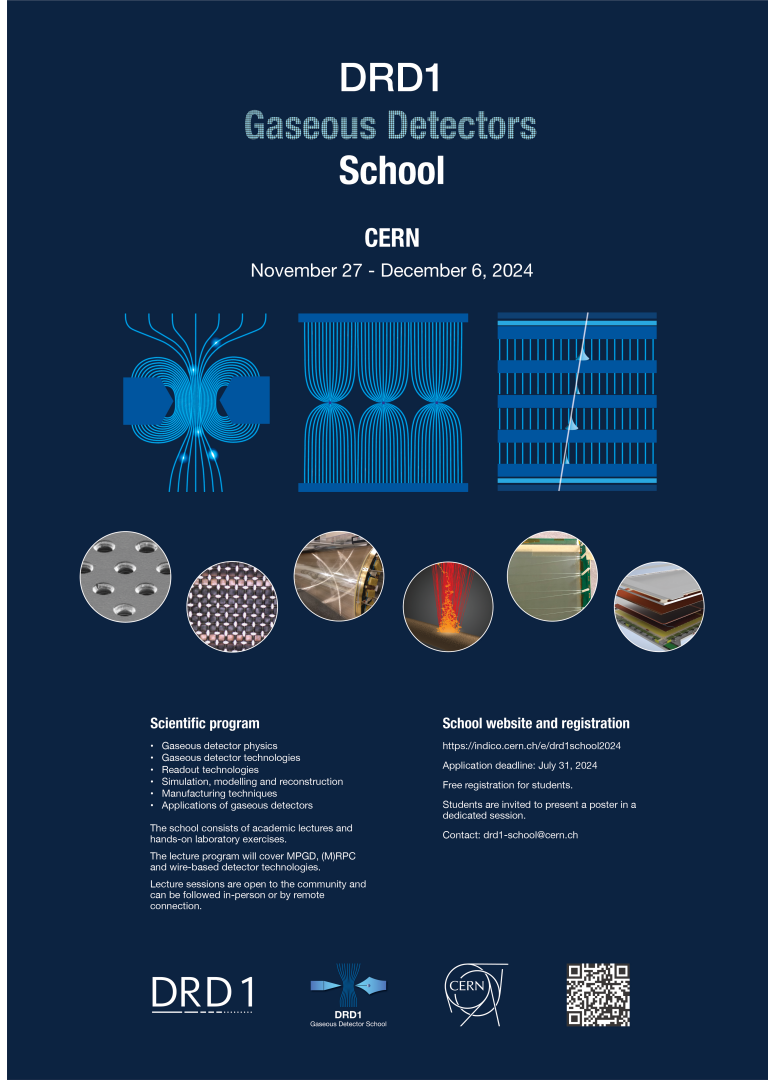
DRD1 Gaseous Detector School 2024

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



DRD1 WG8 - Training and Dissemination

General

Wed, November 27 - Fri, December 6 at CERN

- Single school for 2024 combining MPGD, RPC, Wire technologies
- Targeted at students / young researchers / DRD1 community

- Morning: lecture program
- Afternoon: lab exercises
- Length: 10 days: Wed-Fri

- **Applications are open now**

- Regular meetings with tutors/lecturers - communicated to DRD1-WG8 mailing list
- 6 meetings so far focused on school organisation

Lessons learned from RD51 MPGD School

- Extend to additional detector technologies
- Keep lectures / exercises balance
- More time for simulation exercises
- Additional student groups
- Dedicated Q&A time with lecturers
- Time for working on presentations within lab groups

Important Dates

Deadline for applications: July 31, 2024

Student selection: August by selection committee (volunteers among lecturers)

Notification of acceptance: Beginning of September

Lab book: finalise by end of October

School draft schedule

	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
9:00 - 10:00	Introduction	MPGD technologies	Signal induction	Work in lab groups (analysis, preparing presentations)	Social event	Gas detector physics : stability	Manufacturing MPGD (40min) RPC (40min) Wire (40min)	Electronic readout	Lab session 8	Applications in HEP MPGD (40min) RPC (40min) Wire (40min)
10:00 - 11:00	Gas detector physics	M(RPC) technologies	Data analysis and reconstruction techniques			Modelling OR GAS		Electronic readout		
11:00 - 11:30	Break	Break	Break	Visits		Break	Break	Break		Break
11:30 - 12:30	Modelling	Wire-based detectors	Gas properties / alternative gases / gas systems - OR MODELLING			Gaseous detectors for future TPCs (challenges / example project)	Applications beyond HEP (nuclear,neutrino)	Optical readout and pixellated detectors		Applications beyond fundamental research (medical, …)
12:35 - 13:00	Q&A session (25min, optional) / Lunch break	Q&A session (25min, optional) / Lunch break	Q&A session (25min, optional) / Lunch break	Lunch break		Q&A session (25min, optional) / Lunch break	Q&A session (25min, optional) / Lunch break	Q&A session (25min, optional) / Lunch break	Lunch break	Q&A session (25min, optional) / Lunch break
13:00 - 14:00										
14:00 - 18:00	Lab session 1	Lab session 2	Lab session 3	Lab session 4		Lab session 5	Lab session 6	Lab session 7	Lab session 9	Work in lab groups
18:00 - 21:00						Student poster session		Social dinner		

Lectures

- **Introduction - historical overview**: Fabio Sauli

- **Gas detector physics 1**: tbc
- **Gas detector Physics 2**: Piotr Gasik
- **Signal induction** : Werner Riegler

- **MPGD technologies**: Esther Ferrer Ribas
- **M(RPC) technologies**: Rinaldo Santonico
- **Wire-based detector technologies**: Peter Wintz

- **Gas requirements and choice**: Marcello Abbrescia

- **Data analysis and reconstruction** : Theo Alexopoulous

- **Manufacturing techniques**
  - **MPGD**: tbc
  - **RPC**: tbc
  - **Wire-based detectors**: Gabriel Charles

- **Modelling and Simulation 1&2**: Piet Verwilligen & tbc

- **Electronic readout 1**: Michael Lupberger
- **Electronic readout 2**: R. Cardarelli
- **Optical and hybrid readout techniques**: Davide Pinci

- **Applications in HEP**
  - **MPGD**: Paolo Iengo
  - **RPC**: Imad Laktineh
  - **Wire-based detectors**: Margherita Primavera

- **Gaseous detectors for future TPCs (challenges):** Diego Gonzales Diaz

- **Applications in fundamental research beyond HEP**: Marco Cortesi

- **Applications beyond fundamental research:** Jona Bortfeldt

Lecture program

Open to DRD1 community (in-person or via Zoom)

Please register on school website.

≈20 lectures of 1h each

Time for discussions and questions

Lectures will be recorded and available on Indico agenda

Registration to event necessary for download

Lab exercises

Lab 1 MPGD assembly	Lab 2 RPC assembly & operation	Lab 3 Wire assembly and straw tube operation	Lab 4 Characterisation of drift tube detectors	Lab 5 MPGD characterisation	Lab 6 RPC characterisation	Lab 7 Readout techniques	Lab 8 Simulation 1 - Basic modelling	Lab 9 Simulation 2 - Advanced techniques
Survey of different MPGD technologies under microscope, testing components, assembly triple GEM / MM or µRWELL	Assembly of HPL plates elecgtrodes RPC, basic volt-amperometric characteristic recording	Singe straw assembly, operation of wire-based detector	Characterization of a drift tube operating with a gas mixture in helium atmosphere, gas gain measurements	Characterisation of triple GEM / MM / µRWELL, drift scan, gain curve, transfer efficiency, signals with current and charge preamps	Characterisation of two small RPC detectors - efficiency measurement with scintillator setup	Electronic multi channel readout (delay line readout?), Optical readout with camera	Interactive Garfield exercises with Google Collab	

Lab schedule

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9
Group 1	Lab 1: MPGD Assembly	Lab 2: RPC Assembly	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation	Lab 6: RPC characterisation	Lab 7: Readout techniques
Group 2	Lab 1: MPGD Assembly	Lab 2: RPC Assembly	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation	Lab 6: RPC characterisation	Lab 7: Readout techniques
Group 3	Lab 2: RPC Assembly	Lab 1: MPGD Assembly	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation	Lab 6: RPC characterisation
Group 4	Lab 2: RPC Assembly	Lab 1: MPGD Assembly	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation	Lab 6: RPC characterisation
Group 5	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 1: MPGD Assembly	Lab 2: RPC Assembly	Lab 6: RPC characterisation	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation
Group 6	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 1: MPGD Assembly	Lab 2: RPC Assembly	Lab 6: RPC characterisation	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation	Lab 5: MPGD characterisation
Group 7	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 2: RPC Assembly	Lab 1: MPGD Assembly	Lab 5: MPGD characterisation	Lab 6: RPC characterisation	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation
Group 8	Lab 8: Simulation 1	Lab 9: Simulation 2	Lab 2: RPC Assembly	Lab 1: MPGD Assembly	Lab 5: MPGD characterisation	Lab 6: RPC characterisation	Lab 7: Readout techniques	Lab 3: Wire assembly and straw tubes	Lab 4: Drift tube characterisation

Grouping of different labs in half week to make it easier for tutors to attend

All groups have MPGD and RPC assembly and simulation exercises in first half

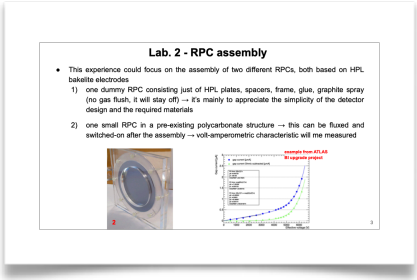
2 desks of each lab needed (can be identical or different activities)

Lab book

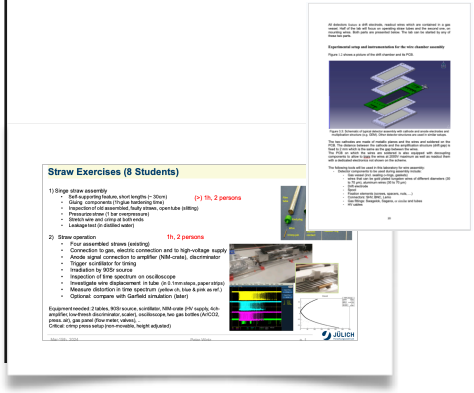
- In preparation
- Some MPGD exercises identical to RD51 MPGD School
- New exercises already defined at different stages

Examples from lab book

Lab 2: RPC Assembly

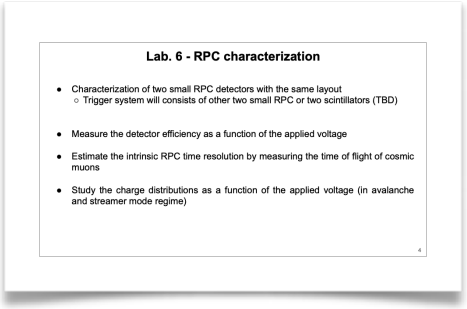


Lab 3: WIRE ASSEMBLY AND STRAW TUBE OPERATION



LAB 4: DRIFT TUBE CHARACTERISATION

LAB 6: RPC Characterisation



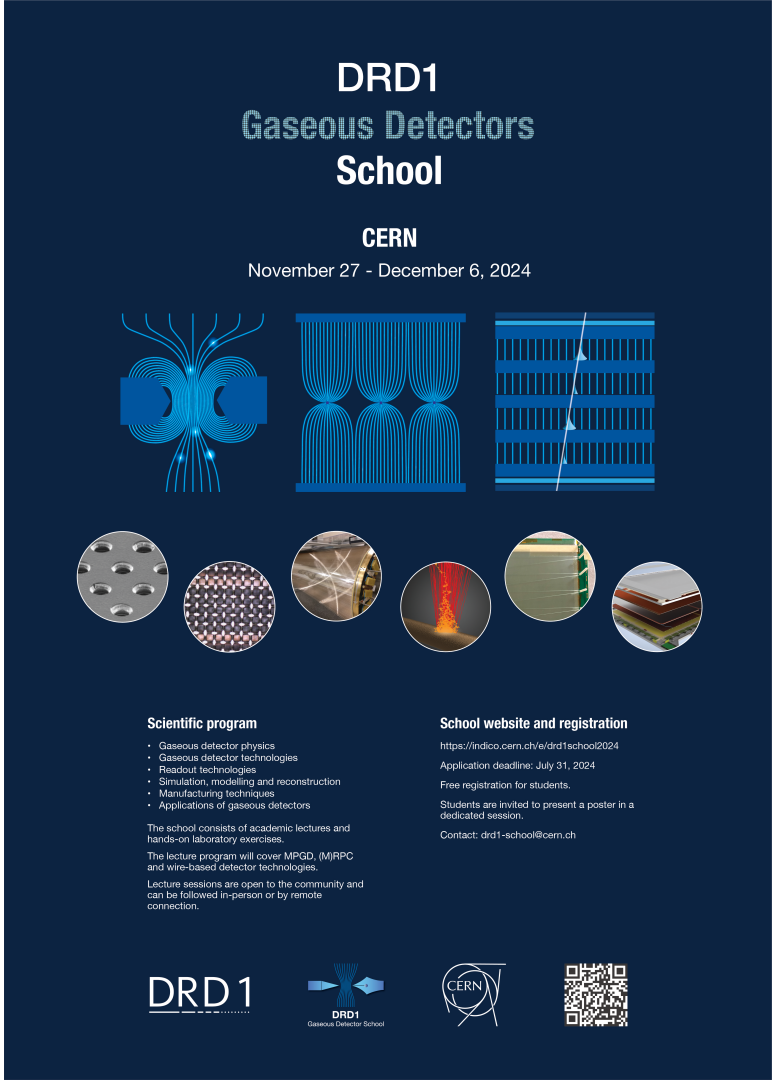
Events

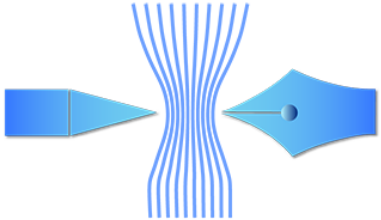
- Student poster session (students are invited to present their own projects / research / experience)
- Presentations by lab groups (possibly in DRD1 Collaboration Meeting WG8 session, tbc)
- Social event on Sunday
- Visits

Poster

- School poster available online: https://indico.cern.ch/event/1384298/attachments/2874346/5033293/DRD1School-Poster.pdf
- Printed copies available now, please contact us if you want some copies

- **Please spread the word!**





Interested to join as tutor?

Follow school preparation?

WG8 mailing list

https://e-groups.cern.ch/e-groups/EgroupsSubscription.do?egroupName=drd1-wg8