DESY Training on Experimental Concepts & Techniques

Naomi Davis, Doris Eckstein, Ingrid Maria Gregor, Moritz Guthoff,Friederike Januschek, Finn King, Katja Krüger, Iffni Meza, Andreas Mussgiller, Andreas Nürnberg, Felix Sefkow, Elizaveta Sitnikova, **S. Spannagel**, Marcel Stanitzki, Anastasiia Velyka, Gianpiero Vignola

ECFA Instrumentation School Discussion
17 November 2025

Introduction

- Currently, there is a shortage in offered training for (aspiring) instrumentation scientists
  - Can be tough to find suitable candidates for open positions e.g. at PostDoc level
  - Esp. for smaller institutes, training-on-the-job is hard (infrastructure, personnel)
- (Our) view on current school landscape
  - Very few (but excellent!) dedicated schools (EDIT, ISOTDAQ, application rations > 4:1)
  - Concept of “traveling school” comes with organizational overhead, some are not offered every year
  - Some broader (HEP) schools include a detector lecture, but not all
  - Hands-on lab activities are extremely valuable!

- We would like to contribute to the offering with a *yearly school at DESY*
- We in parts rely on concepts used in the EURIZON detector school in Wuppertal (7/2023) & EDIT2020 school in Hamburg (2/2020)

D.TECT – School Concept

- Annual school at the same place to keep organizational expenditure

  DESY Hamburg Campus

  - Clean room facilities
  - Extensive laboratories
  - Testbeam Facility
  - Accommodation

- Strong focus on laboratory activities
- Lectures rather on cutting-edge research than on fundamental concepts
- Student presentations on selected lab

- Foreseeing places for 42 students in 2026

School Concept II

- Students apply through Indico website with CV, motivation and reference letter
- Selected students will finalize registration & fee payment
- Students are expected to attend in person for the entire duration of the school, no online participation, also not for the lectures
- Main target audience:
  PhD students working on particle detectors.
  Advanced master students and early postdocs will also be considered for attendance.
- Seminars at two evening on instrumentation topics beyond HEP (e.g. medial imaging)

Attendance Fee includes

- Accommodation in the DESY hostel (twin rooms)
- Lunch vouchers for the DESY canteen
- Social activities, school dinner
- Morning & afternoon coffee breaks
- Material for (some) lab activities

School Agenda in a Nutshell

	Mon 08	Tue 09	Wed 10	Thu 11	Fri 12	Sat 13	Sun 14	Mon 15	Tue 16	Wed 17	Thu 18	Fri 19
08:00	Registration	Morning coffee	Morning coffee	Morning coffee	Morning coffee	Free Time & Escursion	Free Time	Morning coffee	Morning coffee	Morning coffee	Morning coffee	Morning coffee
09:00	Welcome & Introduction	Lecture	Lecture	Lecture	Lecture			Lecture	Lecture	Lecture	Lecture	Students Presentations
10:00	Morning coffee	Lecture	Lecture	Lecture	Lecture			Lecture	Lecture	Lecture	Lecture	
11:00	Lecture										Lecture	Students Presentations
12:00	Lecture	Lab 1 Introduction	Lab 2 Introduction	Lab 3 Introduction	Lab 4 Introduction			Lab 5 Introduction	Lab 6 Introduction	Lab 7 Introduction		Closing
13:00	Lunch	Lunch	Lunch	Lunch	Lunch			Lunch	Lunch	Lunch	Lunch	
14:00	Safety & Labs introduction	Lab 1 Part1	Lab 2 Part1	Lab 3 Part1	Lab 4 Part1			Lab 5 Part1	Lab 6 Part1	Lab 7 Part1	Group Work	
15:00	DESY Campus Tour	Aftern.coffee	Aftern.coffee	Aftern.coffee	Aftern.coffee			Aftern.coffee	Aftern.coffee	Aftern.coffee	Aftern.coffee	
16:00		Lab 1 Part2	Lab 2 Part2	Lab 3 Part2	Lab 4 Part2			Lab 5 Part2	Lab 6 Part2	Lab 7 Part2	Group Work	
17:00												
18:00	Welcome Reception & Student Poster Session	Evening Seminar		Social Event					Evening Seminar		Social Event	

Lecture Program

- **Before the school**
  - Basic understanding of particle interactions and fundamental detection principles is expected from all participants
    - These topics will not be covered in the lecture program
    - The curriculum is designed to extend this knowledge, focusing on advanced instrumentation
  - Will collect & provide online course material for preparation for the students

- **During the school**
  - Series of 2x45-minute lectures on advanced instrumentation topics
  - Content of lectures will be discussed & agreed upon with lecturers ahead of time
  - Focus on current DRD activities

Preliminary list of detector technologies covered:
- Semiconductor Detectors
- Calorimeters
- Timing Detectors
- Photo Detectors and Particle ID
- Gas Detectors
- Liquid Detectors
- Quantum Sensing
- DAQ and Electronics
- Overview of Proposed Future Experiments

Foreseen Laboratory Activities

- Labs are taught in **groups of three students**, with two groups performing the same lab
- Each lab activity is a full day
  - Introductory session (getting to know machines, the lab, the theory) before lunch
  - Often two interlinked tasks in the afternoon, groups swap between them

- Current list of labs:
  - Probing Semiconductor Properties & Electrostatic TCAD Modeling
  - Radiation Detection with Sources & Monte Carlo Simulations
  - Exploring Calorimeter Performance & Shower Reconstruction at the Testbeam
  - Operation and Characterization of Gaseous Detectors
  - Build-Your-Own Particle Detector
  - Tracking & Analysis of Beam Telescope Data at the Testbeam
  - Detector Systems: Experiment Control, Triggers, Thermal & mechanical material properties

D.TECT 2026

The first D.TECT school will be held **8 – 19 June 2026**

- During term time at least for German universities
- We might explore earlier dates (April?) in future years, tbd

Student application will open **01 December 2025**

Application deadline **01 March 2026**

D.TECT 2026

DESY.