DRD1

2nd Collaboration Meeting

Anna Colaleo, Beatrice Mandelli, Eraldo Oliveri, Leszek Ropelewski, Maxim Titov, Piotr Gasik

CERN, June 17-21, 2024

Outline

- Agenda of the Meeting
- Topical Workshop on Electronics for Gaseous Detectors
- Special Session on Funding Schemes
- Collaboration Board
- DRD1 Logo

- 2024 Gaseous Detector Conferences and DRD1 school
- In memoriam Atsuhiko Ochi 2024

Agenda of the Meeting

https://indico.cern.ch/event/1413681/

Please register if you haven't done so yet, especially if you will attend in person.

Agenda

A full week for the community to present and share their **scientific and technological research activities and achievements**

Agenda organized by Working Groups

WG1: Technological Aspects and Developments of New Detector Structures, Common Characterization and Physics Issues

WG2: Applications

WG3: Gas and Materials

WG4: Modeling and Simulations

WG5: Electronics for gaseous detectors

WG6: Production and Technology Transfer

WG7: Collaboration Laboratories and Facilities

WG8: Knowledge Transfer, Training, Career Promotion

Additional Sessions

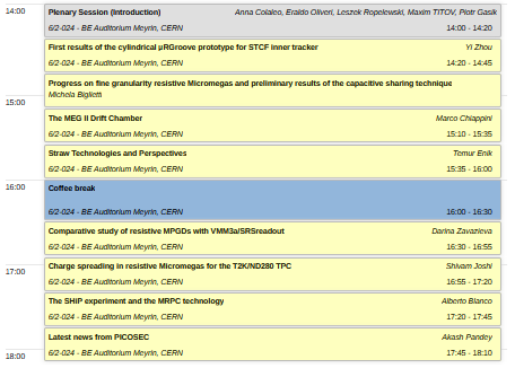
- Work Packages Parallel Sessions (closed, Monday Morning)
- Topical Workshop on Electronics for gaseous detectors (Wednesday)
- Status update on the US RDC6 (Friday Morning)
- R&D Funding Schemes Session (Friday Afternoon)

https://indico.cern.ch/event/1413681/timetable/?view=standard

Agenda

Work Packages Parallel Sessions (closed)

Mon 17/06

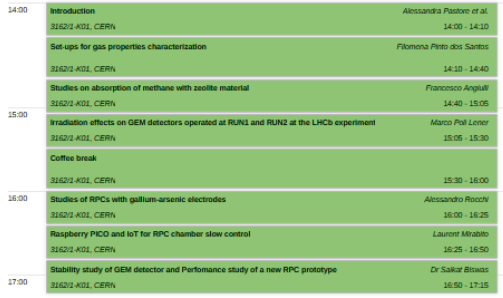


WG1

WG2

Tue 18/06

WG3



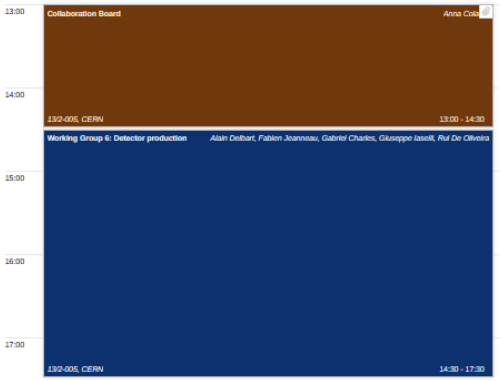
Topical Workshop on Electronics for Gaseous Detectors

Wed 19/06

WG4

Thu 20/06

Collaboration Board



WG6

Status update on RDC6 (US)

Fri 21/06

WG7

WG8

R&D Funding Schemes Session

https://indico.cern.ch/event/1413681/timetable/?view=standard

Topical Workshop on Electronics for Gaseous Detectors

Wednesday, June 19, full-day

Topical Workshop on Electronics for Gaseous Detectors

- **Wednesday, 19 June, 31/3-004 - IT Amphitheatre**
- **Organizers:**
  - Hans Muller (University of Bonn),
  - Lucian Scharenberg (CERN, University of Bonn),
  - Marco Bregant (Universidade de Sao Paulo),
  - Maxime Gouzevitch (Centre National de la Recherche Scientifique),
  - Michael Lupberger (University of Bonn),
  - Sorin Martoiu (Horia Hulubei National Institute of Physics and Nuclear Engineering)

Topical Workshop on Electronics for Gaseous Detectors

New ASICs for MPGDs
Gianni Mazza (Universita' e INFN Torino (IT))

Timepix4 and pixel ASIC design challenges
Xavi Llopart Cudie (CERN)

ASIC design challenges with a focus on precise timing
Gianni Mazza (Universita' e INFN Torino)

Development of a new ASD-ASIC for drift-tube and straw detectors
Oliver Kortner (Max-Planck-Institut fuer Physik, Werner-Heisenberg-Institut)

MPGD electronics from R&D to the ATLAS NSW
George Iakovidis (Brookhaven National Laboratory)

Short status on DRD7 ADC & TDC activities
Marek Idzik (AGH University of Science and Technology)

RPC physics and performance vs. low discrimination threshold
Roberto Cardarelli (INFN e Universita Roma Tor Vergata)

Development of self-triggered drift-tube chambers
Davide Cieri (Max Planck Society)

Electronics for DUNE
Roberto Petti (University of South Carolina)

First data with the uROC concentrator for VMM front-ends
Alexandru Rusu (OAK RIDGE National Laboratory), Dorothea Pfeiffer (CERN)

SOM for eFEC backends
Jose Francisco Toledo Alarcon, Jose Francisco Toledo Alarcon (Valencia Polytechnic University)

Update on eFEC backend project
Hans Muller (University of Bonn)

SALSA: a new versatile readout chip for MPGDs
Damien Neyret (CEA/IRFU,Centre d'etude de Saclay Gif-sur-Yvette, Université Paris-Saclay)

Readout links on SALSA
Irakli Mandjavidze (Université Paris-Saclay)

lpGBT and Versatile link overview
Stefan Biereigel (CERN)

CMS RPC link card
Dr Behzad Boghrati, Behzad Boghrati (Institute for Research in Fundamental Sciences)

The ALTIROC ASIC
Nathalie Seguin-Moreau (OMEGA - Ecole Polytechnique - CNRS/IN2P3)

Electronics requirements for a low-energy nuclear physics TPC
Daniel Bazin (FRIB/MSU), Marco Cortesi (Facility for Rare Isotope Beams, Michigan State University)

Special Session on Funding Schemes

Friday, June 21, 2pm CEST

Discussions on Funding Schemes

- **Dedicated meeting organized by Imad Laktineh and Pino Iaselli on the different funding schemes that the members of the collaboration could look for to support their R&D development**

- **Friday 21st of June, 40/S2-C01 - Salle Curie, CERN**

Collaboration Board

Thursday, June 20, 1pm CEST (Institute Representatives)

Collaboration Board

Meeting: Thursday 20/06, 1pm CEST – All institute Representatives, CB Chair, Spokespersons

Agenda:

- DRD1 Organization:
  - Endorsement of Management Roles:
    - CB Deputy Chair, CB Secretary
    - 3 MB Members Nominated by Spokespersons, Technical Coordinator, Resource Coordinator and Deputy, GLIMOS, MB Secretary
    - Working Groups Coordinator, Work Packages Coordinator, Working Group Conveners, Work Package Leaders and Work Package Project Leaders, SCB Secretary
  - Decision on renewability of the 2 years mandate of SPs and CB Chair (once or not renewable)
- MoU Status
- Common Funds
  - Support to common activities
  - Invoice to RD51 members

Technology Representative Members in the DRD1 Management Board (Elected)

MPGD

Amos Breskin	[Israel, Weizmann Institute of Science]
Paul Colas	[France, Inst. of Research into the Fundamental Laws of the Universe, CEA, Uni. Paris-Saclay]
Mauro Iodice	[Italy, INFN Sezione di Roma Tre]

RPC

Marcello Abbrescia	[Italy, INFN Sezione di Bari, Università di Bari and Politecnico di Bari]
Giuseppe Iaselli	[Italy, INFN Sezione di Bari, Università di Bari and Politecnico di Bari]
Michael Tytgat	[Belgium, Vrije Universiteit Brussel]

Wires & Drift Chambers

Gabriel Charles	[France, Université Paris-Saclay]
Nicola De Filippis	[Italy, INFN Sezione di Bari, Università di Bari and Politecnico di Bari]
Peter Wintz	[Germany, Forschungszentrum Jülich GmbH and Ruhr-Universität Bochum]

TPC

Diego Gonzalez Diaz	[Spain, Inst. Galego de Física de Altas Enerxías / Uni. de Santiago de Compostela]
Jochen Kaminski	[Germany, Physikalisches Institut, University of Bonn]
Thorsten Lux	[Spain, Institut de Física d'Altes Energies]

Total Number of Voting Institutes: 89 out of 165

Institutes per Technologies: MPGD (53), RPC(39), W&DC(26), TPC(34)

Technology Representative Members in the DRD1 Management Board (Elected)

- **Congratulations to the newly elected representatives.**

- **We sincerely congratulate all colleagues who were nominated and ran in the elections. The support from the community was well distributed among all of them.**

DRD1 Logo

Deadline for submission **TOMORROW June 18, 2024, 12:00pm CEST (noon)**

DRD1 Logo call and Selection

To find a logo for the DRD1 collaboration, we are calling for submissions of logo ideas / designs.

If you would like to submit a proposal, you can upload an image here: https://indico.cern.ch/event/1424745/registrations/106501/

DRD1™

Deadline for submissions: TOMORROW June 18, 2024, 12:00pm CEST (noon)

An electronic vote on the submitted logo proposals will be organized soon after.

Please, contact WG8 Conveners if you need more info.

2024 Gaseous Detector Conferences and DRD1 School

2024 Gaseous Detector Conferences

[RPC2024 - 16th International Conference on Resistive Plate Chambers and Related Detectors (Santiago, Spain, 9–13 September 2024)]

Registration is open until July 15th, 2024:
https://rpc2024.tufabricadeventos.com/

Deadline for abstract submission 2024.07.01

https://indico.cern.ch/event/1354736/abstracts/

[MPGD2024 - 8th International Conference on Micro Pattern Gaseous Detectors (Hefei, China, 14-18 October 2024)]

Registration is open:
https://mpgd2024.aconf.org/register.html

Deadline for abstract submission 2024.06.24

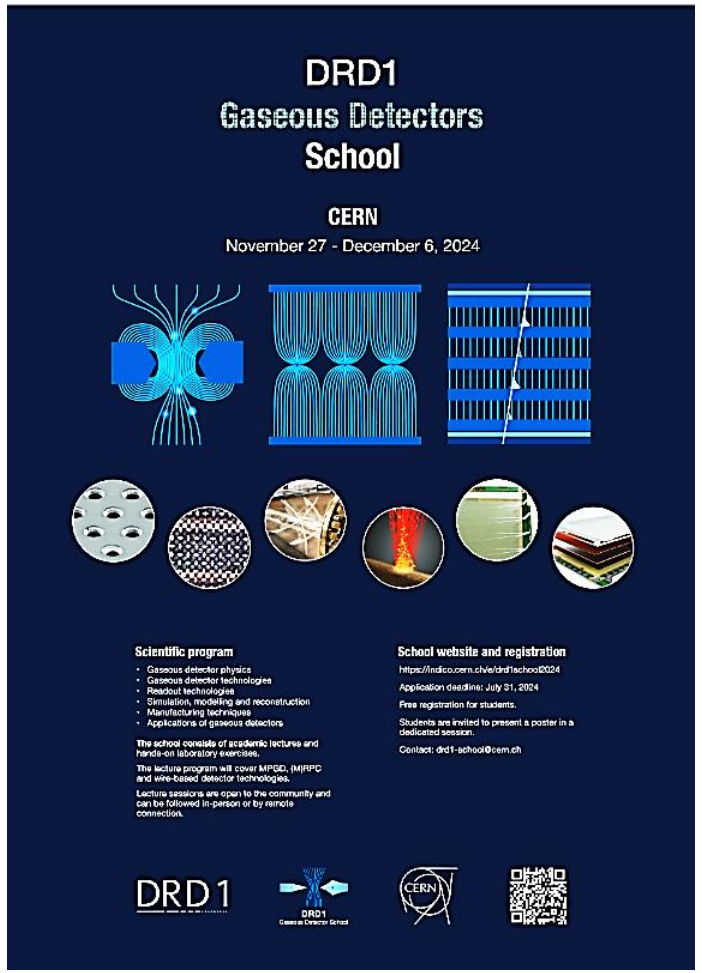
https://mpgd2024.aconf.org/call_for_paper.html

DRD1 Gaseous Detector School

The DRD1 Gaseous Detectors School will take place at CERN from November 27th to December 6th, 2024. The program will consist of both theoretical lectures and hands-on laboratory exercises. The school focuses on state-of-the-art gaseous detector technologies and is targeted at students and young scientists.

More information can be found on the school website:

https://indico.cern.ch/e/drd1school2024



Applications for the school are open from now **until July 13 via the school website.**

In memoriam Atsuhiko Ochi 2024

Atsuhiko Ochi 1969-2024

A brilliant and passionate detector and experimental physicist, Atsuhiko Ochi passed away on April 29, 2024, at the age of 54. He was an enthusiastic physicist and a source of innovative ideas at the forefront of radiation detectors. His outstanding contribution to the development of new Micro Pattern Gaseous Detectors is recognized worldwide. Atsuhiko was also a distinguished lecturer of physics, whose inexhaustible passion, dedication, and remarkable character captivated not only us but also the many students he mentored.

Atsuhiko began his research at the Tokyo Institute of Technology, initially focusing on studying large-area avalanche photodiodes as fast photon and soft X-ray detectors. In 1998, he defended his Ph.D. thesis, "Study of MicroStrip Gas Chamber as a Time-Resolved X-ray Area Detector," earning the 2nd High Energy Physics Young Researcher's Award from the Japan Association of High Energy Physicists. In 2000, alongside Toru Tanimori, he introduced the micro pixel chamber (micro-PIC), a new gaseous detector for X-ray, gamma-ray, and charged particle imaging. It was fully developed using printed circuit board technology and was free of floating structures like wire, mesh, or foils, featuring a pin-shaped anode surrounded by a ring-shaped cathode.

In 2001, Atsuhiko moved to Kobe University, where he joined the ATLAS experiment and devoted his efforts to commissioning the ATLAS TGC chambers. Atsuhiko was in charge of integrating the front-end electronics on the KEK TGC detectors and of detector quality assurance and control. Later, at CERN, he led the acceptance quality control of the detectors. Atsuhiko could always merge his love for experiments with his passion for new ideas. Along with his group in Kobe, while making significant contributions in ATLAS to the design and construction of the new large resistive micromegas for the Muon New Small Wheel (NSW), he conducted R&D studies focused on the use of sputtered layers of diamond-like carbon (DLC) as resistive elements to quench discharges. In this context, he played a crucial role in connecting with the Japanese industry. Atsuhiko was among the first to test it with micromegas, apply it to his micro-PIC detector, and pioneer its use as electrodes for the novel Resistive Plate Chambers he proposed for the MEG II experiment. He supported the use of DLC in the final TPC Micromegas of the Near Detectors of the T2K experiment while serving as a liaison person with BE-Sput company in Kyoto. Nowadays, DLC is the predominant approach in most new resistive MPGD detectors.

Atsuhiko's expertise in gaseous detectors, particularly in MPGD technologies, grew increasingly relevant globally. In his research, Atsuhiko always placed great emphasis on mentoring his students and providing them with access to a worldwide community of experts, facilities, and experiments. He consistently and meticulously shared all relevant research conducted by Japanese colleagues, ensuring proper visibility and recognition for his community. This aspect has been crucial in the context of the international RD51 collaboration on MPGD technologies. Within the collaboration, Atsuhiko played a significant role in its formation and in serving the community as a Management Board Member, Collaboration Board Chair, and Scientific Secretary. Starting in 2016, he was responsible for the Common Projects of the collaboration. Atsuhiko organized MPGD2011, which was the first conference held in Asia as part of the international series. During the transition from the MPGD-based RD51 collaboration to the upcoming DRD1, which encompasses a broader scope of technologies and applications, Atsuhiko made a crucial contribution by maintaining strong ties with the Asian community.

Atsuhiko's vibrant enthusiasm and infectious smile leave an irreplaceable void. His departure is a profound loss, leaving behind a loving wife and two children. We extend our deepest condolences to his family during this difficult time.

His colleagues and friends

"We need new 'eyes' to catch a glimpse of science's frontier." (Atsuhiko)

µPIC

ELSEVIER
Nuclear Instruments and Methods in Physics Research A 471 (2001) 264–267
NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH Section A
www.elsevier.com/locate/nima

A new design of the gaseous imaging detector: Micro Pixel Chamber

Atsuhiko Ochi[a,*,1], Tsutomu Nagayoshi[a], Satoshi Koishi[a], Toru Tanimori[b], Tomofumi Nagae[c], Mirei Nakamura[c]

[a] Department of Physics, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro, Tokyo 152-8551, Japan
[b] Kyoto University, Kyoto 606-8502, Japan
[c] High Energy Accelerator Research Organization (KEK), Tsukuba 305-0801, Japan

Abstract

The novel gaseous detector "Micro Pixel Chamber (Micro PIC)" has been developed for X-ray, gamma-ray and charged particle imaging. This detector consists of double sided printing circuit board (PCB). The stable operation of Micro PIC is realized by thick substrate and wide anode strips. One of the most outstanding feature is the process of production and the cost. The base technology of producing Micro PIC is same as producing PCB, then detector with large detection area (more than 10 cm × 10 cm) can be made by present technology. Our first tests were performed using a 3 cm × 3 cm detection area with a readout of 0.4 mm pitch. The gas gain and stability were measured in these tests. The gas gain of 10^4 was obtained using argon ethane (8:2) gas mixture. Also, there was no discharge between anodes and cathodes in the gain of 10^3 during two days of continuous operation. Although some discharges occurred in the higher gain (approximately 10^4), no critical damage on the detector was found. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Gaseous detector; Imaging; MSGC

2001

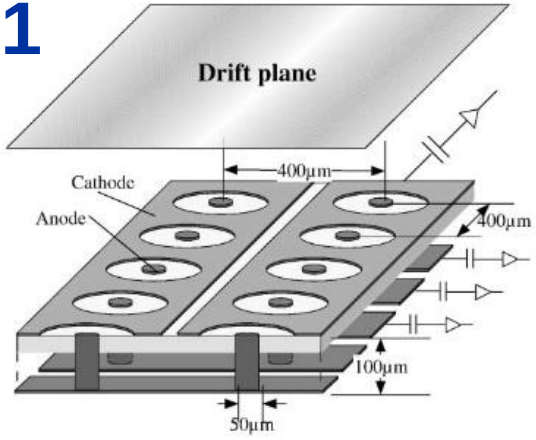


Fig. 1. Schematic structure of Micro PIC.

Available online at www.sciencedirect.com
SciVerse ScienceDirect
Physics Procedia 37 (2012) 554 – 560
Physics Procedia

TIPP 2011 - Technology and Instrumentation for Particle Physics 2011

Development of a Micro Pixel Chamber for the ATLAS upgrade

Atsuhiko Ochi [1], Yasuhiro Homma, Hidetoshi Komai, Yuki Edo, and Takahiro Yamaguchi

Kobe University, Kobe, 657-8501, Japan

Abstract

The Micro Pixel Chamber (µ-PIC) is being developed as a candidate for the muon system of the ATLAS detector for upgrading in LHC experiments. The µ-PIC is a micro-pattern gaseous detector that doesn't have floating structure such as wires, mesh, or foil. This detector can be made by printed-circuit-board (PCB) technology, which is commercially available and suited for mass production. Operation tests have been performed under high flux neutrons under similar conditions to the ATLAS cavern. Spark rates are measured using several gas mixtures under 7 MeV neutron irradiation, and good properties were observed using neon, ethane, and CF_4 mixture of gases. Using resistive materials as electrodes, we are also developing a new µ-PIC, which is not expected to damage the electrodes in the case of discharge sparks.

Keywords: MPGD, µ-PIC, HL-LHC, ATLAS, neutron, gaseous detector

2012

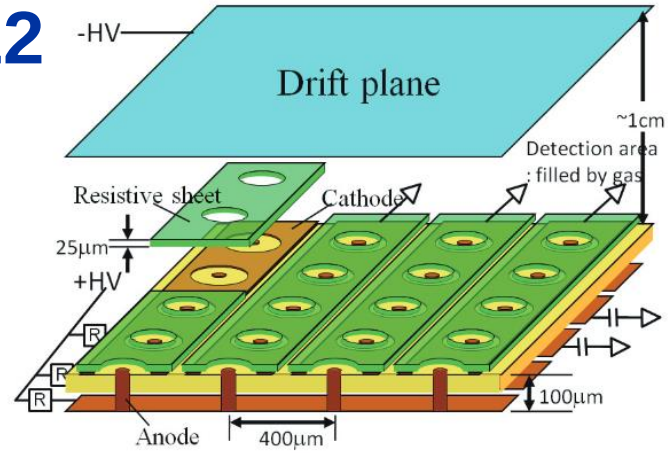


Fig. 9. Schematic structure of µ-PIC with resistive cathodes. It has been developed in order to reduce damage to the readout electrodes caused by sparking, and is currently under tests.

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journal homepage: www.elsevier.com/locate/nima
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Development of the Micro Pixel Chamber with DLC cathodes

Fumiya Yamane *, Atsuhiko Ochi, Kohei Matayoshi, Keisuke Ogawa, Yusuke Ishitobi

Kobe University, 1-1 Rokkodai, Nada, Kobe, Hyogo, Japan

ARTICLE INFO

MSC:
00-01
99-00

Keywords:
Gaseous detector
Micro Pixel Chamber
MPGD

ABSTRACT

We developed a novel design of a Micro Pixel Chamber (µ-PIC) with resistive electrodes for a charged particle tracking detector in high rate applications. Diamond Like Carbon (DLC) thin film is used for the cathodes. The resistivity can be controlled flexibly (10^{5-7} Ω/sq.) with high uniformity. The fabrication process was greatly improved and the resistive µ-PIC could be operated with an area of 10 × 10 cm^2. Resistors for the HV bias and capacitors for the AC coupling were completely removed by applying PCB and carbon sputtering techniques, and the resistive µ-PIC became a very compact detector. The performance of our new resistive µ-PIC was measured in various ways. Consequently, it was possible to attain high gas gains (> 10^4), high detection efficiency, and position resolution better than 100 µm. The spark probability was reduced, and the new resistive µ-PIC was operated stably under fast neutrons irradiation. These features offer solutions for a charged particle tracking detector in future high rate applications.

2020

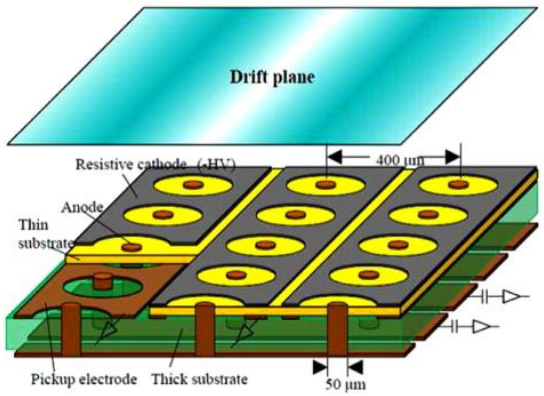


Fig. 2. Schematic view of resistive µ-PIC [16]: Insulating layer is sandwiched between resistive cathode and pickup electrode.

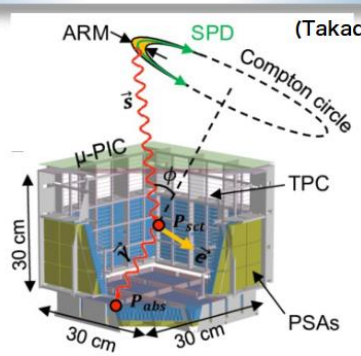
μPIC Space Application (as one example)

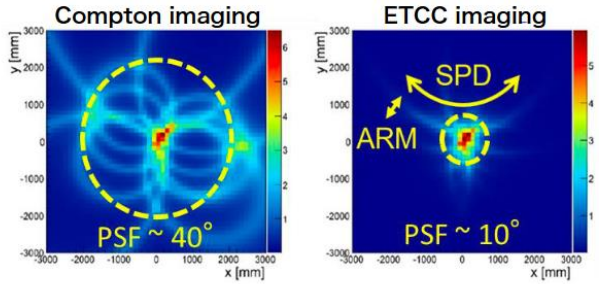
Toru Tamagawa (RIKEN)

MPGD 2022, Weizmann Institute of Science, Rehovot, Israel

Invited talk: MPGD in space applications

3.1 Compton gamma-ray detector

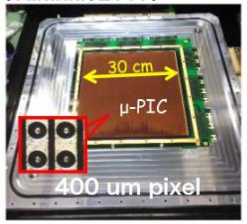


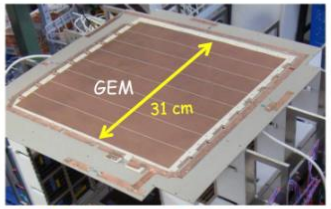


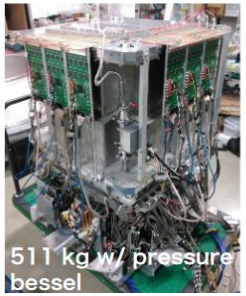
- SMILE: Balloon born gamma-ray observatory
- Open gamma-ray astronomy: detect nuclear gamma-lines from supernovae etc.
- This is the only mission that can track electrons and solve Compton kinematics.
- With the current technology, this cannot be achieved with semiconductors; using MPGD is the only solution.

3.2 SMILE2+ and future

(Takada+2017)







uPIC 400 um pixel
Thick-foil LCP GEM P: 140um, D:70um, T: 100um
Gas 2 atm
Ar 95% + CF_4 3% + iC_4H_{10} 2%

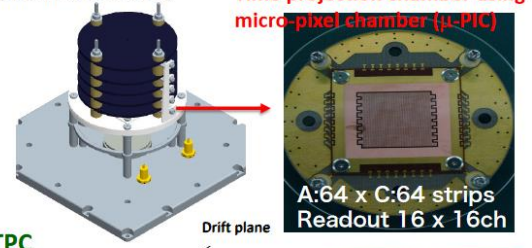
(Takada+2022)

- SMILE2+ successfully detect gamma-ray excess from the galactic center (Takada+2022).
- Upgrade and the next fly scheduled in Australia in 2026.

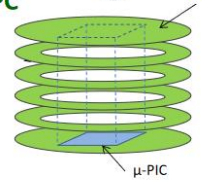
5.2 PS-TEPC and moon exploration

(Kishimoto+2018)

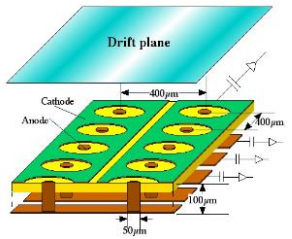
Time projection chamber using micro-pixel chamber (μ-PIC)



TPC

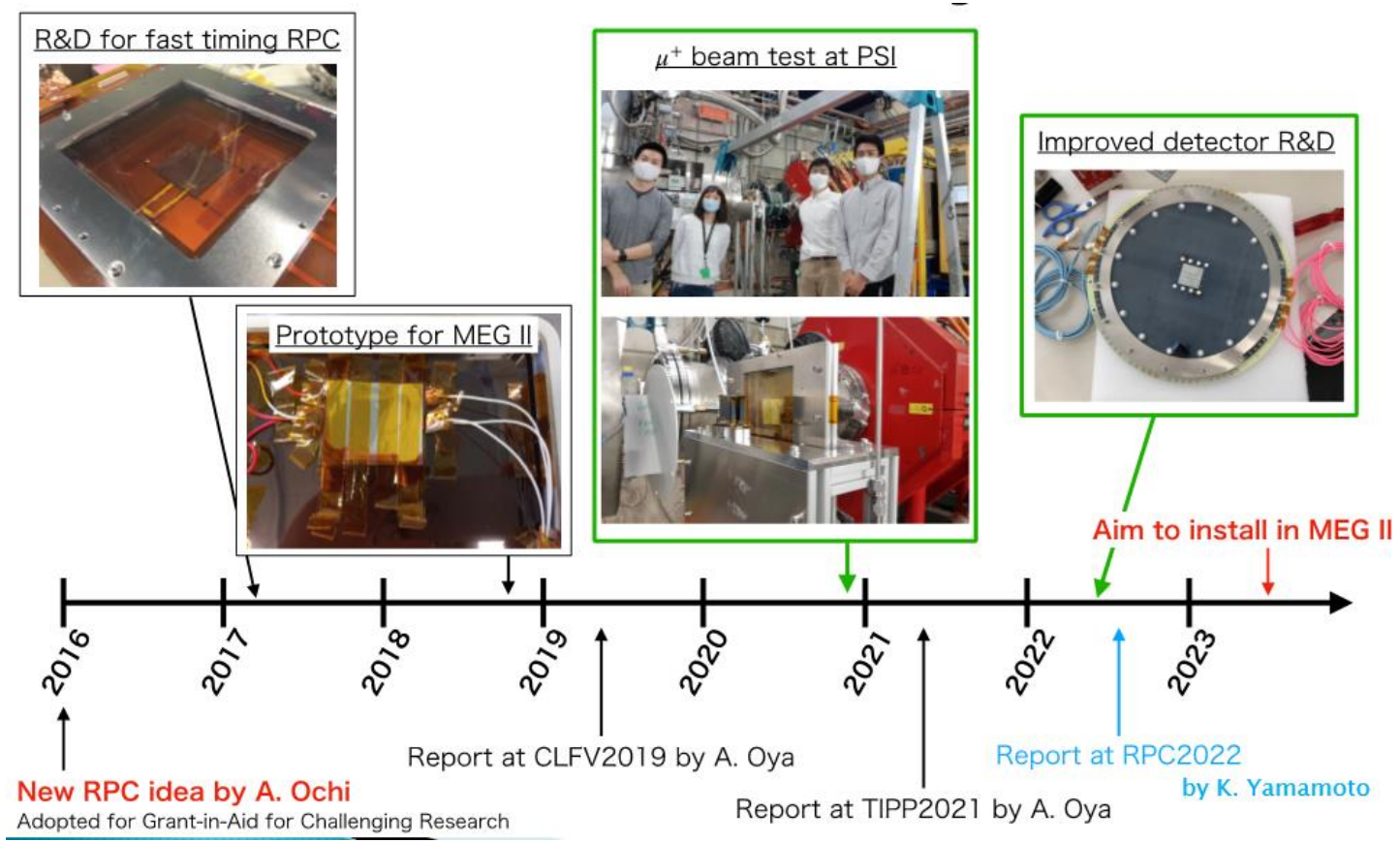


Fiducial volume
2.6×2.6×5.0 cm³



- Not integrated, but event by event.
- Spatial resolution, species.
- Tissue-equiv gases and plastics
- MPGD can play an important role.
- Planned to be installed on the Moon Gateway after 2027.

Resistive Plate Chambers with DLC



Nuclear Instruments and Methods in Physics Research A 1064 (2024) 169375

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Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima

Full Length Article

Prototype study of $0.1\%X_0$ and MHz/cm^2 tolerant Resistive Plate Chamber with Diamond-Like Carbon electrodes

Kei Ieki [a], Weiyuan Li [b], Atsuhiko Ochi [c], Rina Onda [b], Wataru Ootani [a], Atsushi Oya [b,*], Masato Takahashi [c], Kensuke Yamamoto [b]

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ARTICLE INFO

Keywords:
RPC

ABSTRACT

A novel Resistive Plate Chamber (RPC) was designed with Diamond-Like Carbon (DLC) electrodes and performance studies were carried out for 384μm gap configuration with a 2 cm × 2 cm prototype. The use of thin films coated with DLC enables an ultra-low mass design of less than $0.1\%X_0$ with up to a four-layer configuration. At the same time, 42% MIP efficiency, and 180 ps timing resolution per layer were achieved in a measurement performed under a 1 MHz/cm^2 non-MIP charged particle beam. In addition, we propose a further improved design for a 20 cm-scale detector that can achieve 90% four-layer efficiency in an even higher 4 MHz/cm^2 beam. In this paper, we describe the detector design, present the results of performance measurements, and characterize the rate capability of the DLC-based RPCs with a performance projection for an improved design.

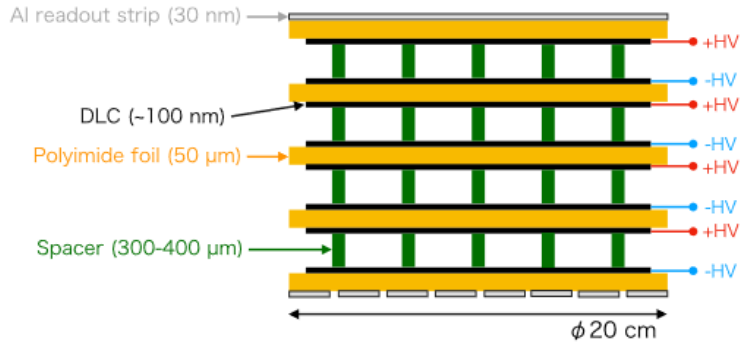

Fig. 1. Concept of Resistive Plate Chamber with DLC-based electrodes for the MEG II experiment. The high voltages are applied independently to each layer. The number of layers is limited because of the requirement of less than $0.1\%X_0$.

ATLAS Muons System: TGCs and Resistive MMs

REVIEW OF SCIENTIFIC INSTRUMENTS 77, 10E709 (2006)

Thin gap chamber performance tests under several MeV neutron sources

Atsuhiko Ochi and Hironori Kiyamura
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Junichi Kaneko
Hokkaido University, Sapporo 060-8628, Japan

Hidetoshi Ohshita and Tohru Takeshita
Shinshu University, Matsumoto, Nagano 390-8621, Japan

Shuji Tanaka and Hiroyuki Iwasaki
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Kentaro Ochiai and Makoto Nakao
Japan Atomic Energy Agency, Tokai, Ibaraki 319-1195, Japan

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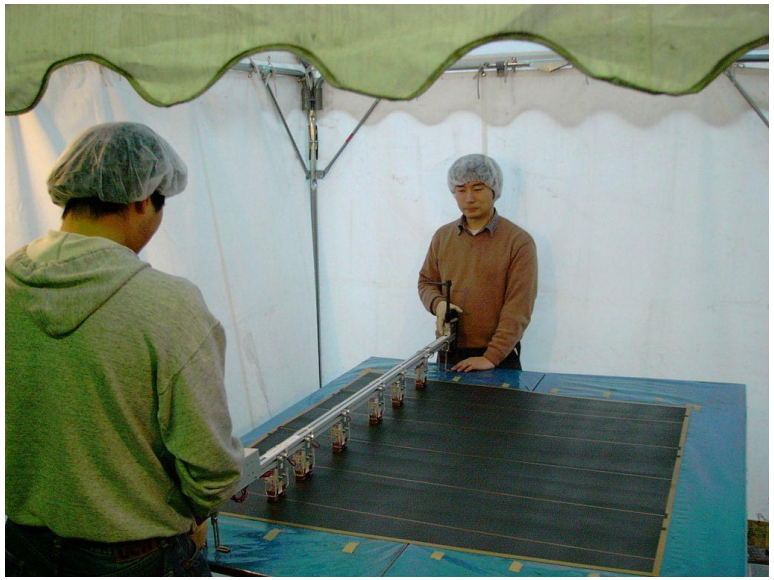

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MPGD 2015

Development of large area resistive electrodes for ATLAS NSW Micromegas

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Abstract. Micromegas with resistive anodes will be used for the NSW upgrades of the ATLAS experiment at LHC. Resistive electrodes are used in MPGD devices to prevent sparks in high-rate operation. Large-area resistive electrodes for Micromegas have been developed using two different technologies: screen printing and carbon sputtering. The maximum resistive foil size is 45 × 220 cm with a printed pattern of 425-μm pitch strips. These technologies are also suitable for mass production. Prototypes of a production model series have been successfully produced. In this paper, we report the development, the production status, and the test results of resistive Micromegas.

RD51/DRD1

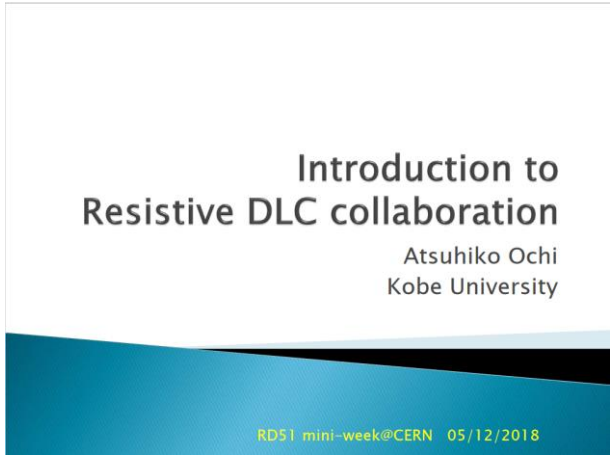
Atsuhiko played a significant role **in the formation of the RD51 Collaboration.**

He served the community as:

- **Management Board Member**
- **Collaboration Board Chair**
- **Scientific Secretary**
- **Responsible for the Common Projects**

Atsuhiko participated to the organization of **MPGD2011 in Kobe**, which was the first conference held in Asia as part of the international series.

During the **transition to DRD1** Atsuhiko has been very **active** and made a crucial contribution by **maintaining strong ties with the Asian community and in particular with Japan.**



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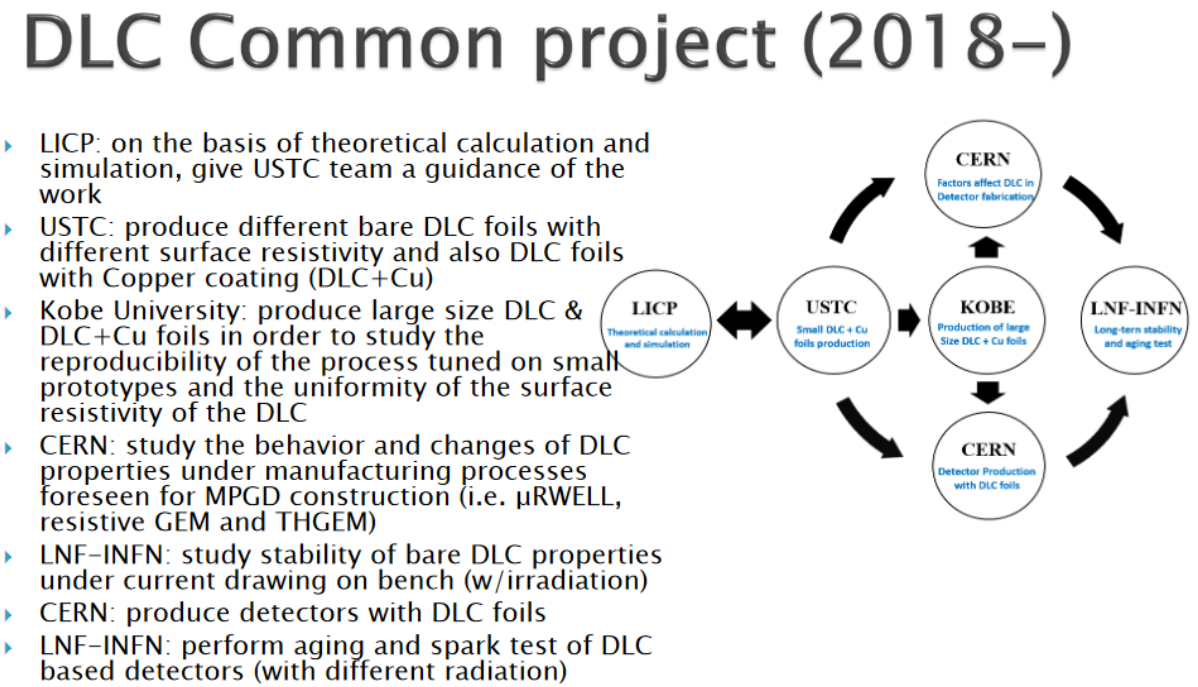


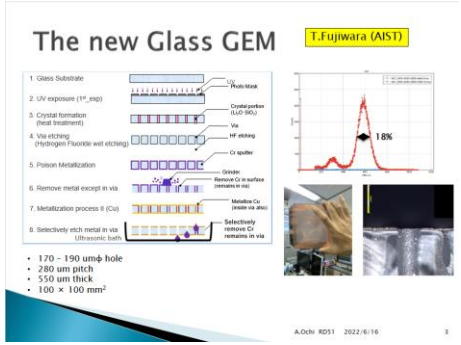
RD51/DRD1 Link with Detector R&D in Japan

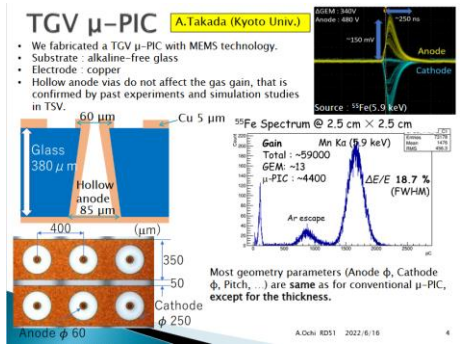
MPGD Activities in JAPAN

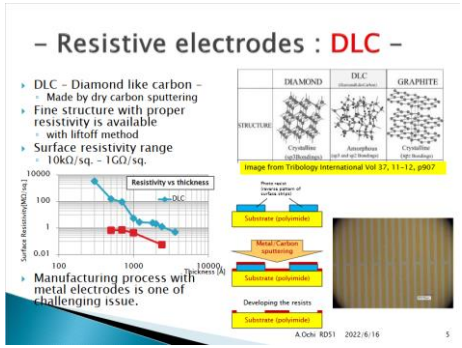
(Not even a complete list)

- Structure studies
  - GEM (Gas electron multiplier)
    - @Many institutes ... KEK, RIKEN, JAEA, U. Tokyo, Kyoto U., Saga U., TIT, Kinki U., TUAT ....
  - THGEM, Capillary plate,
    - Yamagata U., TMU, U.Tokyo, AIST
  - MicroMEGAS
    - Kobe U., U. Tokyo
  - μ-PIC (Micro Pixel Chamber)
    - Kyoto U., Kobe U., ICRR, KEK, J-PARC
- Material studies (Substrate (conventional, polyimide))
  - LCP (Liquid crystal polymer)
    - KEK, RIKEN, U.Tokyo, (SiEnergy co.)
  - Glass
    - U.Tokyo, Yamagata U. AIST
  - PTFE, Ceramic
    - Tokyo IRI, RIKEN
- Resistive electrodes
  - Organic material
    - KEK
  - Sputtering carbon/metal
    - Kobe U.
  - Carbon loaded Epoxy
    - Kobe U., U. Tokyo
- Applications
  - Particle physics (Acc./ Non Acc.)
    - Kobe U. KEK, Kinki U. Saga U.
  - Neutron imaging
    - Kyoto U., KEK
  - Nuclear physics
    - TIT, U.Tokyo., JAEA, Tsukuba U., RIKEN
  - Astrophysics
    - Kyoto U., RIKEN
  - Gas Photomultiplier
    - Yamagata U, TMU, ICRR
  - X/gamma ray imaging
    - Kyoto U., KEK, AIST
  - Medical imaging
    - Kyoto U.

A.Ochi RD51 2022/6/16 2



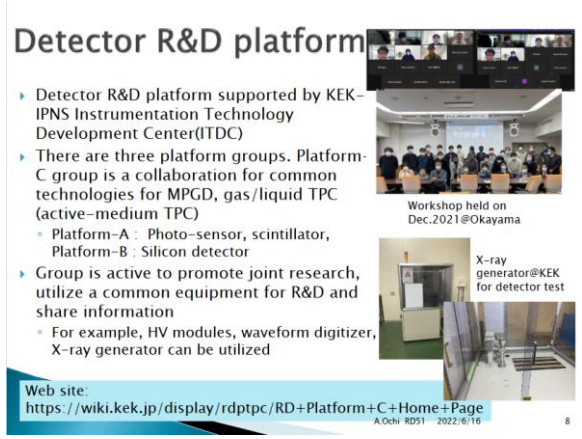


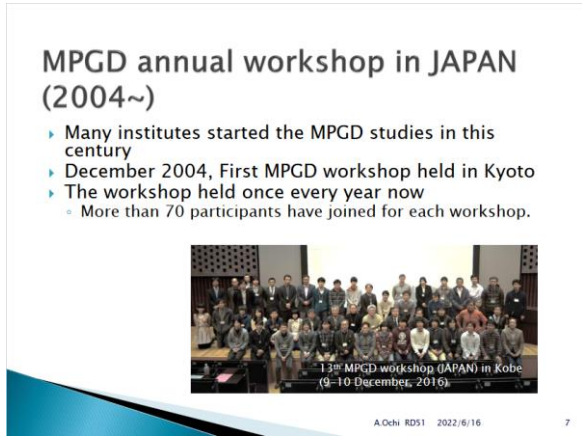


Detector R&D in JAPAN

Atsuhiko Ochi
Kobe University

5th MPGD Conference at Philadelphia, 24/05/2017





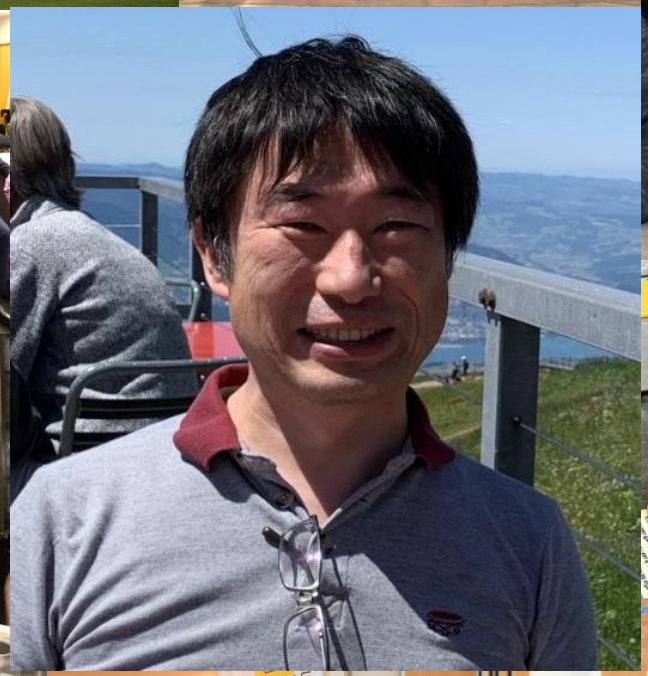




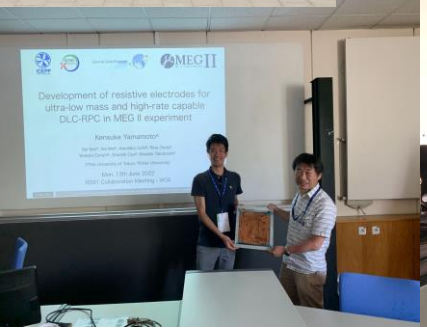
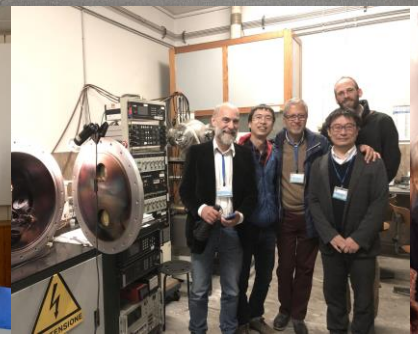

MPGD2011 and 8th RD51 Collaboration Meeting
29 August - 3 September 2011
Kobe, Japan










MEG II
Development of resistive electrodes for ultra-low mass and high-rate capable DLC-RPC in MEG II experiment




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Wishing everyone a productive and insightful meeting

DRD1

https://drd1.web.cern.ch/