

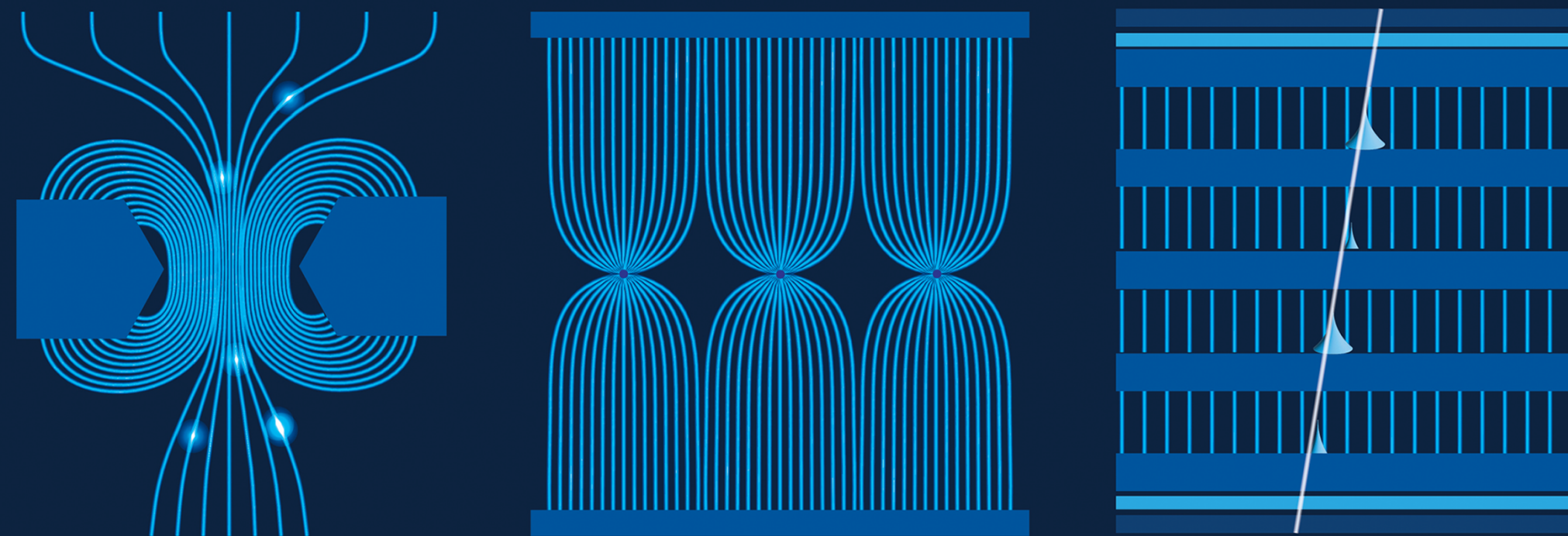
DRD1

Gaseous Detectors

School

CERN

November 27 - December 6, 2024



Scientific program

- Gaseous detector physics
- Gaseous detector technologies
- Readout technologies
- Simulation, modelling and reconstruction
- Manufacturing techniques
- Applications of gaseous detectors

The school consists of academic lectures and hands-on laboratory exercises.

The lecture program will cover MPGD, (M)RPC and wire-based detector technologies.

Lecture sessions are open to the community and can be followed in-person or by remote connection.

School website and registration

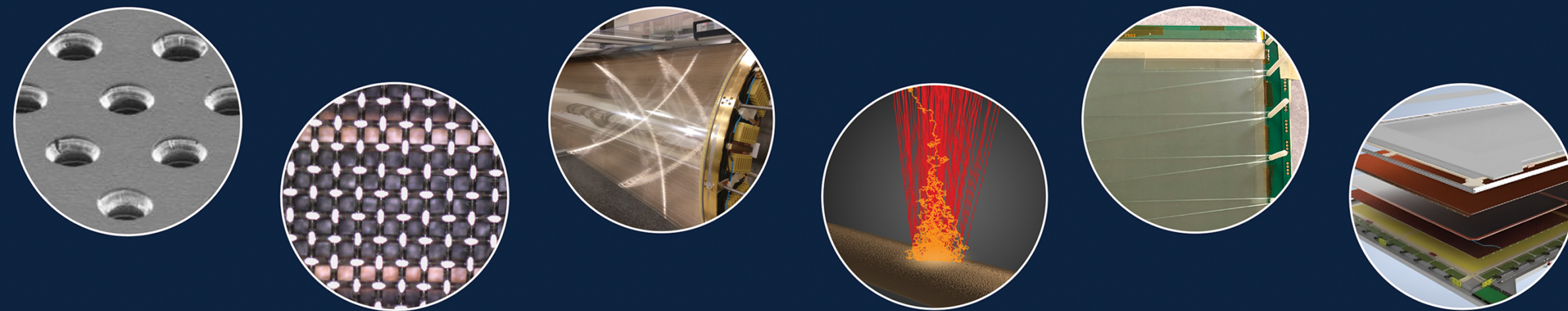
<https://indico.cern.ch/e/drd1school2024>

Application deadline: July 31, 2024

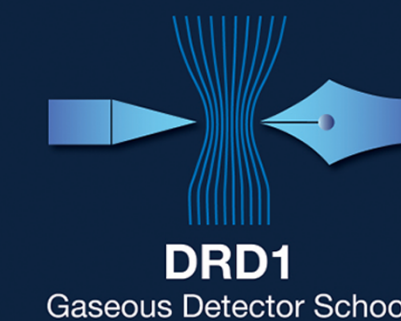
Free registration for students.

Students are invited to present a poster in a dedicated session.

Contact: drd1-school@cern.ch



DRD1



Overview

The school focuses on state-of-the-art gaseous detector technologies.

The programme of the school comprises morning lectures offering an overview on gas detectors physics, gaseous detector technologies, simulation techniques, manufacturing approaches as well as applications,

In the afternoons, hands-on exercises on various technologies in the afternoons, with an emphasis on methodologies are organised.

Lecture topics

Gas detectors physics

- Primary ionisation
- Charge transport
- Avalanche multiplication
- Gas properties

Gaseous detector technologies

- MPGDs
- (M)RPCs
- Wire-based detectors

Simulation and modelling

- Signal formation
- Modelling approaches
- Simulation frameworks & tools

Readout technologies

- Electronic readout
- Optical & hybrid readout

Manufacturing techniques

- MPGDs
- (M)RPCs
- Wire-based detectors

Applications

- High Energy Physics
- Applications beyond HEP
- Beyond fundamental research

Schedule

	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
9:00 - 10:00	Introduction	MPGD technologies	Signal induction	Visits (SC, AVC, AD)	Social event 10-18h	Gas detector physics : stability	MPGD manufacturing	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 2	(M)RPC manufacturing	Electronic readout		
11:00 - 11:30	Break	Break	Break	Break		Break	Break	Break		
11:30 - 12:30	Modelling	Wire-based detectors	Gas properties / alternative gases / gas systems	Work in lab groups (analysis, preparing presentations)		Applications beyond HEP (nuclear,neutrino)	Wire-based detector manufacturing	Optical readout and pixellated detectors	Applications beyond fundamental research (medical, ...)	
12:30 - 12:45	Q&A session (optional) / Lunch break	Q&A session (optional) / Lunch break	Q&A session (optional) / Lunch break			Lunch break	Q&A session (optional) / Lunch break	Q&A session (optional) / Lunch break		Q&A session (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
		Visit Christmas market				Student poster session		Social dinner		

Lectures

Time for questions after all lectures

If lecturer agrees also during lectures

From Zoom: please raise hand and wait to be called



Q&A session: optional, time for additional questions after morning lectures

Lectures may be recorded and made available to registered participants

Q&A after lectures will not be recorded



Coffee breaks upstairs (behind cafeteria) at 11:00

Please be on time to restart at 11:30



Lectures

08:00	Registration 40/S2-C01 - Salle Curie, CERN	08:30 - 09:00
09:00	Welcome 40/S2-C01 - Salle Curie, CERN	Burkhard Schmidt 09:00 - 09:10
	Practical information and safety during lab exercises 40/S2-C01 - Salle Curie, CERN	Florian Maximilian Brunbauer et al. 09:10 - 09:20
10:00	Introduction 40/S2-C01 - Salle Curie, CERN	Fabio Sauli  09:20 - 10:20
11:00	Gas detector physics 1 40/S2-C01 - Salle Curie, CERN	Fabio Sauli  10:20 - 11:20
	Break 40/S2-C01 - Salle Curie, CERN	11:20 - 11:50
12:00	Simulation and Modelling 1 40/S2-C01 - Salle Curie, CERN	Piet Verwilligen 11:50 - 12:50
13:00	Q&A Session (optional) 40/S2-C01 - Salle Curie, CERN	12:50 - 13:05

Lab schedule

Small groups: 4 students each

Split in 8 groups, each group will perform 9 different lab exercises

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9
	Wed Nov 27	Thu	Fri	Sat	Mon -Dec2	Tue	Wed	Thu-AM	Thu-PM
Group 1	Lab 1: MPGD Assembly	Lab 8: Simulation 1	Lab 2: RPC Assembly	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 8: Simulation 1	Lab 2: RPC Assembly	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 8: Simulation 1	Lab 1: MPGD Assembly	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 8: Simulation 1	Lab 1: MPGD Assembly	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 1: MPGD Assembly	Lab 9: Simulation 2	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 1: MPGD Assembly	Lab 9: Simulation 2	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 2: RPC Assembly	Lab 9: Simulation 2	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 2: RPC Assembly	Lab 9: Simulation 2	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

Lab book describing lab exercises:

https://indico.cern.ch/event/1384298/attachments/2874346/5229649/DRD1_School_Lab_Book.pdf

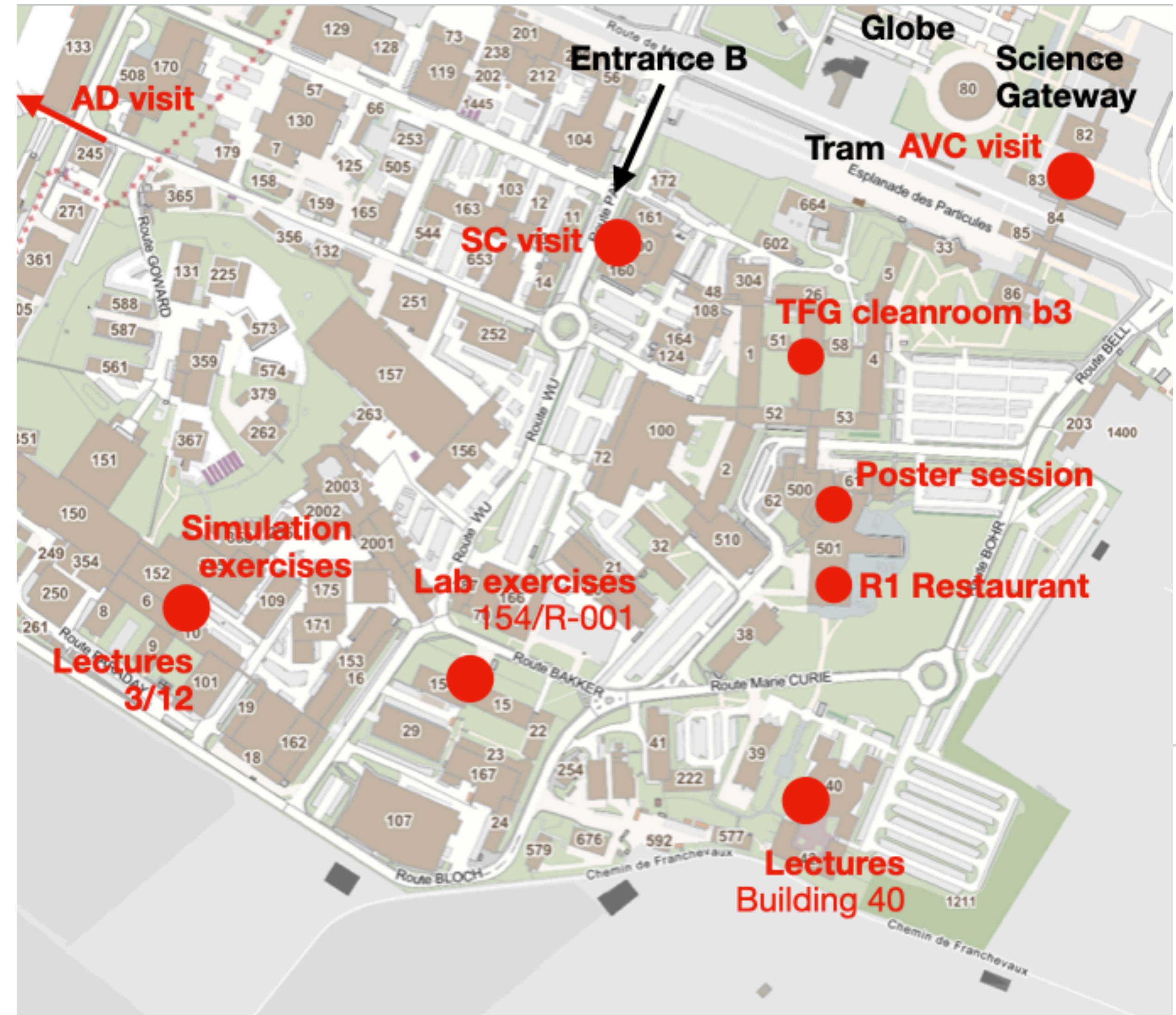
Lab exercises - logistics

Meeting point for all labs: GDD lab
154/R-001

Tutors will meet you there and take you to
the location for lab exercise

Please read lab book before the exercise
of the day

**Please bring your laptop with you,
especially for simulation exercises.**



Group photo



Group photo will be taken on Thursday
Meeting outside of lecture room

Student poster session



Poster session will take place on Monday, Dec 2 from 18:00 - 21:00
in building 500 Mezzanine (500/1-201)
Drinks and light snacks will be available

Please bring your printed poster to the poster session

If available, please send a PDF copy of your poster to drd1-school@cern.ch
to be uploaded on the Indico agenda

Student presentations



Students are invited to give a presentations during WG8 session of DRD1 Collaboration Meeting (<https://indico.cern.ch/event/1442324/>) on Friday, Dec 13

Content

Presentation should explain the setup and experimental methods of one of the lab exercises
Can contain results obtained during the exercise as well as additional analysis performed.
Some open questions and further analysis are given in the lab book.

Each group can present one lab exercise during the meeting

Ideally, we aim to cover all different lab exercises. Please let us know at the end of the school which two exercises you found most interesting to plan which lab group covers which exercise.

Visit program

Visits to Synchrocyclotron, ATLAS visitor centre and Antiproton decelerator are organised

Places limited and no further places available

Grouping given on practical information sheet

Saturday, Nov 30, 2024

from 8:40 to 11:00

CERN Science Gateway

New visitor center with self-guided exhibitions and activities, no reservation required

<https://visit.cern/>

Possibility to visit before/after ATLAS cavern visit or on your own schedule incl. on weekend



Social events

Thu, Nov 28 - 18:30h - Visit of Geneva Christmas market (<https://www.noel-au-quai.ch/>)

Meeting point in front of building 154 (lab location), tram 18 to Geneva

Optional: Fondue dinner at Bains the Paquis (<https://buvettedesbains.com/>)

Sun, Dec 1 - 10-18h - Day trip by bus to Annecy with stop on Saleve

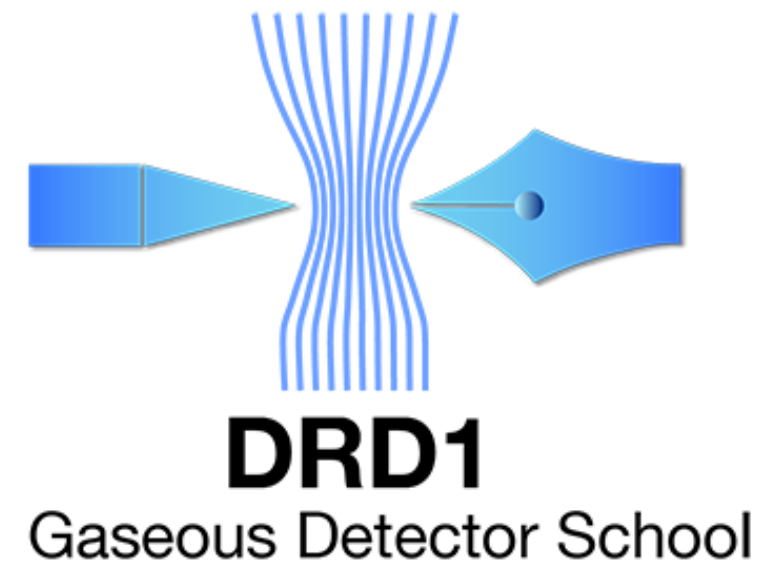
Meeting point in front of building 154 (lab location) at 9:45am

Leave Annecy at 17h to return to CERN ≈18h

Wed, Dec 4 from 19h - Social Dinner

Pizzeria Le Casanova (<https://lecasanovarestaurant.com>)

Meeting point in front of building 154 (lab location)



?

drd1-school@cern.ch