# Organization of the Tracker DAQ School

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Not the first one, but still unprecedented effort!

| # | When | Δt | participants | trainers | |
|---|------|-----|--------------|----------|---|
| 1ˢᵗ | March 2016 | 2 days | 28 | | |
| 2ⁿᵈ | July 2017 | 2 days | 32 | 8 | |
| 3ʳᵈ | October 2019 | 3 days | 71 | 10 | |
| 4ᵗʰ | March 2021 | 10 days | 109 | 21 | Online! |

Good opportunity to record lessons and manuals for future newcomers
Maybe the last "live" training
Training material will remain online: others will be able to follow

# 4<sup>th</sup> Tracker-upgrade DAQ school

- March 8–12 and 15–19

- 109 participants
  - 58 for Inner Tracker
  - 51 for Outer Tracker
  - from 35 groups in 33 "hosting" institutes

- 21 trainers
  - Introductory lessons
  - Exercise presentation
  - Exercise tutoring
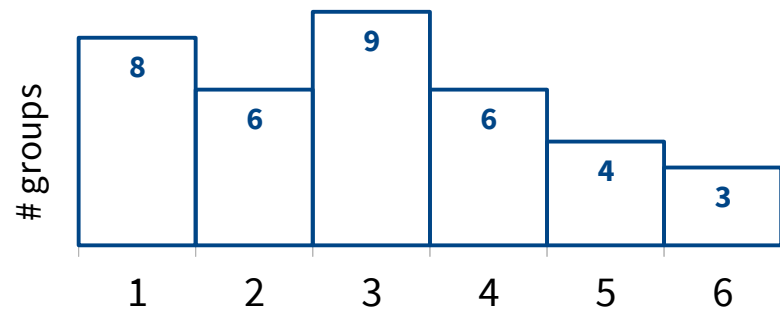
Working group size
(some hosting insitute split over the two weeks)

Hosting region
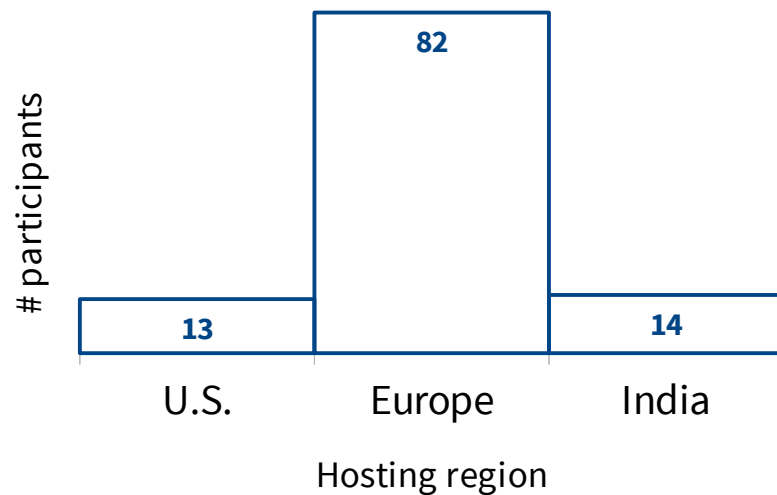
March

| 3 | 4 | 5 | | 6 | 7 | | 8 | 9 | 10 | 11 | 12 | | 13 | 14 | | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WED | THU | FRI | | SAT | SUN | | MON | TUE | WED | THU | FRI | | SAT | SUN | | MON | TUE | WED | THU | FRI |

Participants can follow introduction lessons at their time zone

Exercises go online

Zoom support for ½ of IT GROUPS

Zoom support for ½ of OT GROUPS

Zoom support for ½ of IT GROUPS

Zoom support for ½ of OT GROUPS

# School organization

The school is divided into:

- **Introductory lessons**: general topics useful to understand the scope and the tools of the Tracker DAQ

- **Practical exercises**: hardware exercises to get experience with an Inner Tracker or an Outer Tracker DAQ chain. If you have time, also a coding exercise!

Exercises will be organized in the following way:

- **Exercise introductions** written material will be made available at the start of the school. Every group is assigned one of the two weeks to try out the exercises with tutoring.

- **Exercise tutoring sessions** are time slots of 4 hours will be allocated each day for the exercises and tutors will be available on zoom to provide help in completing the exercises

A **plenary session** will be online on zoom every day from 14:00 to 15:00 (CERN time) to help with questions on the software architecture, installation or other general issues.

# Lessons

**09:00** → 10:15    **Introductory lessons: Final system**

**09:00**    **Welcome and school organization**
Speaker: Dr Stefano Mersi (CERN)

**09:15**    **DAQ for the final system**
The tracker sub-detector and its readout/control during the experiment runs
Speaker: Dr Stefano Mersi (CERN)

**09:30**    **Outer Tracker: 2S**
Detector structure
Final hardware components:
- CBC
- CIC
- lpGBT
What components do and how they are connected
Speaker: Sarah Seif El Nasr (University of Bristol (GB))

**09:45**    **Outer Tracker: PS**
Detector structure
Final hardware components:
- SSA
- MPA
- CIC
- lpGBT
What components do and how they are connected
Speaker: Sarah Seif El Nasr (University of Bristol (GB))

**10:00**    **Inner Tracker**
Hardware and software components and how they are connected
Speaker: Stella Orfanelli (CERN)

**10:00** → 12:18    **Introductory lessons: Test systems**

**10:00**    **OT-2S Hardware**
List of supported hardware for readout with Ph2_ACF and the corresponding auxiliary electronics needed
Speaker: Mark Istvan Kovacs (CERN)

**10:20**    **OT-PS Hardware**
List of supported hardware for readout with Ph2_ACF and the corresponding auxiliary electronics needed
Speaker: Mark Istvan Kovacs (CERN)

**10:40**    **IT Hardware**
List of supported hardware for readout with Ph2_ACF and the corresponding auxiliary electronics needed
Speaker: Dr Mauro Dinardo (Universita & INFN, Milano-Bicocca (IT))

**10:58**    **System tests software**
Components and architecture
Speaker: Fabio Ravera (Fermi National Accelerator Lab. (US))

**11:18**    **System tests software**
Existing Graphical User Interfaces
Speaker: Stefan Maier (KIT - Karlsruhe Institute of Technology (DE))

**11:38**    **System tests firmware: Inner Tracker**
Speaker: Ioannis Kazas (Nat. Cent. for Sci. Res. Demokritos (GR))

**11:58**    **System tests firmware: Outer Tracker**
Speaker: Inna Makarenko (Universite Libre de Bruxelles (BE))

https://indico.cern.ch/event/1014295/

Simplified list:

1. (**all**) setup the DAQ system from scratch
   (up to firmware programming on μDTC)

2. (**inner**) configure RD53A on SCC up to threshold tuning

3. (**outer**) configure 2S hybrid (or module) up to threshold tuning

4. (**all**) coding exercise

# Who does what?

**Participants**: attend to the introductory video lessons before the school starts, at their convenient time. Then try to put in practice the exercise on a setup in a hosting institute.

**Hosting institute contact persons**: prepare the hardware for the school and arrange for logistics. They will arrange for telepresence in the lab (if needed), with one or more "remote hands". Zoom **breakout rooms** can and should be used for this.

**Teachers**: record lessons and provide their description of the exercises

**Tutors**: are available to help during the tutoring sessions

# Tutoring sessions

Make sure you are **using the latest version of Zoom**, since we will be using the "**breakout room**" feature in Zoom.

Each tutoring session has its own zoom room.

Groups are divided by the **hosting** institute (i.e. the place where the setup is, not necessarily the participant's home institute).

Timetable and zoom rooms can be seen here:

https://indico.cern.ch/event/986962/timetable/?view=standard

# Hardware tutoring (Mon–Thu)

Your group will try to follow the instructions for the hardware exercise (either IT or OT).

When you connect to zoom, you will be automatically redirected to a **breakout room** together with your group. Please refer to the local experts (if there are any) for trivial matters. If you have a problem you do not know how to solve, then **go to the main room and ask for help** from an expert.

Your hardware tutoring room and specific breakout room are detailed in the **registration details page:**

    https://cms-tracker-daq.web.cern.ch/cms-tracker-daq/
    → Private → Tables → Participant List

To leave the breakout room use the "leave room" blue button and you will reach the main room, where the tutors will (hopefully) be available to help.

To go back to your breakout room, click on "Breakout rooms" at the bottom

Breakout Rooms

If you like you can also try yourself with coding some DAQ software.

If you have completed the hardware exercise on Wednesday, the first "software exercise" session will start.

The software tutoring room will be here:
https://cern.zoom.us/j/63792982390?pwd=MjY1RkVmV0t0R3dtTnpQZkVRNmlIQT09

In these sessions everyone will be in the main room, and 6 breakout rooms will be available for tutors to move aside to provide directed help.

All Times @CERN (CET)

**Week 1**

|  | Mon 8 | Tue 9 | Wed 10 | Thu 11 | Fri 12 |
|---|---|---|---|---|---|
| 9:00–13:00 | **[A-OT-1] 7+1** Stefano, Sarah, Younes, Alexander, Martin, Roland, Inna, (Christian) | **[A-OT-2] 7+1** Sarah, Younes, Alexander, Martin, Sandro, Roland, Inna, (Christian) | **[A-OT-3] 7** Sarah, Younes, Alexander, Martin, Sandro, Inna, Christian | **[A-OT-4] 6** Sarah, Younes, Alexander, Sandro, Stefan, Christian | |
| 14:00–15:00 | **[A-All-1] 3** Stefano, Sarah, Mauro | **[A-All-2] 3** Stefano, Sarah, Mauro | **[A-All-3] 3** Stefano, Sarah, Mauro | **[A-All-5] 5** Stefano, Fabio, Emery, Younes, Martin | **[A-All-6] 6** Fabio, Mauro, Emery, Younes, Martin, Stefan |
| 15:00–19:00 | **[A-IT-1] 6** Stefano, Dominik, Arne, Kai, Brian, Ester | **[A-IT-2] 7** Stefano, Dominik, Arne, Mauro, Kai, Brian, Ester | **[A-IT-3] 6** Stefano, Dominik, Arne, Kai, Brian, Ester / 17:00 **[A-All-4] 3** Mauro, Younes, Martin | 15:00 **[A-IT-4] 5** Dominik, Arne, Kai, Brian, Ester | |

**Week 2**

|  | Mon 15 | Tue 16 | Wed 17 | Thu 18 | Fri 19 |
|---|---|---|---|---|---|
| 9:00–13:00 | **[B-OT-1] 8** Stefano, Sarah, Younes, Martin, Sandro, Inna, Christian, Kevin | **[B-OT-2] 7** Sarah, Younes, Martin, Sandro, Inna, Christian, Kevin | **[B-OT-3] 5** Sarah, Martin, Sandro, Christian, Kevin | **[B-OT-4] 4** Sarah, Younes, Sandro, Kevin | |
| 14:00–15:00 | **[B-All-1] 3** Stefano, Sarah, Fabio | **[B-All-2] 4** Stefano, Sarah, Fabio, Sebastien | **[B-All-3] 4** Stefano, Sarah, Fabio, Sebastien | **[B-All-5] 6** Fabio, Sebastien, Emery, Younes, Martin, Kevin | **[B-All-6] 6** Fabio, Mauro, Emery, Younes, Martin, Kevin |
| 15:00–19:00 | **[B-IT-1] 7** Stefano, Dominik, Arne, Kai, Brian, Antonio, Ester | **[B-IT-2] 7** Stefano, Arne, Mauro, Kai, Brian, Antonio, Ester | **[B-IT-3] 7** Stefano, Dominik, Arne, Kai, Brian, Antonio, Ester / 17:00 **[B-All-4] 5** Fabio, Sebastien, Mauro, Younes, Martin | 15:00 **[B-IT-4] 6** Stefano, Arne, Kai, Brian, Antonio, Ester | |

# Useful links

List of tutors, per tutoring session

https://cms-tracker-daq.web.cern.ch/cms-tracker-daq/private/shifts.php

Zoom rooms that will be used are also on the school's indico page:

https://indico.cern.ch/event/986962/timetable/?view=standard

School calendar (to incorporate in your google calendar):

https://cms-tracker-daq.web.cern.ch/cms-tracker-daq/public_content/calendar/school.ics

**Warning**: the breakout room mechanism will only work on the day of the tutoring, so don't panic if you click on the link now and it doesn't work!