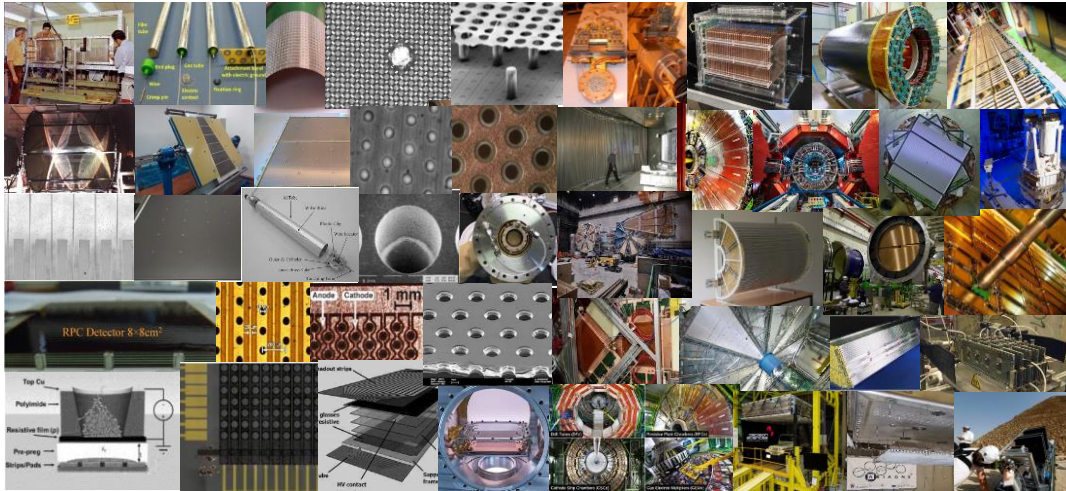


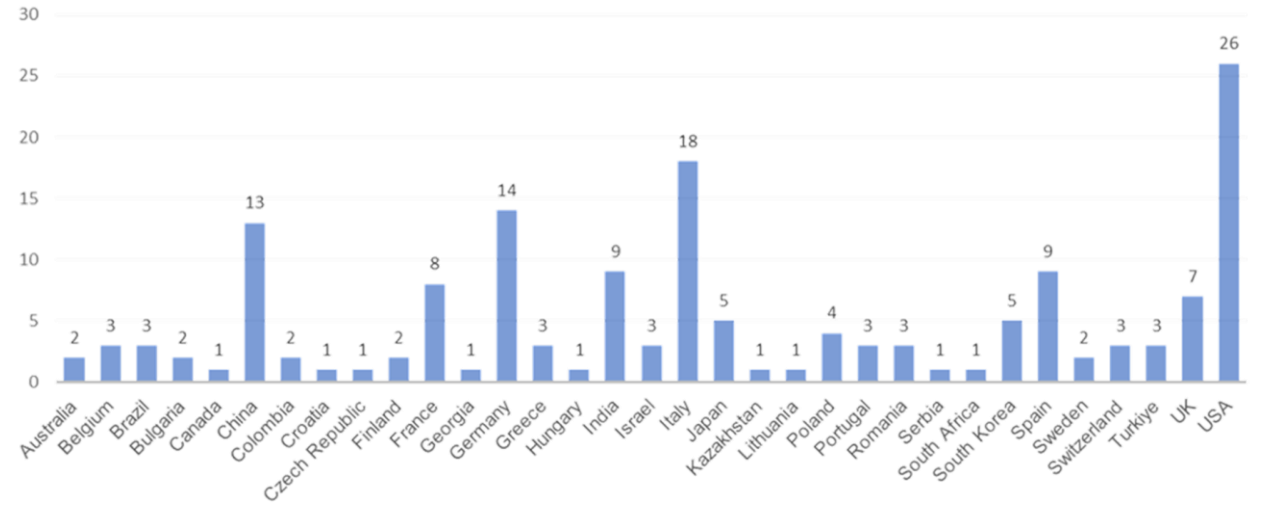
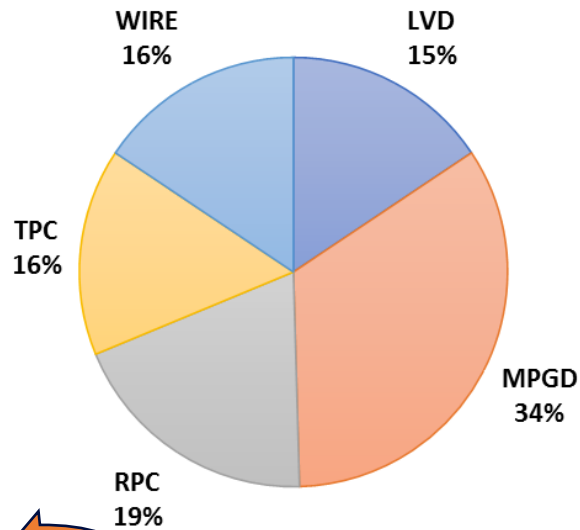
DRD1: A very large and diversified set of technologies and solution, a very large and diversified community

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

Courtesy of Eraldo



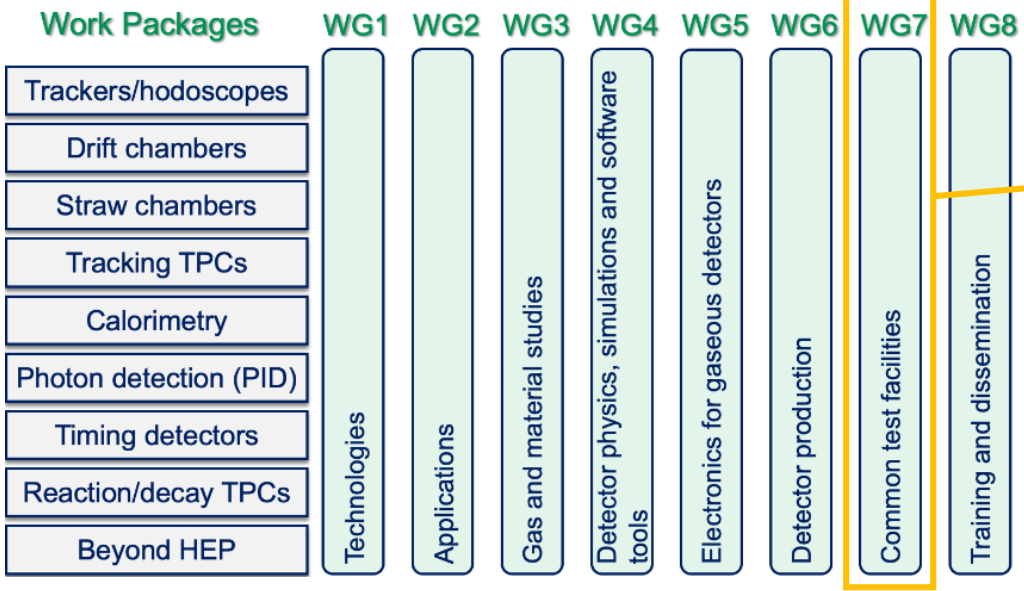
- More than 160 Institutes
- More than 30 Countries
- More than 700 members
- 5 Industrial, Semi-Industrial and Research Foundations



Countries of DRD1 Institutes (today)



DRD1 connection to SPS/NA (PPE134 & GIF++)



Working group 7

Common test facilities

Contacts: K. Floethner, R. Guida, K. Kuznetsova, Y. Tsipolitis

Contact email: DRD1-WG7-convenors@cern.ch

Subscribe/Unsubscribe the WG7 egroup/ mailing list: [Subscribe/Unsubscribe](#)

SPS Schedule: <https://ps-sps-coordination.web.cern.ch/>



Fig.1: CERN Gamma Irradiation Facility (GIF++)

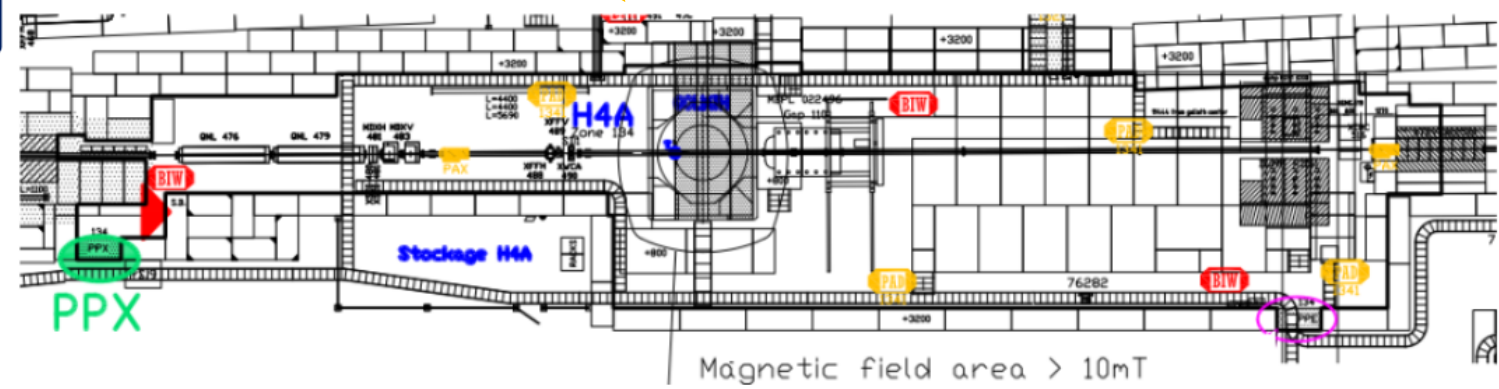


Fig.2: CERN North Area SPS Extraction line, H4 Beam line (PPE134/EHN1)

Common Test Beam at the CERN SPS/NA: CERN's PS and SPS can provide a variety of particle species with a wide momentum range. The collaboration plans to request common test beam time periods at the SPS. The H4/PPE134 experimental area in EHN1 is identified as the best location given the available beams, the space and the presence of a 1.5T Magnet with a large enough opening. The area has been used in the past by the RD51 Collaboration for regular common test beam campaigns.

- DRD1 is structures different working groups
- WG7 is for Common test facilities (<https://drd1.web.cern.ch/activities-wg7>)
 - PPE134 as a possible common test beam facility
 - GIF++ as a possible common irradiation facility
 - Follows similar common efforts as done in RD51 to give easier access to larger facilities and keep a permanent exchange within the community

DRD1 Test Beam Campaigns @ H4/SPS

Research to advance technological development of Gaseous Detectors
 Yorgos Tsiopolitis (Yorgos.Tsiopolitis@cern.ch), Eraldo Oliveri (Eraldo.Oliveri@cern.ch),
 Karl Jonathan Flöthner (karl.jonathan.floethner@cern.ch)

Generic and Application driven R&D

Muon/Tracking: GEM, Micromegas, uRWELL, cylindrical/planar uRGroove, TPC, Straw
 Timing: PICOSEC micromegas/uRWELL
 Calorimetry: MPGD DHCAL

Project Driven R&D & Commissioning

HL-LHC: CMS ME0
 Twin TPC for MIXE
 AMBER triple GEM (G4G)

FE electronics and DAQ

VMM3a for TPC, Tiger, Mu2e, ASD. GEMROC, SAMPIC

2024 SPS Test Beam Campaign

(to give you a better feeling of the use of the beam and what we do)

8 setups

Diagram showing 8 setups (A-H) in a tunnel. A photo shows the physical setups in a tunnel environment.

- SETUP A: B. PICOSEC (F. Brunbauer, M. Lisowski)
- SETUP B: PICOSEC (T. Enik, K. Kuznetsova)
- SETUP C: STRAW (T. Enik, K. Kuznetsova)
- SETUP D: RHUM (M. Indica, G. Sekhmetzde)
- SETUP E: TRIN TPC (F. Garcia Fuentes)
- SETUP F: GDD/ROD1 Tracker (K. Floethner)
- SETUP G: USTC (Y. Zhou)
- SETUP H: CMS ME0 (A. Pellegrini, P. Everaerts)

[https://indico.cern.ch/event/1409215/contributions/5922965/subcontributions/479395/attachments/2843563/4973590/DRD1-April24-TestBeam-H4-Summary-Updated%20\(2\).pdf](https://indico.cern.ch/event/1409215/contributions/5922965/subcontributions/479395/attachments/2843563/4973590/DRD1-April24-TestBeam-H4-Summary-Updated%20(2).pdf)

8 setups

Diagram showing 8 setups (A-H) in a tunnel. Two photos show the physical setups in a tunnel environment.

<https://indico.cern.ch/event/1436361/contributions/6044369/subcontributions/492820/attachments/2894558/5074788/DRD1-June-July24-TestBeam-H4-Summary-withStraws.pdf>

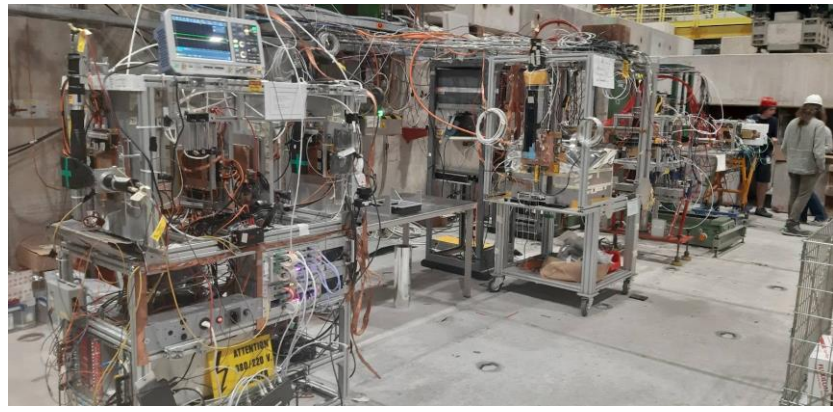
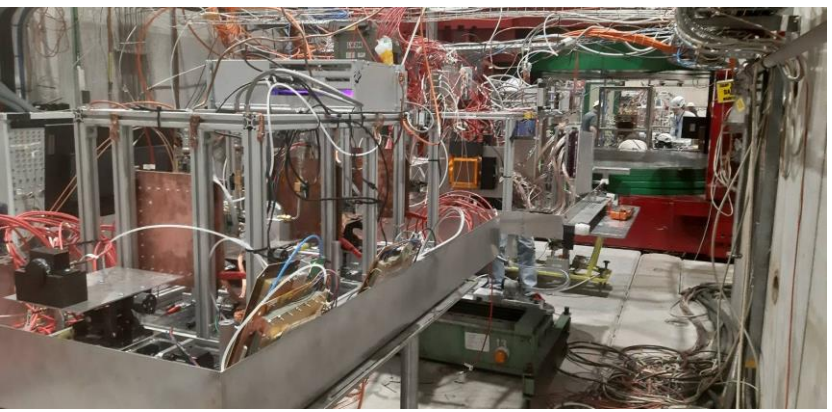
5 setups

BEAM H4, PPE134 – INSTALLATION (DRD1, Sept 18 – Oct 2)

Diagram showing 5 setups (A-E) in a tunnel. Three photos show the physical setups in a tunnel environment.

- SETUP A: PICOSEC (F. Brunbauer)
- SETUP B: USTC (Y. Zhou)
- SETUP C: STRAW (T. Enik, K. Kuznetsova)
- SETUP D: GEMROC (DHCAL) (not ready -> plans to come next year)
- SETUP E: GDD/ROD1 Tracker (L. Scharenberg, K. Floethner)
- SETUP F: SAMPIC (not ready -> plans to come next year)
- SETUP G: MPGD comp. Studies (Christine Zamboni)

<https://indico.cern.ch/event/1462524/contributions/6157737/subcontributions/508550/attachments/2939656/5164466/DRD1-September24-TestBeam-H4-SUMMARY.pdf>



DRD1 H4 – Short Feedback from the 2024 run

Aimed vs collected statistics (if applicable)

- In 2024 we had three beam periods with excellent beam – all setups profited and finished there physics program (apart from losses caused by the setups – no losses due to beam operation)

Highlights & Major issues faced (we had excellent shared BBQs with GIF)

- Remarkable support from North Area teams – Installation and dismounting is really demanding
- **Support from Liaison physicists** outstanding as always
- No problems with muon beam purity and no problems by changing beam files (in the past collimators got stuck from time to time, since addition of XCIO.022.450 we did not faced any issues with that)
- No major issues faced during 2024 because of a maximal setup count of 8 at a time
- For maximum Muon Rate one has to pay attention to PAXNA14404
(reduces to 15uSv/h in case of GIF access with three spills this can be exceeded).
 - Intermediate solution found with GIF++ (XCSH.022.068 can be adjusted) --> could be automated/avoided?

Desiderata for 2025

- More setups/groups are expected to participate due to the now larger collaboration (DRD1 > RD51)
 - We expect to face problem which occurred in the past with 8+ setups because of the overall higher demands
(# of power (220V/50Hz) sockets, # of Outlets/Available IPs, # of Remotely controllable tables, # of installed CAT7 cables)
 - Upgrade of gas system is planned before next beam time
 - **+10 gas lines** (+10 return)
 - Possibility of **shorter lines for flammable gas** (technically possible - to be checked with safety)
- **As early as possible information about change in beam conditions** (e.g. planned LHC fillings or other reductions/losses in beam)
-> lets us schedule accesses more efficient
- (foot and drinks in the snack machine in EHN1 also on the weekend – machines sometimes empty or card reader does not work)

DRD1 H4 – Feedback from the 2024 run (beam)

- **Beam parameters and quality**
 - Muons Beam
 - No problems with Muon Beam Contamination or with collimators getting stuck (because of XCIO.022.450 , 1.5 of steel)
 - For maximum Muon Rate one has to pay attention to PAXNA14404 (reduces to 15uSv/h in case of GIF access → with three spills this can be exceeded).
 - Intermediate solution found with GIF++ (XCSH.022.068 can be adjusted) --> could be automated/avoided?
 - Muons/Pions Beam
 - Maximum Particle Rate: highest the best (now we are at about 10^6 muons/spill, above 10^7 pions/spill).
 - Pions Beam
 - Rate per unit area [Hz/cm²]: Of interest to scan different rates per unit area (from 10^4 Hz/cm² to 10^6 Hz/cm²). Easy to control rate (Hz) via collimator, not trivial to control rate densities (Hz/cm²).
 - Well defined beam spot was optimal to scan different areas of DUTs
 - Electron Beam
 - Not used this year
- **Support from Liaison physicists** outstanding as always in promptness (to minimize our losses – also on short notice), availability (often outside working hours or in holidays) and quality (all requests satisfied)
- **LHC Filling** (et al.) – the only important comment here is to be informed in advance (e.g. schedule of LHC fillings). Sometimes the information on SPS-Page1 is not useful (sometimes the same message is just reposted with a later time but no additional information)

DRD1 H4 – Feedback from the 2024 run (infrastructure 1/2)

- **Aspects connected to the large number of users running in parallel during DRD1 test beam campaigns:**
 - Remarkable support from North Area teams – Installation and dismounting is really demanding given the large number of setup. More on SPS coordination side: to keep in mind in the users planning, useful to have it during MD worked well this year.
 - # of gas distribution lines (number of available lines was critical when we had several teams with different gases) & long distance to flammable gas barrack (a lot of gas is lost if the lines have to be pressurized over such long distance).
 - # of power (220V/50Hz) sockets in the exp. area: increasing the number of “independent” power distribution sockets in the area can help to better decouple teams running in parallel (**8 setups still ok – more setups created issues in the past**)
 - # of Outlets/Available IPs no problems this year since we had max 8 setups (**huge problems in recent years with more setups**)
 - # of Remotely controllable tables and platform. They are used always and by many groups (both Desy and small XSCA). Till now always fine but in some cases at the limit (sometimes a setup has to be prioritized to be able to remote control).

DRD1 H4 – Feedback from the 2024 run (infrastructure 2/2)

- Goliath - despite used only once in 2024, it is very important (Field and opening) for us to have it available.
- Ethernet cables (>cat.7) from experimental area to CR (only cat.5, **not suitable for DAQ** – temporarily cables added for several setups)
- Support outside normal working hours/days sometime more difficult (intervention on beam and specific services as flammable gases).
- Access via Timber to beam data very important/useful.
- Upgrade of the Beam instrumentations & environmental sensors could bring to significant improvement in the measurements Just as one example beam profile from delay chambers limited in rate. Time tagging could be as well useful. P,T,H) potentially useful (access via Timber)
 - We experienced a **difference of a factor of 2 in rate** by comparing the **scintillators from Cesar** and different setups
- Storage in 887 very useful for equipment that we have used in all beam period (trackers/racks)
- Good Sharing with GIF++. Most of beam configurations are ok for both, large improvement after the new XCIO. Impact of access under control. Only aspect that could affect seriously the sharing is the potential use of Goliath. (this is again more on SPS coordination side).
- Light Off in the night outside the building (dangerous) -> was solved for this year
- Cafeteria / Weekend (**empty food and drink machines** – card reader of coffee machine does often not work)

DRD1 H4 – Summary for 2024 and Outlook for 2025

Transition from RD51 to DRD1 went smoothly – still mainly MPGD based groups/setups attended this year

In 2025 we hope for larger attendance from other gaseous detector technologies (RPC, Wire, ...)

Compared to RD51 we **do not expect strong impact on the beam request** (time and beam type/quality) ... mostly muons/pions high rate, three periods of two weeks each, overlapped with GIF++ for the majority of the time)

We **do expect instead an impact on the infrastructure** because of a larger and diverse community. We will have to see how big will be the presence of the new community and the needs. Nevertheless, **comments previously listed in the feedback part, well represent the main aspects that we will have to consider.**

A upgrade of the gas system is planned and should provide **10 more gas lines** (+10 return lines) – in addition there will be the possibility to install flammable gas close to the area (infrastructure would be there – to be checked with safety)

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