

# *WP6: transfer of knowledge*

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SENSE MIDTERM REVIEW

## INTRODUCTION

- The current SENSE program involves work at Fermilab and CERN, the largest and most advanced particle physics laboratories in the world
- They share a similar mission and similar experimental technologies, with the consequent safety risks involved
- The transfer of knowledge at both laboratories involves continuous scientific/technological training of all employees and visitors, through conferences, seminars and workshops
- It also includes the technical training necessary to perform experimental operations in a safe, efficient and sustainable manner

## CERN (EUROPEAN LABORATORY FOR PARTICLE PHYSICS)

- European laboratory managed collectively by 24 member states, 10 associate member states, 2 observer states, 45 states with cooperation agreements
- Founded in 1954. Weak interaction vector bosons and Higgs boson discovered at CERN
- Nobel prizes in 1984, 1992, 2013 assigned to discoveries and experimental developments performed at CERN
- ~2700 staff members, and ~18000 «users» (accessing the lab physically or using computing resources remotely)



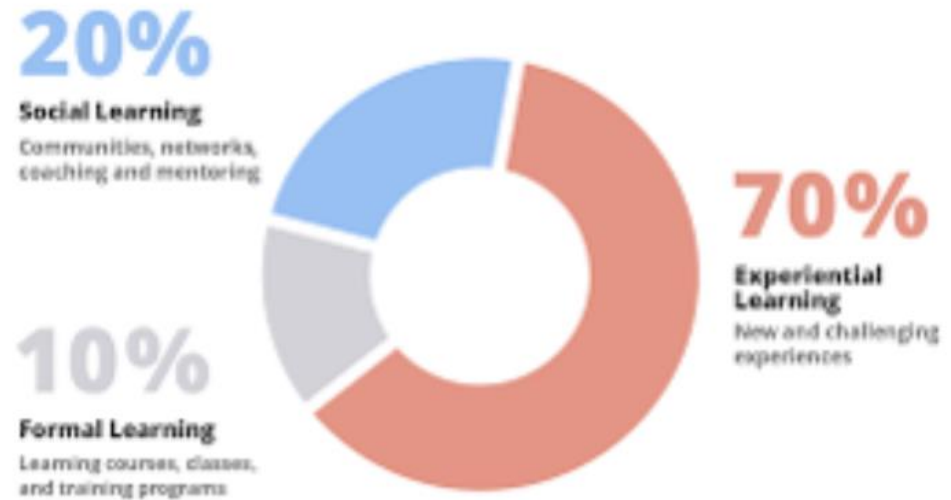
## CERN LEARNING AND DEVELOPMENT (L&D)

- A Learning and Development service within CERN HR has been created to manage learning programmes of employees and users in a coordinated manner, from onboarding to retirement
- This covers a spectrum of competencies beyond the strictly scientific/engineering ones:



## CERN LEARNING AND DEVELOPMENT (L&D)

- L&D organizes a vast variety of learning programmes, though in the CERN model most learning happens through experience and networking



## CERN MANDATORY TRAINING PROGRAM

- Some basic training is a requirement for access to CERN (even remote access to its computing resources) by staff or users employed by other institutions
- This involves basic physical safety (including radiation protection) and computing security



### Computer Security

Programme

This computer security course addresses the "do's" and "don'ts" of the use of computer resources at CERN. ...



### Data Privacy Basics - e-learning

Programme

CERN's Legal Framework for processing of personal data  
Personal data and sensitive personal data  
Data proc ...



### Emergency Evacuation / Évacuation en cas d'urgence

Programme

TARGET AUDIENCE: Any person entering CERN site.  
OBJECTIVE: Know the correct behaviour to adopt and the ...



### Radiation Protection - Awareness / Radioprotection - Sensibilisation

Programme

TARGET AUDIENCE: Any person entering CERN site.  
OBJECTIVES: Obtain information about radioactivity, ra ...



### Safety at CERN / La Sécurité au CERN

Programme

The course validity is unlimited since November 2021. If you have completed it before this date, please ...



### Security - Awareness / Sûreté - Sensibilisation

Programme

TARGET AUDIENCE: Any person entering the CERN sites.  
OBJECTIVE: Familiarise with CERN's Security Policy, ...

- CERN staff also has mandatory courses for science communication
- People with supervisor roles are required to do specific courses for team management

## CERN HSE (HEALTH, SAFETY, ENVIRONMENT)

- This unit – among other things – has the task to inform and train the CERN population on health hazards, safety issues and risks
- It manages the Safety Training Centre at Preveessin, where all training sessions (both classroom and practical training) take place
- Specific committees are dedicated to specific occupational risks (Radiation Protection, Flammable Gases, Cryogenic Safety)

More information can be found at <https://hse.cern/services-support/safety-training>



# CERN ACADEMIC TRAINING

academictraining.cern.ch

- CERN academic training lectures cover physics and technology research results, as well as leading-edge news from other disciplines
- They are open to the whole CERN community (staff, fellows, associates, students, users...) free of charge
- All lectures since 1968 are freely available on the web

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|--|--|--|--|
| <p>4348</p> <p>RIEGLER, WERNER</p> <p>Signals, Noise and Signal processing in Particle</p> <p>Posted on 2024-10-17</p> | <p>3456</p> <p>RIEGLER, WERNER</p> <p>Signals, Noise and Signal processing in Particle</p> <p>Posted on 2024-10-16</p> | <p>3871</p> <p>RIEGLER, WERNER</p> <p>Signals, Noise and Signal processing in Particle</p> <p>Posted on 2024-10-15</p> | <p>3206</p> <p>RIEGLER, WERNER</p> <p>Signals, Noise and Signal processing in Particle</p> <p>Posted on 2024-10-14</p> |
| <p>3601</p> <p>DOMCKE, VALERIE</p> <p>Gravitational Wave Astronomy</p> <p>Posted on 2024-04-12</p>                     | <p>3610</p> <p>DOMCKE, VALERIE</p> <p>Gravitational Wave Astronomy</p> <p>Posted on 2024-04-11</p>                     | <p>3978</p> <p>DOMCKE, VALERIE</p> <p>Gravitational Wave Astronomy</p> <p>Posted on 2024-04-09</p>                     | <p>3747</p> <p>GÖTTSCHE, MALTE</p> <p>Science for Nuclear Arms Control</p> <p>Posted on 2024-02-08</p>                 |

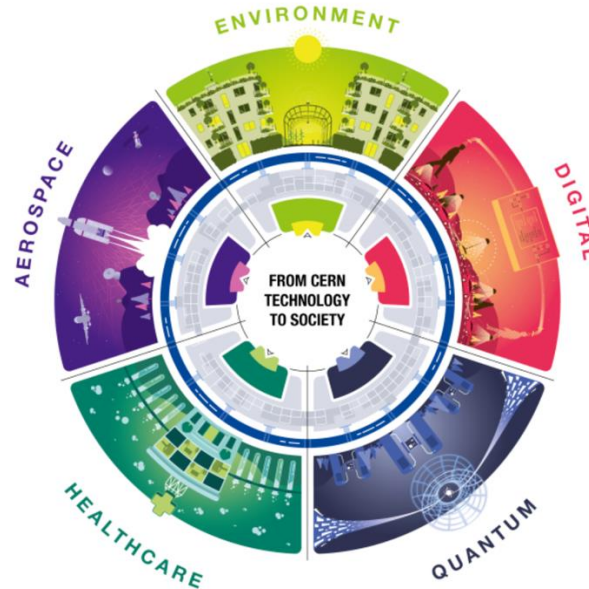


## CERN KNOWLEDGE TRANSFER

Places like CERN contribute to the kind of knowledge that not only enriches humanity, but also provides the wellspring of ideas that become the technologies of the future.

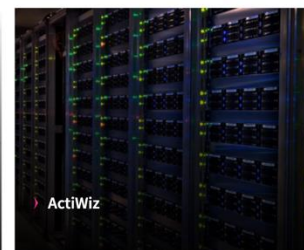
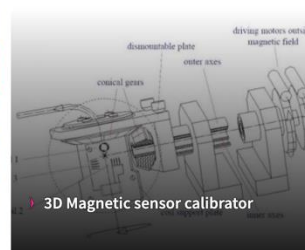
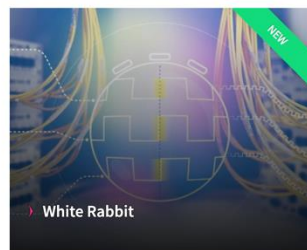
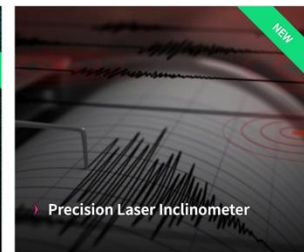
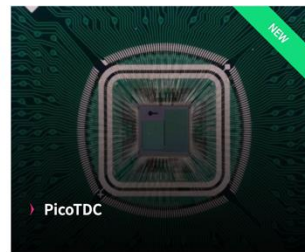
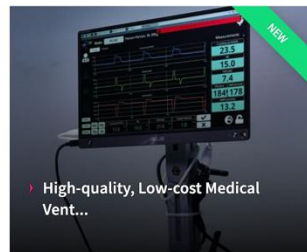
— Fabiola Gianotti, Director-General of CERN

- The Knowledge Transfer Group aims to engage with industry experts to create opportunities for transfer of technology and know-how, maximizing the impact of CERN on society.
- 51 contracts (licences, collaborative R&D) signed in 2023 mainly with industry



## CERN KNOWLEDGE TRANSFER ACTIVITY

- Several initiatives are organized in order to facilitate Knowledge Transfer:
  - R&D collaborations for start-ups and spin-offs
  - Participation to European Commission-funded projects
  - Knowledge Transfer Seminars
  - Open source software and hardware licences (as for the World Wide Web)
  - Training in business and entrepreneurship for CERN personnel
  - Dedicated funding to bridge the research/industry gap
- Example technologies include read-out/visualization technologies with applications in medicine, mechatronics/robotics in high-radiation environment, laser sensing for seismography, high-precision time synchronization (White Rabbit)...



## FERMI NATIONAL ACCELERATOR LABORATORY (FERMILAB)

- The largest US laboratory in particle physics, managed by the US Department of Energy (Office of Science)
- Founded in 1967. Involved in crucial discoveries such as the bottom and top quarks and the tau neutrino
- Lately more focused on rare event physics: neutrino oscillation, in particular DUNE, and muon physics
- A Quantum Institute dedicated to quantum information science has been launched in 2019
- 2160 employees, and scientific visitors from more than 50 countries



# ENVIRONMENT, SAFETY AND HEALTH(eshq.fnal.gov)

- The Environment, Safety and Health (ESH) service at Fermilab manages all of the policies designed to manage safety hazards:
  - Procedures for safe and efficient laboratory operations
  - Environmental reports
  - Information for workers' safety and health
- As a consequence, ESH manages all the training courses necessary for safe and efficient experimental operations within the lab
- Each employee or user has a personalized profile (Individual Training Summary/Plan) listing all necessary training for their specific work tasks and risks involved

|                               |   |            |            |                      |  |     |     |                        |   |
|-------------------------------|---|------------|------------|----------------------|--|-----|-----|------------------------|---|
| <a href="#">FN000235 / CR</a> | Basic Electrical Safety   | 09/15/2019 |            |                      |  | Yes | 2   | <a href="#">104768</a> | Requirement: 29 CFR 1910.332  |
| <a href="#">FN000382 / CR</a> | Electrical Safety Orientation   | 09/15/2019 |            |                      |  | Yes | 5   | <a href="#">104768</a> | Requirement: 29 CFR 1910.147; 1910.303  |
| <a href="#">FN000372 / CR</a> | Environmental Management System (EMS)                                   | 02/04/2017 |            |                      |  | Yes | .45 | <a href="#">97764</a>  | Requirement: ISO 14001  |
| <a href="#">FN000733 / CB</a> | Event Review and Analysis Overview for Employees, Users, and Affiliates | 01/12/2023 | 01/31/2026 | Complete             |  | Yes | 3   | <a href="#">136484</a> | Requirement: QAM 12140  |
| <a href="#">FN000540 / CB</a> | Export Control Awareness  | 11/28/2023 | 11/30/2025 | Complete             |  | Yes | 5   | <a href="#">136557</a> | Requirement: CLAUSE I.101C - DEAR 970 5225-1 COMPLIANCE WITH EXPORT CONTROL LAWS AND REGULATIONS (NOV 2015) |
| <a href="#">FN000741 / CB</a> | Fermilab Emergency Preparedness Awareness Training                      | 03/31/2024 | 03/31/2025 |                      |  | Yes | 5   | <a href="#">153717</a> | Requirement: DOE O151.1   |
| <a href="#">FN000512 / CB</a> | Fermilab Technical Publications Training                                | 09/15/2019 |            |                      |  | Yes | 5   | <a href="#">104729</a> | Requirement: DOE  |
| <a href="#">FN000466 / CB</a> | General Records Management  | 09/04/2022 |            | Not Required by ITNA |  | Yes | 1   | <a href="#">123886</a> | Requirement: DOE O 243.1B   |
| <a href="#">FN000763 / CB</a> | General Records Management Refresher                                    | 03/04/2024 | 03/31/2025 |                      |  | Yes |     | <a href="#">155323</a> | Requirement: Records DOE Order 243.1C   |
| <a href="#">FN000735 / CB</a> | GERT - (General Employee Radiological Training)                         | 11/04/2024 | 11/30/2026 | Complete             |  | Yes | 1   | <a href="#">153783</a> | Requirement: 10 CFR 835-Subpart J   |
| <a href="#">FN000156 / CR</a> | Hazard Communication  | 02/04/2017 |            |                      |  | Yes | 1   | <a href="#">97764</a>  | Requirement: 29 CFR 1910.1200   |
| <a href="#">FN000374 / CR</a> | Introduction to Cybersecurity   | 11/04/2024 | 11/30/2025 | Complete             |  | Yes | 1   | <a href="#">153691</a> | Requirement: DOE O 205.1B   |
| <a href="#">FN000341 / CR</a> | New Employee ES&H Orientation   | 02/04/2017 |            | Not Required by ITNA |  | Yes | 2.5 | <a href="#">97764</a>  | Requirement: FESHM Chapter 2070   |
| <a href="#">FN000717 / CB</a> | New User/Affiliate Orientation  | 02/04/2017 |            |                      |  | Yes |     | <a href="#">97764</a>  | Requirement: Fermilab   |
| <a href="#">FN000029 / CR</a> | O.D.H. Training   | 10/03/2024 | 10/31/2025 | Complete             |  | Yes | 2   | <a href="#">153687</a> | Requirement: FESHM Chapter 4240   |
| <a href="#">FN000199 / CR</a> | PPE (Personal Protective Equipment) Availability And Use                | 02/04/2017 |            |                      |  | Yes | 1   | <a href="#">97764</a>  | Requirement: 29 CFR 1910.132  |
| <a href="#">FN000607 / CR</a> | Property Control and Fleet  | 03/31/2024 | 03/31/2027 | Complete             |  | Yes | 5   | <a href="#">153701</a> | Requirement: DOE Prime Contract   |
| <a href="#">FN000412 / CR</a> | Protecting Personal Information   | 03/31/2024 | 03/31/2025 |                      |  | Yes | 1   | <a href="#">153700</a> | Requirement: DOE regulations about PII.   |
| <a href="#">FN000796 / CB</a> | Safeguards and Security Awareness                                       | 08/06/2024 |            |                      |  | Yes | 1   | <a href="#">161504</a> | Requirement: DOE O 142.3A DOE O 475.1   |
| <a href="#">FN000719 / CB</a> | Science and Technology (S&T) Risk Matrix Lab-wide Training              | 01/07/2025 | 01/31/2028 | Complete             |  | Yes | 5   | <a href="#">168485</a> | Requirement: DOE S&T Risk Matrix  |
| <a href="#">FN000682 / CR</a> | Work Planning & Controls  | 12/11/2023 | 12/31/2026 | Complete             |  | Yes | 2   | <a href="#">136593</a> | Requirement: FESHM 2060   |
| <a href="#">FN000508 / CR</a> | Workplace Violence and Active Shooter/Active Threat Awareness Training  | 02/25/2023 | 02/28/2026 | Complete             |  | Yes | 5   | <a href="#">136519</a> | Requirement: DOE O 151.1  |

## TRAINING FOR FERMILAB ACCESS

- Remote access to Fermilab computing resources for scientific collaborators requires basic training on:
  - Computing security
  - Protecting personal information
  - Export control
- Access to non-public areas of the lab for scientific users or subcontractors is dependent on completing key training courses, for awareness of safety and security
- [New User and Affiliate Orientation](#) training
- [Safeguards and Security Awareness](#) training
- [Fermilab Emergency Preparedness Awareness](#) training
- [Sexual Harassment Awareness and Prevention](#) training
- [Workplace Violence and Active Shooter/Active Threat Awareness](#) training
- Access to particular building with additional risks (radioactivity, cryogenics, chemicals...) is conditioned to additional specific training

## FERMILAB INTERNSHIPS

- The transfer of knowledge mission of Fermilab is expressed through a very rich programme of internships, allowing scientists at different career levels to take part in the everyday activity of the lab
  - High school students
  - Undergraduates
  - Graduate students (including dedicated INFN program for Italian students)
  - Professionals (including teachers and educators)



## FERMILAB PUBLIC ACTIVITIES

- Dissemination and outreach to the general public is one of Fermilab's main missions
- The lab site is open to the public, including the Lederman Visitor Center, the main building (Wilson Hall) and the restored prairie areas
- A dedicated series of lectures (Saturday Morning Physics) connects high school students to particle physics
- Workshops are devoted to high school teachers
- An art gallery in Wilson Hall includes works of art inspired by Fermilab physics
- A program of Colloquia from high-level scientific speakers from around the world, open to the general public

