

HSF Training Activity

Overview, Goals



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... And many more! (see slide 8)

WLCG/HSF Workshop 2025

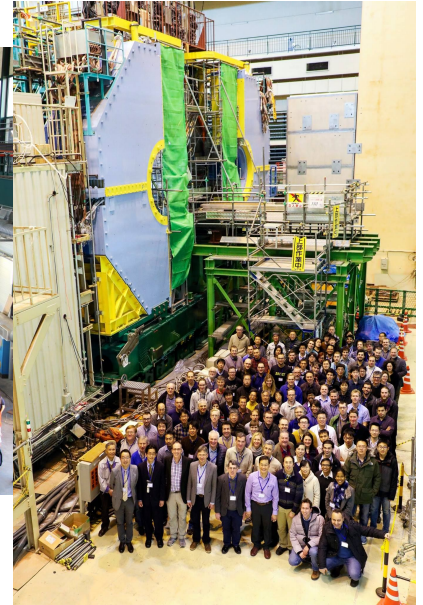
May 7, 2025



Software Development in HEP

As a key for a sustainable scientific program

- Scientific collaborations are **big and growing**.
 - $O(1K)$ collaborators in hundreds of institutes around the world.



Software Development in HEP

As a key for a sustainable scientific program

- Scientific collaborations are **big and growing**
 - O(1K) collaborators in hundreds of institutes around the world
- High Energy Physics (HEP) and Nuclear Physics (NP) are **computationally intensive** and **data driven** fields
 - A full physics potential requires investment into the software used to collect, process, and analyse data
- **Developers with strong foundation** are critical resources in the success of the current and future experiments
 - The researchers must be brought up to date with new software technologies, concurrent programming, and artificial intelligence
 - They must maintain, improve, and sustain the software

Training and Onboarding Initiatives in HEP

How do experiments teach software?

Virtual

Hybrid

In person



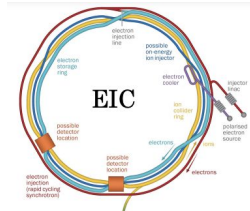
Online book



Starter Kit



Data Analysis Schools



Online tutorials



Software tutorials



Synchronous tutorials
“Carpentries-style”

“Software is different, but challenges are common”

HEP Software Training

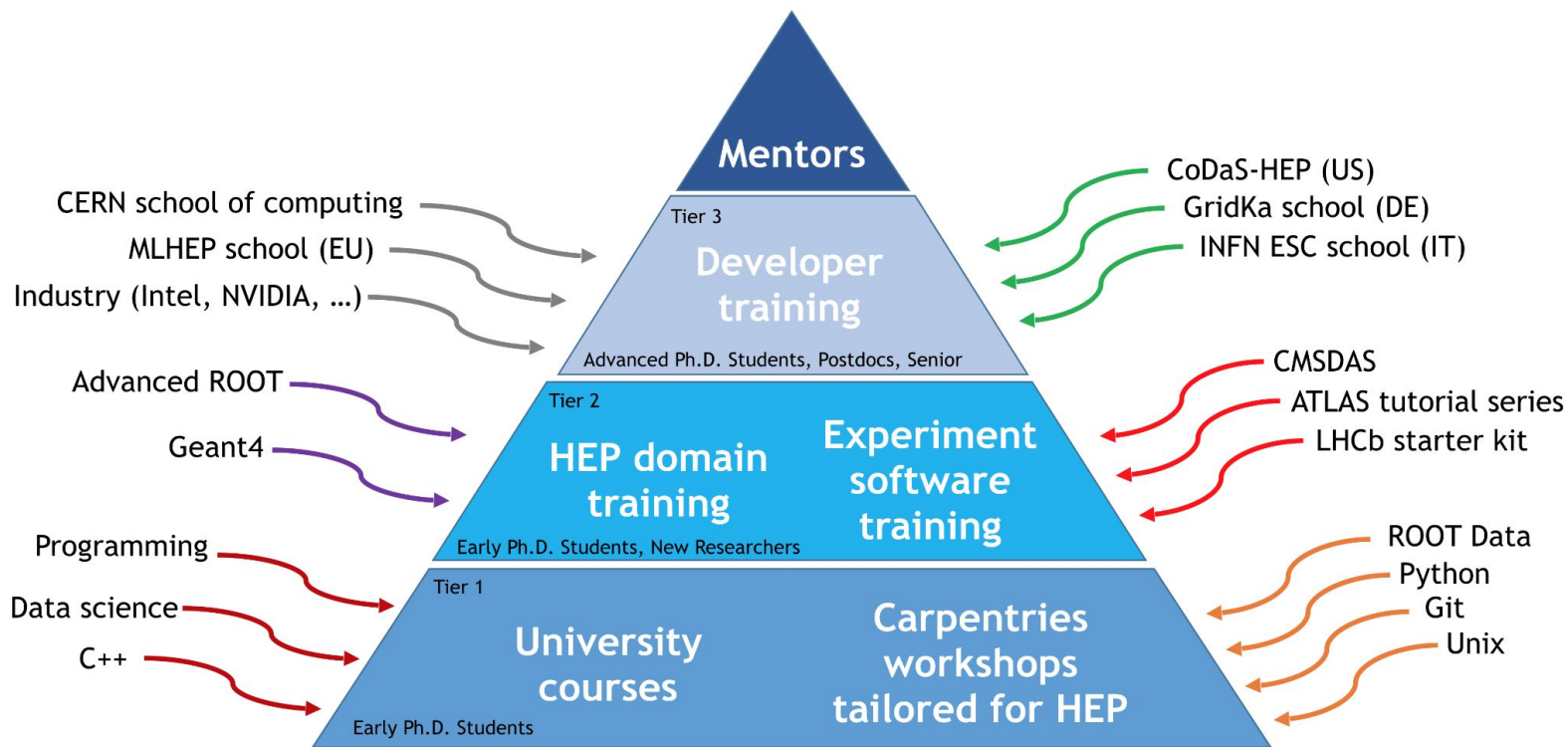
Why not leave everything to the experiments?

- O(10k) HEP people worldwide need to be trained in software engineering & computing
- Common challenges faced:
 - Most people developing code have non-permanent positions with contracts of 2 - 4 years
 - Training activities are not the most popular in making career steps and by funding agencies
 - Material for training is a moving target as technology evolves (e.g., Deep NNs, GPUs, FPGAs, ...)
- **This should be a community effort!**



HEP Software Training

We can cover more ground together!



HSF Training

Organization

- Established in 2018
- Develops material for an introductory software curriculum
 - And teaches this curriculum to scientists
- Focuses on common software material across HEP
 - From basic core software skills
 - To advanced training required in software and computing
- Remote weekly public meetings (via Zoom) to plan and assess progress
 - Led by four co-conveners
 - Proposals are discussed and events are planned
- Engages with different experimental collaborations and initiatives
 - IRIS-HEP, FIRST-HEP, and The Carpentries

Join an event!

Discover new topics together with mentors and peers!


Self study!

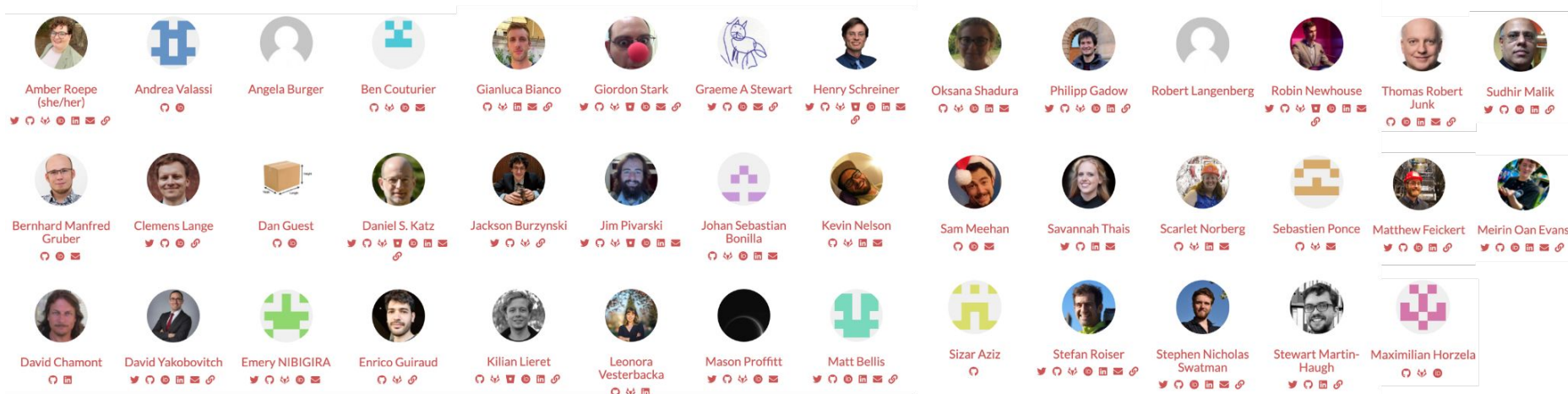
Learn at your own pace. No matter if you want to get a quick overview or dive in the details, this is for you!

<https://hepsoftwarefoundation.org/training>

HSF Software Training

The community

- An active community of members supporting training on voluntary basis 
 - Coming from multiple collaborations, adding value to the training from different environments



<https://hepsoftwarefoundation.org/training/community.html>

HSF Software Training

Principles

We need a **unified**, **scalable**, and **sustainable** software training framework

Unified

- Material and events should be **centrally listed & discoverable**
- Concentrate efforts by developing **cross-experiment** content
- A **community** must guide, support, and coordinate

Scalable

- Material must be teachable by **multiple instructors**
- **Self-study** must not be an afterthought

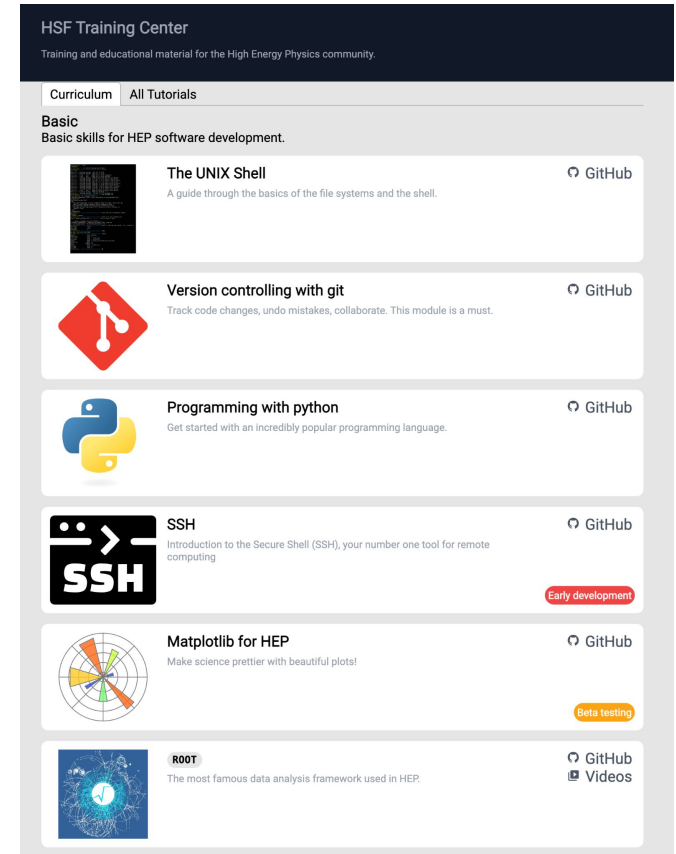
Sustainable

- Material must be **open source** and **maintained collaboratively**
- **Incentives & recognition** important motivators

HSF Software Training Center

Upscaling software skills

- Most experiments have similar training needs and material
- We are aiming to compile the available material in a single entry point
- Students can focus on what is most relevant to them
 - Basics as Unix shell, Python, Git
 - Intermediate modules as Docker, Apptainer, CMake, CI/CD
 - Some specific to HEP data analysis: ROOT, Scikit-HEP, REANA




The screenshot displays the HSF Training Center website. At the top, it says "HSF Training Center" and "Training and educational material for the High Energy Physics community." Below this, there are tabs for "Curriculum" and "All Tutorials". The "Basic" section is highlighted, with the subtitle "Basic skills for HEP software development." The list of modules includes:

- The UNIX Shell**: A guide through the basics of the file systems and the shell. (GitHub)
- Version controlling with git**: Track code changes, undo mistakes, collaborate. This module is a must. (GitHub)
- Programming with python**: Get started with an incredibly popular programming language. (GitHub)
- SSH**: Introduction to the Secure Shell (SSH), your number one tool for remote computing. (GitHub) Early development
- Matplotlib for HEP**: Make science prettier with beautiful plots! (GitHub) Beta testing
- ROOT**: The most famous data analysis framework used in HEP. (GitHub) Videos

<https://hsf-training.org/training-center/>

Today

Agenda

Overview, goals	<i>Michel Hernandez Villanueva</i>
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	14:15 - 14:30
The EVERSE training and recognition plan	<i>Kenneth Brian Rioja</i>
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	14:30 - 14:55
GWOSC and gravitational-wave data analysis training	<i>Massimiliano Razzano et al.</i>
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	15:00 - 15:25
Coffee break	
<i>Cafeteria, building 200, IJCLab</i>	15:30 - 16:00
Training on sustainable computing at DESY	<i>Christoph Wissing</i> 
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	16:00 - 16:25
User Learning for ePIC	<i>Holly Szumila-Vance</i>
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	16:30 - 16:55
HOWTO Train: the HSF Training experience	<i>Michel Hernandez Villanueva</i>
<i>Auditorium Joliot Curie, Building 100, IJCLab</i>	17:00 - 17:25

Goals for Today

And how to collaborate

- Identify room for collaboration between organisations
- Make training events and material discoverable, link learning resources
- Share problems, lessons learned, plans and solutions
- Exchange ideas

- HSF Training holds public weekly meetings: Mondays at 4pm CEST
 - <https://indico.cern.ch/category/10294/>
 - Everyone is welcome to join!

- Reach us also via the channels shown in [our webpage](#)

Next Training Events

HSF and Friends

- **HSF/IRIS-HEP Software Basics Training (Hybrid)**
 - 18–20 June 2025, CERN
 - Bash, Git, Python, ROOT and Scikit-HEP
 - <https://indico.cern.ch/event/1516608/>

- **Deep learning “Train-the-trainer”, with [ErUM-Data-Hub](https://indico.desy.de/event/47263/)**
 - 15–19 Sept 2025, Berlin
 - Practical knowledge on how to teach deep learning
 - <https://indico.desy.de/event/47263/>

