webpage

<http://rd51-public.web.cern.ch/RD51-Public>

**We encourage to reference this webpage to promote RD51 collaboration activities**

■ Home ■ Organization ■ WG Activities ■ Meetings ■ Documents ■ Safety ■ Other Links

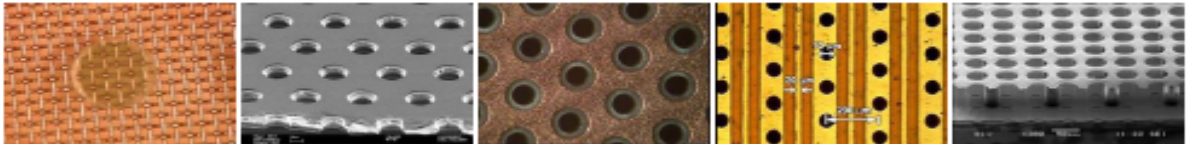
## RD51 Collaboration

### Development of Micro-Pattern Gas Detectors Technologies

The proposed R&D collaboration, RD51, aims at facilitating the development of advanced gas-avalanche detector technologies and associated electronic-readout systems, for applications in basic and applied research. **The main objective of the R&D programme is to advance technological development and application of Micropattern Gas Detectors.**

The invention of Micro-Pattern Gas Detectors (MPGD), in particular the Gas Electron Multiplier (GEM), the Micro-Mesh Gaseous Structure (Micromegas), and more recently other micro pattern detector schemes, offers the potential to develop new gaseous detectors with unprecedented spatial resolution, high rate capability, large sensitive area, operational stability and radiation hardness. In some applications, requiring very large-area coverage with moderate spatial resolutions, more coarse Macro-patterned detectors, e.g. Thick-GEMs (THGEM) or patterned resistive-plate devices could offer an interesting and economic solution. The design of the new micro-pattern devices appears suitable for industrial production. In addition, the availability of highly integrated amplification and readout electronics allows for the design of gas-detector systems with channel densities comparable to that of modern silicon detectors. Modern wafer post-processing allows for the integration of gas-amplification structures directly on top of a pixelized readout chip. Thanks to these recent developments, particle detection through the *ionization of gas* has large fields of application in future particle, nuclear and astro-particle physics experiments with and without accelerators.

The RD51 collaboration involves ~ 350 authors, 59 Universities and Research Laboratories from 20 countries in Europe, America, Asia and Africa. All partners are already actively pursuing either basic- or application-oriented R&D involving a variety of MPGD concepts. The collaboration established common goals, like experimental and simulation tools, characterization concepts and methods, common infrastructures at test beams and irradiation facilities, and methods and infrastructures for MPGD production.



Micromegas      GEM      THGEM      MHSP      Ingrid

**RD51 Conference Contributions, Seminars (a lot of information – feel free to use slides)**

<http://rd51-public.web.cern.ch/RD51-Public/Documents/ConferenceContributions.html>

<http://rd51-public.web.cern.ch/RD51-Public/Documents/Seminars.html>

# RD51 Collaboration Notes

<https://espace.cern.ch/test-RD51/RD51%20internal%20notes/Forms/AllItems.aspx>  
(CERN userID or email and NICE password are required to access internal notes)

- RD51-2010-001: R. Oliveira, V. Peskov, F. Pietropaolo, P. Picchi,  
“First Tests of Micromegas and GEM-like Detectors made of a Resistive Mesh”
- RD51-2010-002: Kondo Gnanvo, Leonard V. Grasso III, Marcus Hohlmann,  
Judson B. Locke, Amilkar S. Quintero, Debasis Mitra,  
« Imaging of high-Z material for nuclear contraband detection with a minimal  
prototype of a Muon Tomography station based on GEM detectors »

Also article at [www.wired.com](http://www.wired.com) - the online version of "WIRED", a US magazine  
on technology and popular science:

<http://www.wired.com/wiredscience/2010/07/muon-detector/>

- RD51-2010-003: V. Peskov, M. Cortesi, R. Chechik and A. Breskin, « Further  
evaluation of a THGEM UV-photon detector for RICH – comparison with MWPC »

**We encourage everybody to submit preliminary results of the work  
as RD51 internal notes (before journal publications)**

# RD51 Collaboration Meetings and Mini-Weeks in 2011

- **17<sup>th</sup> - 19<sup>th</sup> January: RD51 Mini-week @ CERN**
- **20<sup>th</sup> – 21<sup>st</sup> January: RD51 “Software School” @ CERN**
- **April (between 15<sup>th</sup> – 30<sup>th</sup>): RD51 Collaboration Meeting @ CERN**  
**dates to be fixed at the RD51 CB meeting in Bari**
- **29<sup>th</sup> August – 1<sup>st</sup> September: 2011 MPGD Conference (near Kobe, Japan)**
- **2<sup>nd</sup> – 3<sup>rd</sup> September: RD51 Collaboration Meeting (near Kobe, Japan)**
- **November – December : RD51 Mini-Week @ CERN**

# MPGD 2011 Conference and 8th RD51 Collaboration Meeting

**29<sup>th</sup> Aug. – 3<sup>rd</sup> Sept.: 2011 MPGD Conference and RD51 Collaboration Meeting**

**Preliminary website:** <http://ppwww.phys.sci.kobe-u.ac.jp/~upic/mpgd2011/>

**Seaside Hotel MAIKO VILLA KOBE**

<http://www.maikovilla.co.jp/english>

## Access to Conference Site:

- From Kansai Intl. airport (4-5 Direct flights from Europe / day)
  - Shuttle taxi service (2H, 3500 JPY)
  - Airport Limousinbus to Sannomiya; center of Kobe(75min, 1900 JPY), and JR train to Maiko (20min, 290 JPY)
- From Itami airport (Domestic flights)
- From Kobe airport (Domestic flights)



# MPGD 2011 Conference and 8th RD51 Collaboration Meeting

**29<sup>th</sup> Aug. – 3<sup>rd</sup> Sept.: 2011 MPGD Conference and RD51 Collaboration Meeting**  
**Preliminary website:** <http://ppwww.phys.sci.kobe-u.ac.jp/~upic/mpgd2011/>

**Seaside Hotel MAIKO VILLA KOBE**  
<http://www.maikovilla.co.jp/english>

## Conference Site:

- West area of Japan
- There is a beach close to the hotel. (about 10 min. walk)
- View is very nice. The hotel is in front of Akashi street, on which, there is world longest suspension bridge!
- The hotel is apart from big city (about 20 min. from central Kobe by train)



**2011 MPGD Registration fee:**  
**~ 30,000 JPY/person (~270 EUR)**

**RD51 Collaboration Meeting – free**  
**(covered by the RD51 CF)**

**Accommodation (incl. breakfast):**  
**• 7,500 JPY - 12,000 JPY**

## Meals:

- **Lunch: 1500 ~ 2500 JPY**
- **Dinner: 4000 JPY**



**For more detailed information – please contact Atsuhiko Ochi**

# 6<sup>th</sup> RD51 Collaboration Meeting (Bari, Italy, October 7-10, 2010):

<http://indico.cern.ch/conferenceDisplay.py?ovw=True&confId=102799>

- **Thursday, October 7, 2010:**

**14:00 - 18:00** Opening Plenary Session

- **Friday, October 8, 2010:**

**09:00 - 12:30** WG2: Common Characterization and Physics Issues

WG6: Production

**14:00 – 18:30** Excursion

**19:00 – 23:00** Collaboration Dinner

- **Saturday, October 9, 2010:**

**09:00 – 12:30** WG4: Simulation Software Tools

WG7: Common Facilities Production

**14:00 – 18:00** WG1: Technical Aspects and Developments of New Structures

WG5: Micro-Related Electronics

**18:00 - 20:00** Collaboration Board Meeting

- **Sunday, October 10, 2010:**

**09:00-14:00** Plenary Session (WG Summaries)

**Thank you, BARI, for bringing us together !!!**