Role of CERN and DESY

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KET ESPPU workshop, January 20/21 2025

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

DESY.

CERN

Germany is largest member state of CERN:

- About 1300 users in 2023, 70% from CERN experiments
- German institutions contribute to success of CERN in major way, e.g. LHC collaborations, DRD collaborations, … theory
- Steward for accelerator physics in Europe

DESY and CERN

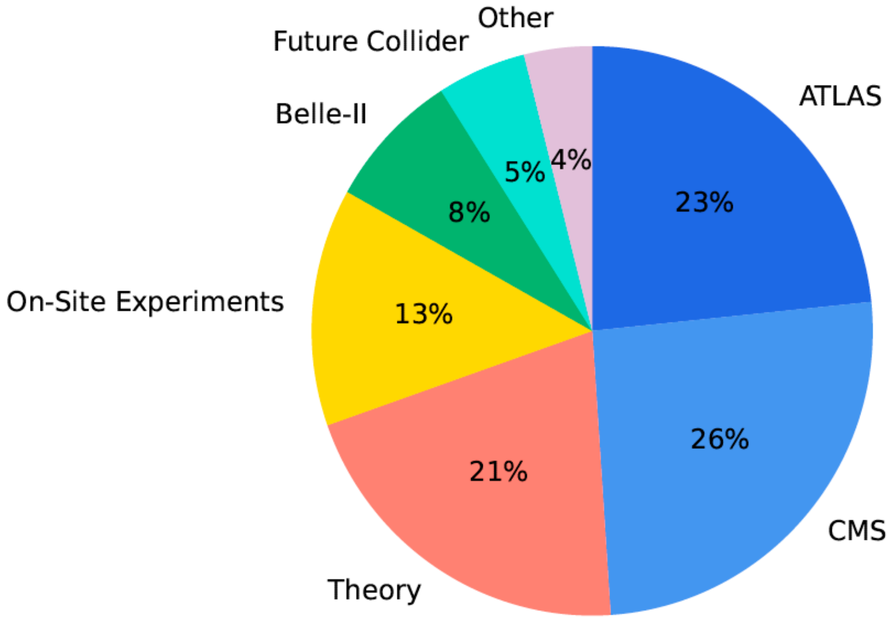
Success of both DESY and CERN is rooted in designing, building and operating large accelerators

- Currently R&D at CERN and DESY complementary
  - CERN: mostly on HF magnets for proton accelerators
  - DESY: mostly on SRF and PWFA for electron accelerators (≈70 FTE)
- There are many synergies and DESY recognizes CERNs role as the steward of accelerator physics in Europe
- GSI and KIT also work on accelerator R&D and have synergies with CERN
- DESY and CERN operate test beam facilities that are complementary
  - DESY 2024: > 500 users (particularly important during SPS shutdowns)

DESY and CERN

DESY is the **only large laboratory** (within Helmholtz) that supports experimental particle physics and is the largest laboratory for accelerator physics in Germany

- Total personnel 2952 people; base budget 309 M€
- HEP: about 350 FTE
- Accelerator physics: > 700 FTE



DESY has launched a **programme of on-site experiments** with strong intl. participation

- Axions: ALPS II, BabyIAXO, MADMAX
  - CERN collaborates on BabyIAXO and enables MADMAX R&D
- QED: ALPS II, LUXE

BabyIAXO, MADMAX and LUXE not yet fully funded

Reminder: ESPPU 2020

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General considerations for the 2020 update

B. The European organisational model centred on close collaboration between CERN and the national institutes, laboratories and universities in its Member and Associate Member States is essential to the enduring success of the field. This has proven highly effective in harnessing the collective resources and expertise of the particle, astroparticle and nuclear physics communities, and of many interdisciplinary research fields. Another manifestation of the success of this model is the collaboration with non-Member States and their substantial contribution. ***The particle physics community must further strengthen the unique ecosystem of research centres in Europe. In particular, cooperative programmes between CERN and these research centres should be expanded and sustained with adequate resources in order to address the objectives set out in the Strategy update.***

CERN, DESY and other national labs

Lab Directors Group (LDG):

- Consists of CERN and nat. labs strongly engaged in HEP: PSI, STFC labs, NIKHEF, LNF, CEA, IJClab, CIEMAT
- Did survey to understand resources, competences and interests
- Any large project will benefit from joint expertise of technical staff at national labs
  - E.g. most labs are strongly engaged in accelerator and detector roadmap
- Will prepare submission commenting on how the network between the labs is working and/or can be strengthened in the future

Proposed Statements

Statement before entering questions

CERN is the world's leading laboratory for accelerator-based particle physics and a beacon for Europe's international competitiveness, as highlighted in the report "The future of European competitiveness" by Mario Draghi. CERN's leading role is to be secured by a flagship collider project after the LHC, which can be used to search for answers to our fundamental questions. CERN has repeatedly proven that it can successfully realise large-scale technological projects. CERN’s strength in accelerator research and development is essential for the realization of the future flagship project. The diversity of the research programme at CERN must be maintained.

Statement: Part 1

The role of CERN and DESY and other major laboratories in Germany

Germany is the largest member state contributing to CERN and has been contributing significantly to its success in particle and nuclear physics. In 2023, nearly 1300 employees from more than 25 German research institutions (universities, Max-Planck and Helmholtz institutes) were registered as users of CERN. About 70% of the users contribute to the success of the LHC experiments. German institutions also play a pivotal role in multiple recently initiated Detector R&D (DRD) collaborations hosted by CERN.

As the german national laboratory for particle physics, DESY plays an important role for the particle physics community. DESY contributed in tight collaboration with the German universities to large collider experiments by providing technical infrastructure, facilities and expertise for large scale projects. Aditionally, DESY has launched a programme of mid-size experiments searching for axion-like particles (ALPS II, BabyIAXO, MADMAX) and probing QED in a new regime (ALPS II, LUXE) with strong international contributions, and collaborates with CERN on BabyIAXO and MADMAX. While ALPS II is running, the other experiments are not yet fully funded.

Statement: Part II

CERN and DESY share a long-standing tradition of collaboration in particle and accelerator physics, with the success of both laboratories rooted in their ability to design, construct, and operate large accelerators.Within Germany, DESY is the sole institution within the Helmholtz Association dedicated to experimental particle physics and the largest accelerator laboratory. Currently, the R&D activities on accelerator technologies by CERN and DESY are complementary, with CERN focusing on high-field magnets for proton accelerators, while DESY concentrates on SC-RF and PWFA-based accelerators for electrons. The Helmholtz centers KIT and GSI also have significant accelerator R&D activities with synergies with CERN. CERN and DESY also both operate complementary "Test Beam" facilities for detector R&D widely utilized by particle and nuclear physicists for experiments at CERN, FNAL, GSI, PSI and elsewhere. DESY and CERN also share a long tradition of collaboration in software and data science, particularly in studies related to future colliders. DESY's cooperation with the universities on one hand and with CERN on the other is an essential ingredient for the long-term strategy of the German particle physics community

Looking ahead, a more systematic and more coordinated approach towards sharing technical expertise and resources between CERN and the national laboratories would be of great benefit to ensure that particle physics projects at CERN and other laboratories can be realised in a timely and cost effective manner.