

2024 - NorCC workshop Trondheim



Norwegian Centre for CERN-related Research

Heidi Sandaker - NorCC 03.09.2024

Welcome to NorCC Workshop 2024

- **Welcome to Trondheim and NTNU !**
 - **Many thanks to NTNU, the local organising team and Eli !**
 - Agenda for the workshop is here: <https://indico.cern.ch/event/1320728/>
 - Please note the dates of the next upcoming workshops:
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- Special welcome to Pål Sørgaard, Forskningsrådet, who will attend the workshop !

Upcoming workshop dates

2025 : 17 - 18 Sept

2026 : 09 - 10 Sept

2027 : 22 - 23 Sept

Goal of this workshop

- **Discuss our first draft of our roadmap - plan for the next 10 years**
It is not complete but hopefully a step in the right direction
- **Discuss new research or collaborations that can give us an advantage internationally**
- **Discuss what we would like to do to prepare for the future (HL-LHC + post LHC)**

Welcome to NorCC Workshop 2024

Centred around 4 main sessions:

- Goals for HL-LHC and how to meet them
- Goals for non LHC experiments and how to meet them
- Goals for FCC & future colliders in general and how to meet them
- Goals for FCC alternatives ("Plan B") and how to meet them

Each session includes:

- Physics (T+E)
- Analysis
- Detectors
- Computers
- Accelerators
- Technology
- Applications

Day 1	
09:00	Session 1 - Introduction <i>Heidi Sandaker</i>
10:00	329, Hovedbygningen, NTNU Gløshaugen 09:00 - 10:15
	Break 10:15 - 10:30
11:00	Session 2 - Goals for HL-LHC and how to meet them (ALICE) <i>Ionut Cristian Arsene et al.</i>
	329, Hovedbygningen, NTNU Gløshaugen 10:30 - 11:40
	Session 2 - Goals for HL-LHC and how to meet them (ATLAS) <i>Dr Eirik Gramstad et al.</i>
	329, Hovedbygningen, NTNU Gløshaugen 11:40 - 12:00
12:00	Welcome by NTNU Rector Tor Grande 329, Hovedbygningen, NTNU Gløshaugen 12:00 - 12:15
	Lunch @ Kjelhuset 12:15 - 13:30
13:00	Overview of relevant NTNU activities <i>Are Strandlie et al.</i> 329, Hovedbygningen, NTNU Gløshaugen 13:30 - 13:45
14:00	Visit to laboratories 13:45 - 14:45
15:00	Session 2 - Goals for HL-LHC and how to meet them (ATLAS) continued <i>Are Strandlie et al.</i> 329, Hovedbygningen, NTNU Gløshaugen 14:45 - 15:30
16:00	Session 3 - Goals for non-LHC experiments and how to meet them <i>Antoine Camper et al.</i> 329, Hovedbygningen, NTNU Gløshaugen 15:30 - 16:15
	Break w/ snack & coffee/tea 16:15 - 16:30
17:00	Session 3 continued <i>Antoine Camper et al.</i> 329, Hovedbygningen, NTNU Gløshaugen 16:30 - 18:00

Day 2			
09:00	Session 4 - Goals for FCC & future colliders in general, and how to meet them <i>Erik Adli et al.</i>		
10:00	329, Hovedbygningen, NTNU Gløshaugen 09:00 - 10:25		
	Break 10:25 - 10:35		
11:00	Session 5 - Goals for FCC alternatives ("Plan B") and how to meet them <i>Dr Carl A. Lindstrøm et al.</i>		
	329, Hovedbygningen, NTNU Gløshaugen 10:35 - 12:00		
12:00	Lunch @ Kjelhuset 12:00 - 13:15		
13:00	NorCC Governing Board meeting 230, Hovedbygningen, NTNU Gløshaugen 13:15 - 15:00	NorCC Young Researchers Council (YRC) meeting 231, Hovedbygningen, NTNU Gløshaugen 13:15 - 15:00	Work on roadmap 329, Hovedbygningen, NTNU Gløshaugen 13:15 - 15:00

Welcome to NorCC Workshop 2024

Additional events:

- Welcome by Tor Grande
- Overview of NTNU activities + Visit to laboratories
- Parallel sessions day 2
 - Draft 2 of roadmap working session
 - YRC council
 - Governing Board

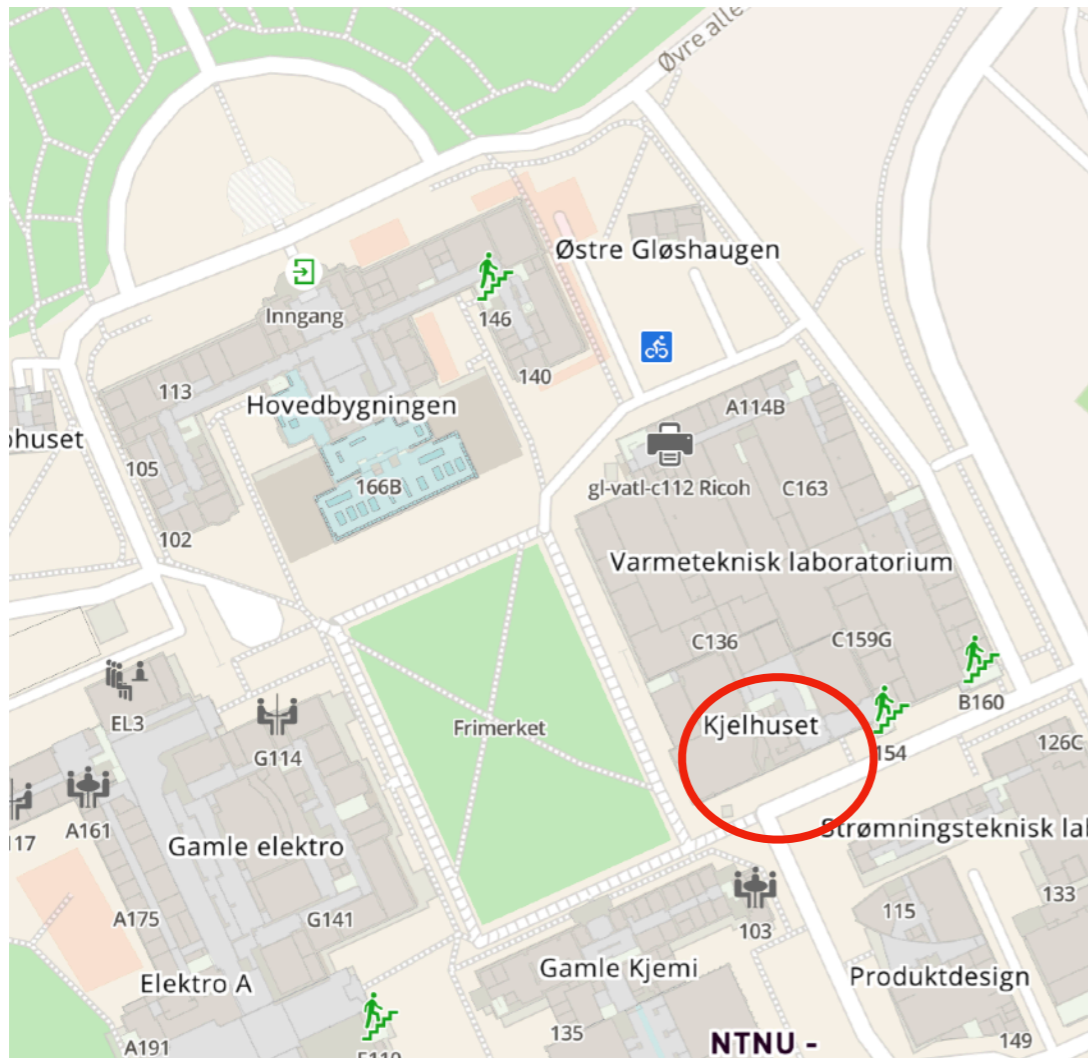
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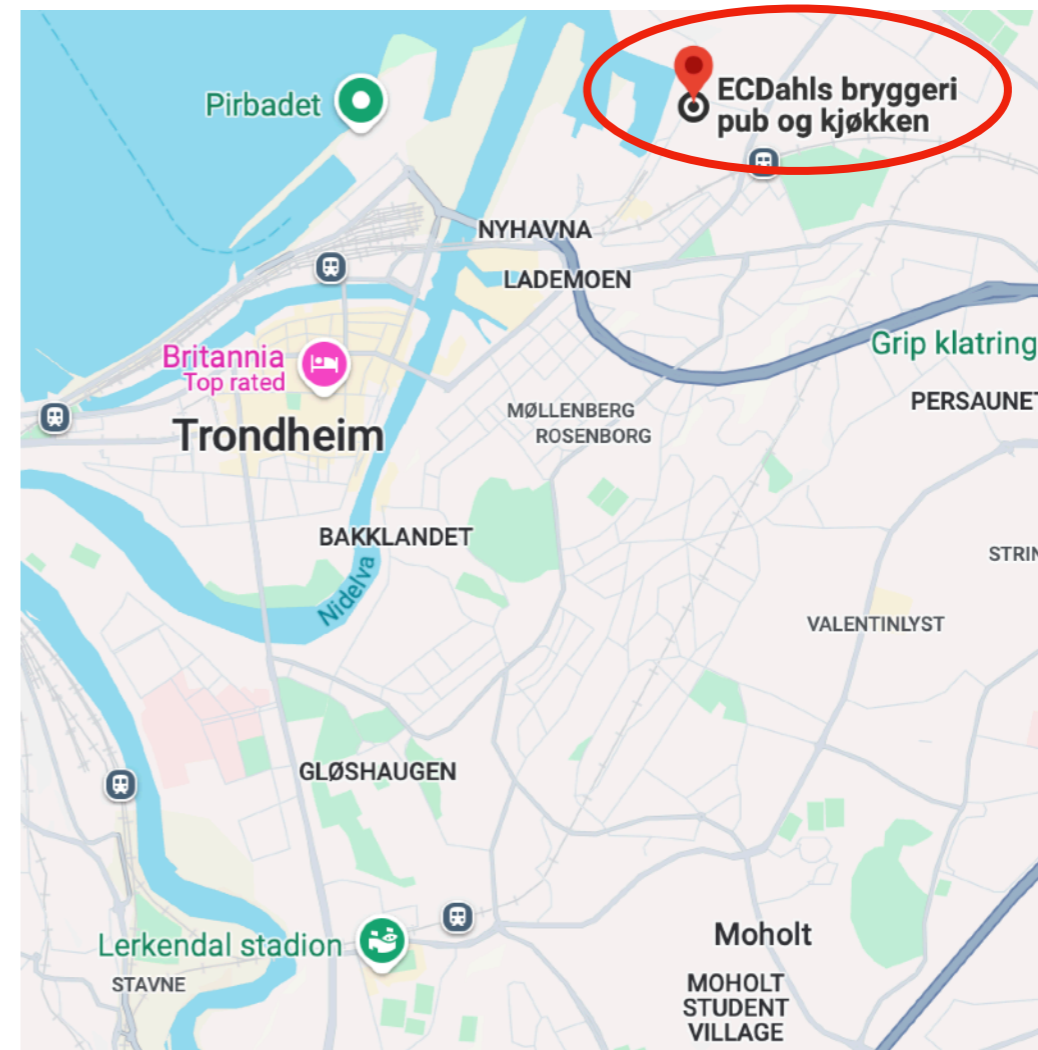
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	Work on roadmap 13:15 - 15:00

Welcome to NorCC Workshop 2024

Lunch



19:30 - Dinner - Workshop dinner @
E.C. Dahls Pub og Kjøkken



Welcome to NorCC (for those who are new)

Practical info:

- NorCC meetings - <https://indico.cern.ch/category/13574/>
- NorCC webpage - <https://norway.cern/>
- NorCC mailing lists (self-sign up at CERN)
 - Norway-CERN-research@cern.ch
 - Norway-CERN-young-researcher@cern.ch
 - Norway-CERN-research-permstaff@cern.ch
 - + various subgroups (contact conveners)
- Information on CERN student programs:
 - <https://careers.smartrecruiters.com/CERN/students>
- (Ir-)regular seminars
 - Third Tuesday in a month - announced by e-mail
 - Suggestions of speakers are made to Eli/Heidi, all suggestions are welcome
- Students seminars - [do we start again?](#)
 - First Tuesday each month - Sign up is e-mail to Eli
 - 15 min + discussion
 - Presentation training and/or discussion of a problem



NorCC organisation

Changes

◆ 5 research activities

- A1 - Particle Physics
- A2 - Nuclear Physics
- A3 - Accelerator Physics
- A4 - Low Energy Physics
- A5 - Technology

◆ 2 supporting activities

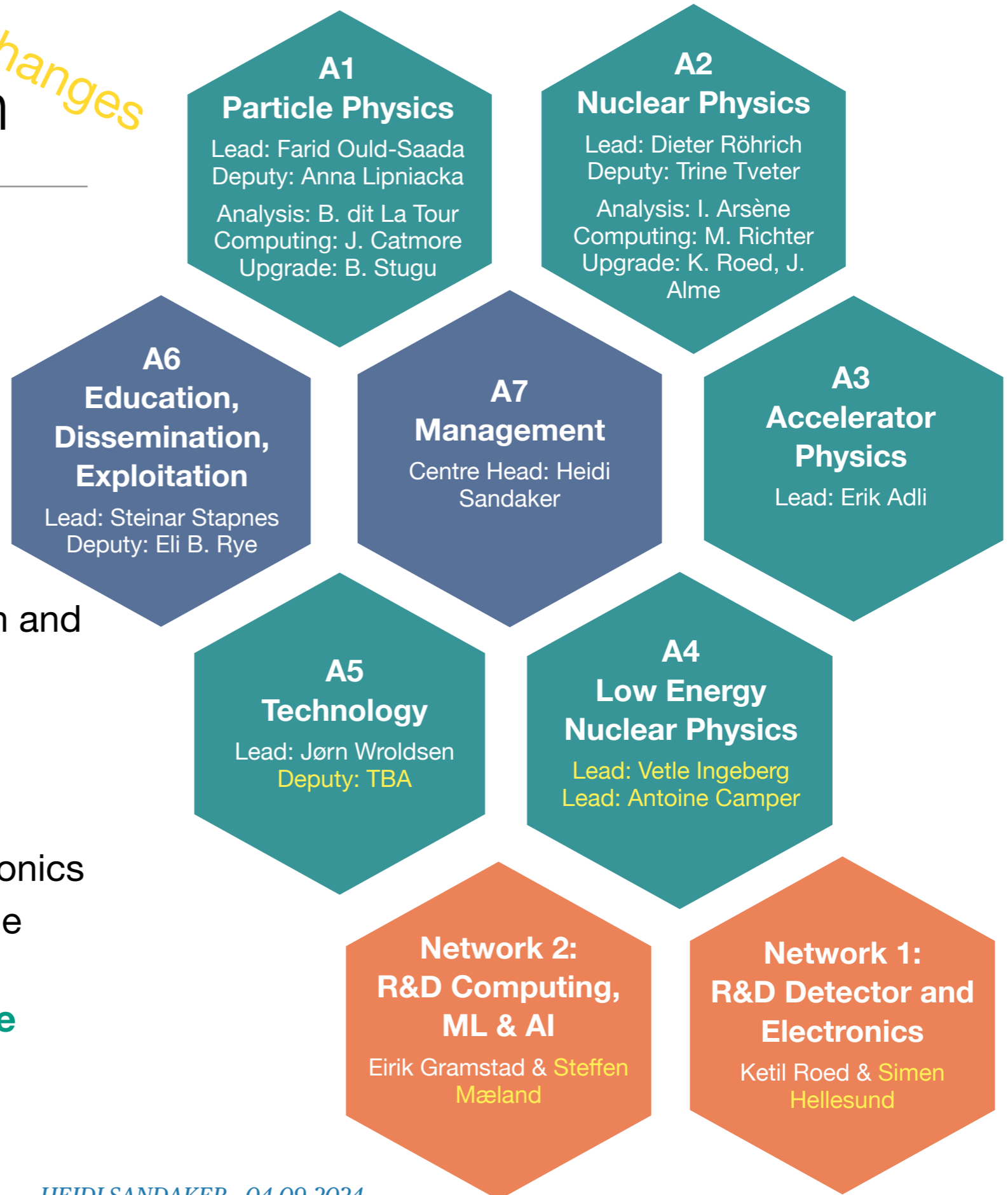
- A6 - Education, Dissemination and Exploitation
- A7 - Management

◆ 2 networks enabling synergies across the research activities

- N1 - R&D Detector and Electronics
- N2 - R&D Computing, Machine Learning and AI

◆ Laboratories and infrastructure

- NorLHC I & II
- NorFab (USN)



Example of activities 2024

ATLAS probes uncharted territory with LHC Run 3 data

The ATLAS collaboration has released its first results from searches for new physics phenomena conducted with data from Run 3 of the LHC

26 JULY, 2024 | By ATLAS collaboration

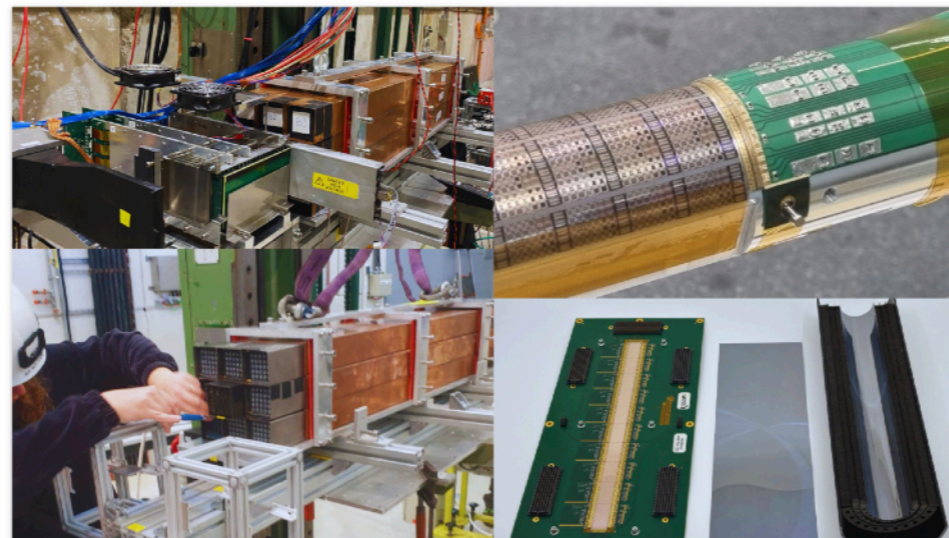


Display of a collision event recorded by the ATLAS detector at an energy of 13 TeV. Each track (blue lines) represents an electron or positron. The inset shows an axial view of the detector, illustrating the electron tracks dispersing a few mm. (Image: ATLAS/CERN)

ALICE gets the green light for new subdetectors

CERN's dedicated heavy-ion physics experiment, ALICE, is upgrading its Inner Tracking System and adding a forward calorimeter for the next phase of the LHC upgrade

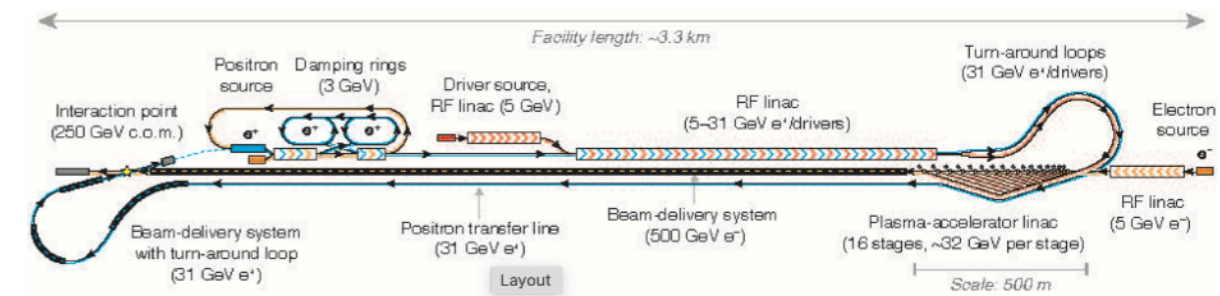
25 APRIL, 2024 | By ALICE collaboration



ALICE's new subdetectors, Forward Calorimeter (left) and components of the Inner Tracking System 3 (right) (Image: ALICE Collaboration)

HALHF Project

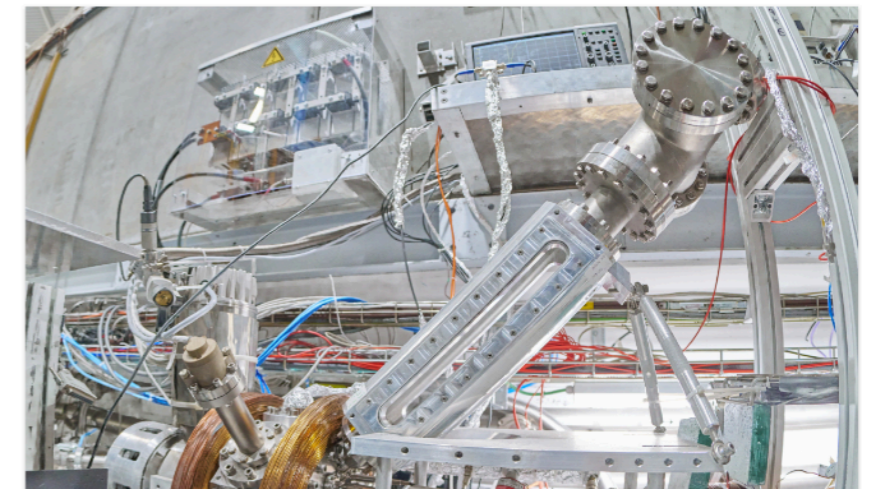
The Hybrid Asymmetric Linear Higgs Factory Project - HALHF



AEGIS experiment paves the way for new set of antimatter studies by laser-cooling positronium

In cooling positronium with laser light for the first time, AEGIS may also have taken the first step towards a matter-antimatter system that emits laser-like gamma-ray light

22 FEBRUARY, 2024



Example of activities 2024

Summer@cern 2024



Statnett and CERN collaborate to embrace innovative energy

Statnett and CERN, the European Laboratory for Particle Physics, have signed a Memorandum of Cooperation (MoC). The agreement aims to explore collaborative opportunities across technological areas, find sustainable solutions for the operation of future grids, and foster innovative energy practices enabling an environment-friendly transition.



En kjernefasilitet

8. februar 2024 / jinsigve / MatNat

Det er mange sentre, store prosjekt og initiativ ved vårt fakultet. For svært mange av disse er infrastruktur essensielt. Denne uken fikk jeg anledning til å besøke et av fakultetets lengst varende engasjement med tilhørende stor prosjektaktivitet, nemlig CERN (Conseil Européen pour la Recherche Nucléaire). Den europeiske organisasjonen for forskning på nukleärfysikk. Forskningen er svært...

Upcoming: CERN 70 celebrations

Special thanks to Hilde, Eli, Bjarne, Trygve and all the organisers !

- **September 4 - Workshop Trondheim - celebratory dinner**
- **September 11 - Flagship event Oslo**
 - <https://indico.cern.ch/event/1445315/>
“Vorspiel”, Reception, “Nachspiel”
 - From CERN: CERN Council director (Eliezer Rabinovici) and head of International Relations (Charlotte Warakaulle)
 - NB: Remember to sign up: <https://www.uio.no/om/aktuelt/universitetsplassen/domus-bibliotheca/arrangementer/2024/cern70aar.html>
- **September 13 - Celebration Bergen**
- <https://indico.cern.ch/event/1444661/>
- **September 17 - CERN staff/user party !**
- **October 1 - Official celebration**

+ exhibition Rådhusplassen, forskningsdagene UiB...

HEIDI SA



Markering av CERN 70 år i Oslo

📅 Wednesday 11 Sept 2024, 14:00 → 22:00 Europe/Zurich

📍 Oslo

Description | 2024 er det 70 år siden CERN ble etablert, med Norge som ett av 12 opprinnelige medlemmer

Alle innlegg er populærvitenskapelige og arrangementet er åpent for alle.

Vorspiel og mottakelse strømmes direkte. Andreas Wahl er programleder.

NB! Om du ønsker å delta fysisk på vorspiel og mottakelse, meld deg på her: <https://www.bibliotheca/arrangementer/2024/cern70ar.html>

Arrangør: Norsk senter for CERN-relatert forskning (NorCC) og UiO

Contact ✉ eli.baverfjord.rye@cern.ch

14:00 → 15:55 Vorspiel

14:00

Velkommen! 🗨

Speaker: Andreas Wahl

NorCC roadmap 2025-2035

NorCC roadmap 2025-2035

- **About the current draft**

- V1 - Uploaded to this agenda and distributed to our community last week
- V2 - To be updated tomorrow+ based on our discussions these two days and distributed soon after

- **Scope of roadmap**

- Identify our key research areas and focus areas in the next decade
 - Physics (experimental and theoretical), analysis, computing, detectors, accelerators, technology, applications
- Identify / strengthen areas where Norway have or can obtain a competitive advantage
- Find old or new areas of research where we can increase or enhance collaboration across institutes / experiments / laboratories in Norway and with CERN
- Identify new areas of research which will be important in the future and where preparatory work needs to start now

- **Who are this roadmap for:**

- For ourselves, for more strategic planning and optimal use of our efforts / resources
- As a foundation for input to European strategies for (future) Nuclear and (current) Particle physics
- For university/institute leaders for their planning and support
- To NFR & KD to more easily plan for long-term support for CERN-related research
- For use for our applications to EU, NFR and others

NorCC roadmap 2025-2035

Outline of draft

Chapter 1 - Introduction & Summary

Chapter 2 - Scope of Roadmap

Chapter 3 - Overall strategic goals

Chapter 4 - LHC in the next decade: High Luminosity LHC, Run 4 and preparation for Run 5

Chapter 5 - Non-LHC experiments

Chapter 6 - Long term R&D for High Energy research: towards the post-LHC era

Chapter 7 - Long term future for Low Energy research

Chapter 8 - Proposed activities - implementation (how to meet the goals)

Chapter 9 - Organisation and Collaboration

Chapter 10 - Research Education, Training and recruitment

Chapter 11 - Outreach, dissemination and exploitation

Chapter 12 - Environment and Societal impact

Dedicated sessions today and tomorrow

For all chapters :

Physics (experimental and theoretical), analysis, computing, detectors, accelerators, technology, applications (when applicable)

Overall goals - fundamental physics

- What are the exact properties of the Higgs boson?
- How do the light quarks and massless gluons make up for the mass of nucleons and nuclei, and what are the properties of Quark-Gluon Plasma?
- What are the plausible theoretical models explaining the experimentally observable beyond-Standard Model phenomena?
- How can gravity be included in the same theoretical framework as particle and nuclear physics

These questions also strongly relate to fundamental questions in cosmology and astrophysics, such as

- What was the structure of the Universe in the first instants after the Big Bang?
- What is the origin of dark matter and dark energy, which take up to 85% of the total Universe mass?
- What is the origin of the large matter / anti-matter asymmetry in the Universe?

The NorCC community plans to contribute also to the accelerator and detector development efforts dedicated to both the LHC upgrades as well as the post-LHC goals.

Overall goals - R&D, technology exploitation and applications to society

- Invent new reliable, radiation hard, fast and precise future detectors for particle and nuclear physics
- Develop new statistical methods and tools for data analysis
- Research sustainable computing/ML/AI solutions for future detector control, data acquisition, data analysis and simulations
- Develop new sustainable technologies, e.g. cooling, power, data control systems and robotics systems necessary for future long term experiments at CERN
- Develop long-term targeted collaboration with academia, industry and CERN on CERN-related technology research

Overall goals - Exploitation, Education and Training

- Provide education in Norway for nuclear and high energy physics as well as for the related technologies
- Train a new generation of scientists and engineers in Norway
- Engage industry in Norway for deliveries and collaboration, and facilitate technology transfer

Additional discussions - if we have time

- **Organisation of CERN-related research in Norway**
 - NorCC - what is working well, what is not?
 - Weekly steering committees (regular, extended, open)
 - Yearly workshops
 - Activities
 - Networks
 - Does communication flow well?
 - Newsletter
 - YRC
 - Other organisational matters?
- **Recruitment, education and training**
 - Common courses - next steps
 - Summer@CERN / Entrepreneurial training / Screening week / ...
 - Visits to CERN
 - CERN student programs
 - CERN liaison

Additional discussions - if we have time

- **The importance of fundamental physics**
 - Which arguments do we want to put forward
- **Impact on society**
 - Fundamental Physics - new knowledge
 - Technology developments
 - Training and educating workforce
 - ...

European strategies and Roadmaps

- **2024 European Long Range Plan for Nuclear Physics**
 - <https://indico.ph.tum.de/event/7629/contributions/8953/attachments/6020/8072/FullLRP2024Report03042024clean.pdf>
 - Andreas will say a few words about this plan later today
- **Next update of the European Strategy for Particle Physics**
 - <https://europeanstrategy.cern>
 - Technology developments
 - RECFA delegate - Farid Ould-Saada
 - Norway representative in ESG - Heidi Sandaker