

CERN's Status Report

Ongoing HL-LHC civil engineering work at point 5



Fabiola Gianotti, ECFA, 13/7/2020



Some news since Nov 2019 Plenary ECFA

Delivery of **excellent physics results** from full scientific programme continued.

LS2 activities (accelerator consolidation, East Area renovation, etc.) progressed on time until COVID. Diode consolidation of the 1232 LHC dipoles completed.

LHC Injectors Upgrade (LIU) is 95% complete → commissioning starting gradually

HL-LHC is ~ 35% complete

Phase-1 upgrades of experiments progressing well, with some delays (e.g. ATLAS muon NSW)
Phase-2 upgrades of ATLAS and CMS: finalising design, completing TDRs, moving from R&D to prototyping in some cases.

LS3 pushed back by 1 year (now starts Jan 2025) to allow experiments to complete upgrades. Following schedule meeting in Nov 2019.

96% of the contributions to 2020 budget received from Member and Associate Member States, similar to previous years → **we thank them for continued, strong support despite difficult times**

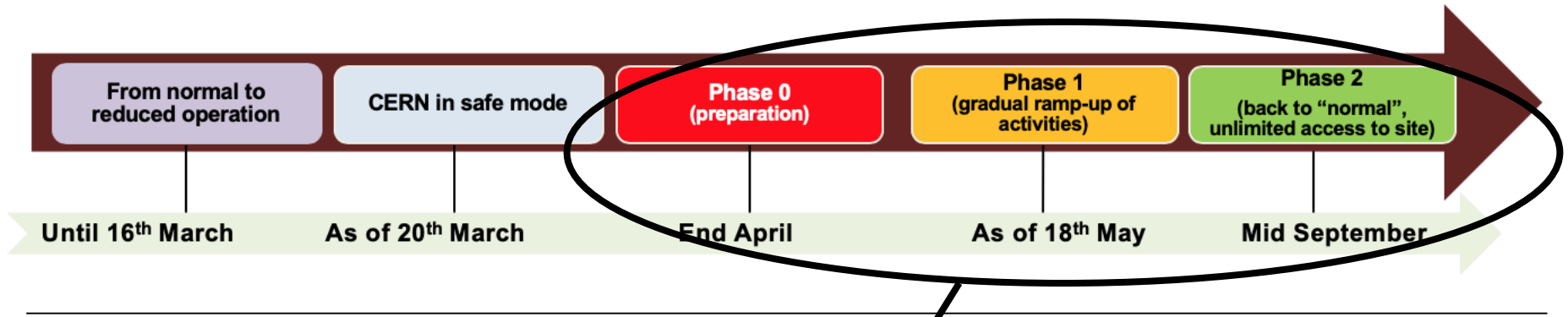
Strong commitment of CERN to minimise impact on environment, as well to save and re-use energy (~ 25 MCHF so far in the Medium-Term Plan over 2018-2028).

Council agreed that **CERN 2017-2018 Environment Report be made public** (first time ever)

Science Gateway: 67.5 MCHF secured (out of total cost of 79 MCHF). No delays so far.



The last 5 months



Phase 0



Safety and security of site and facilities; continuity of essential services; few urgent activities

to

Phase 1



Resume gradually, starting with LS2, accelerator and detector upgrades, urgent site and building work. Personnel on telework slowly back as mid Jun

Phase 2



Ramp-up to "unlimited" access completed by mid-Sept if everything goes well at CERN, Host States and beyond

Activities on-site limited to those essential for safety and security of site and equipment

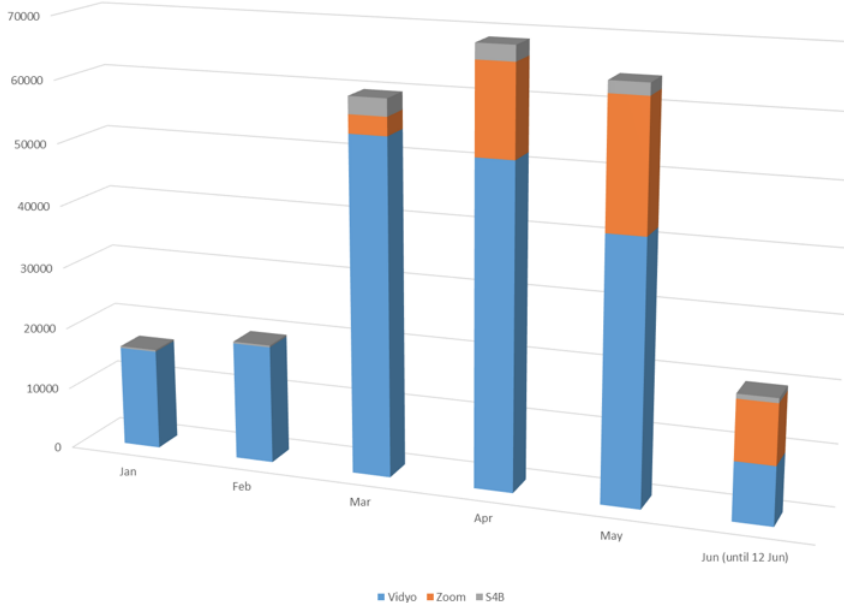
→ some 300 people (security, fire brigade, site maintenance, IT support, stand-by services, etc.)

All other personnel on telework (if compatible with their activity) or remunerated special leave

Departments prepared activity continuity plans and implemented needed digital procedures to ensure remote operation → 100% continuity in most cases.

All necessary services remained operational and were able to support on-site and remote work (medical service, site access and security, computing, finance, human resources, Host-Sate relations, etc.)

Video Conferencing Usage Trends (#Meetings)



Teleworking very successful, thanks also to reinforced IT infrastructure and assistance, with > 17 000 daily connections to video-conferencing tools.

Meetings, seminars, colloquia, training sessions, data analysis continued remotely at intense pace



Re-start plan

Soon after transition to safe mode → we started to develop a plan for **gradual, flexible** and **safe** re-start of activities and for bringing personnel* back on site → with situation improving around Europe in May, and lifting of restrictions in our Host States, plan was implemented as of 18 May

Supported by comprehensive Covid-19-specific health and safety measures, adapted to risk at any given time, developed by HSE unit in consultation with expert authorities.

They include personal protective equipment on surface and underground, hygiene measures, ventilation, policies for people feeling unwell, vulnerable people, visitors, meetings, transport, duty travel, cleaning, ...

Updated here with other news related to CERN's plans:

<https://hse.cern/news-article/coronavirus-information-measures-and-recommendations>

Plan reviewed weekly in the Enlarged Directorate (ED) and with the experiment managements and project leaders and adapted to health situation at CERN, our Host States and beyond, as well as to CERN's evolving priorities.

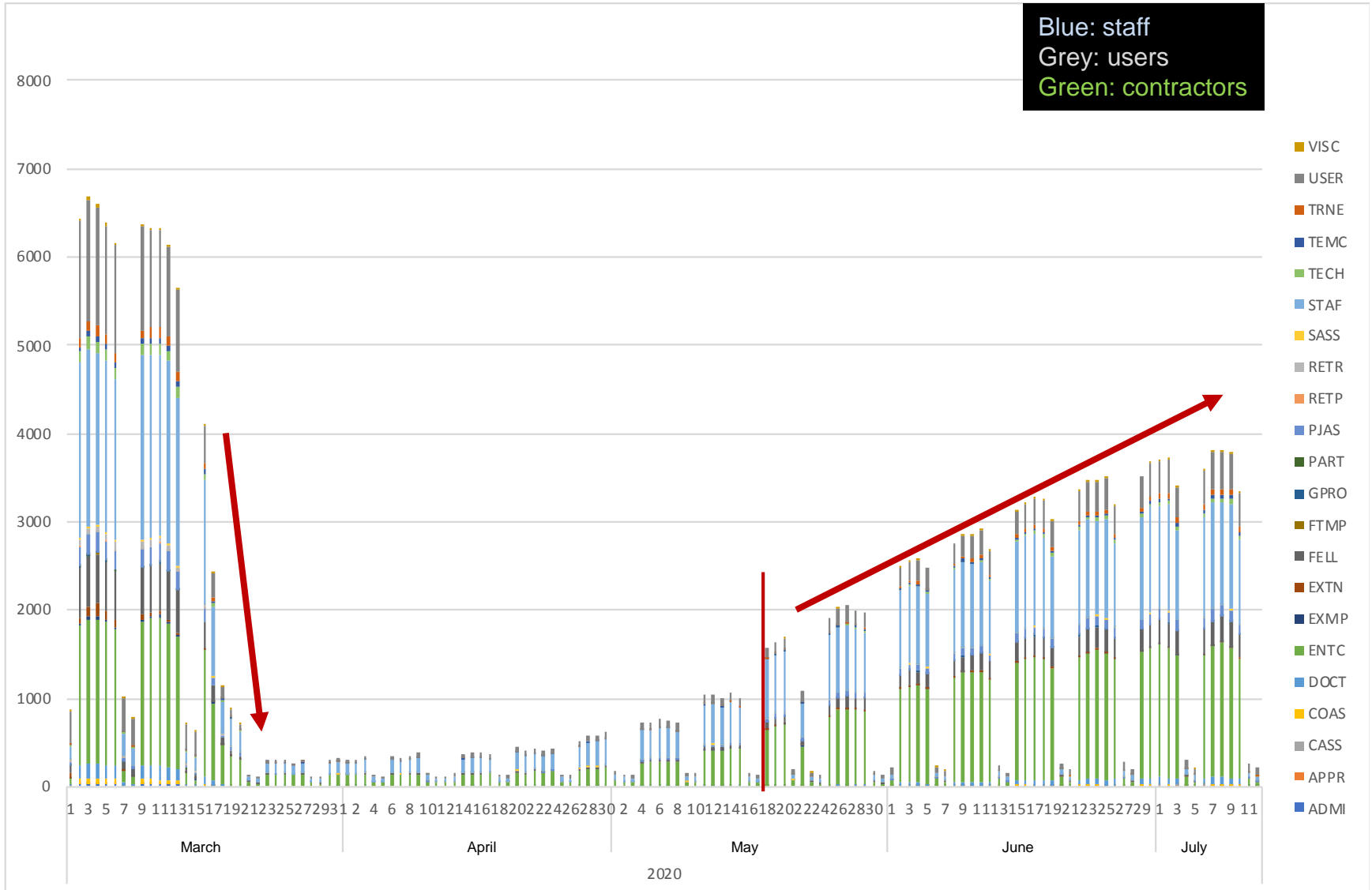
Ramp-up is slower for experiments, as they depend critically on:

- availability of users and other MPA not living in local area → travel and border restrictions
- work at Institutes (many Institutes subject to stricter restriction than in F and CH)

* CERN's personnel includes ALL categories: employed members (MPE: staff and fellows) and associated members (MPA: users, scientific associates, project associates, students, etc.)



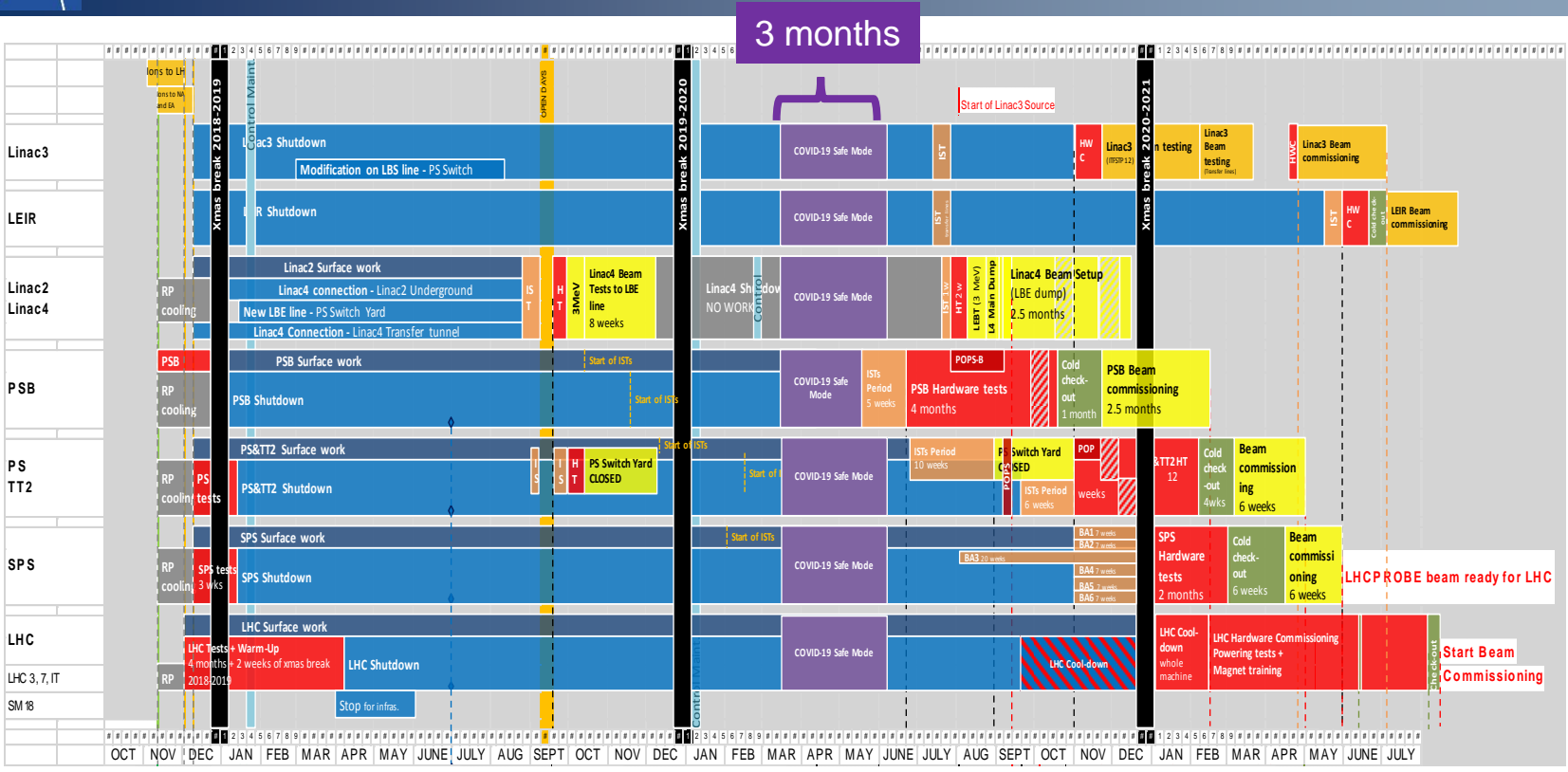
Number of people on site daily



From the access control system, can monitor that number of people simultaneously on site does not exceed the target value at any given time (safety!)



LS2 and accelerators



Preliminary: subject to changes!

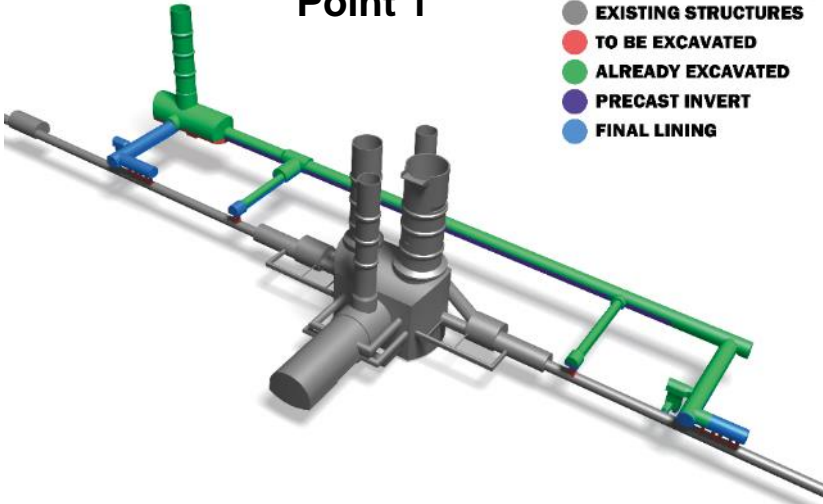
- ❑ Able to resume activities from where they stopped (thanks to controlled transition to safe-mode)
- ❑ Accelerator schedule delay is linear: ~ 3 months
- ❑ Beams to fixed target programme: second half 2021
- ❑ Beams from injectors to LHC Aug 2021

Experimental facility	Start Physics
ISOLDE	21.06.2021
SPS North Area p ⁺	12.07.2021
ELENA	23.08.2021
nTOF	27.09.2021
PS East Area	18.10.2021
SPS North area Pb ions	15.11.2021

Point 1

STATUS: 2020.05.22

- EXISTING STRUCTURES
- TO BE EXCAVATED
- ALREADY EXCAVATED
- PRECAST INVERT
- FINAL LINING

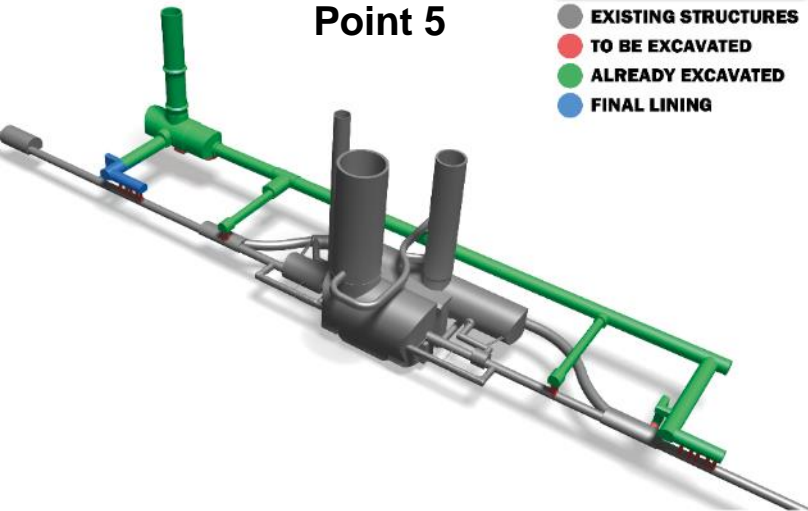


Excavation 95% completed both cases

Point 5

STATUS: 2020.05.12

- EXISTING STRUCTURES
- TO BE EXCAVATED
- ALREADY EXCAVATED
- FINAL LINING

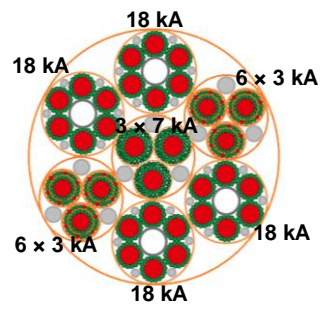


New technologies: Nb₃Sn and MgB₂

Nb₃Sn inner triplet full-size prototype (7.2 m) ready to be tested in SM18

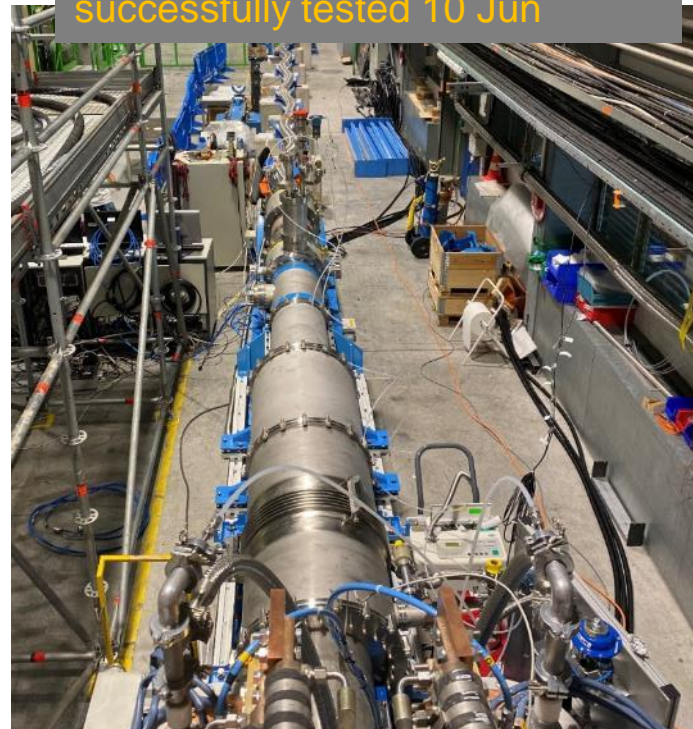
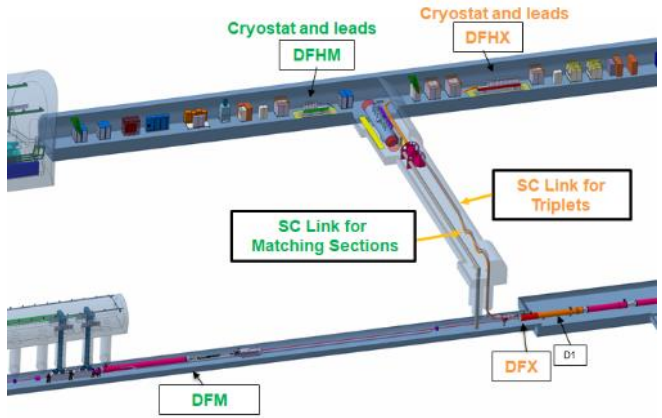


Power transmission line



MgB₂ cable:
 $\Phi \sim 90$ mm
 $I_{tot} > 100$ kA @ 25 K

L= 60 m demonstrator of superconducting link for triplets successfully tested 10 Jun



Status of Nb₃Sn dipoles



1 unit: 2 Nb₃Sn dipole plus a collimator
2 such units needed for operation at HL-LHC

S1 successfully tested → qualified for installation



S2 showing non-conformities and degradation.
S4 being tested.



S3 failed test → back to workshop



S5 being built



Depending on S4 and S5 tests, we may (or not) be able to install first unit in LS2

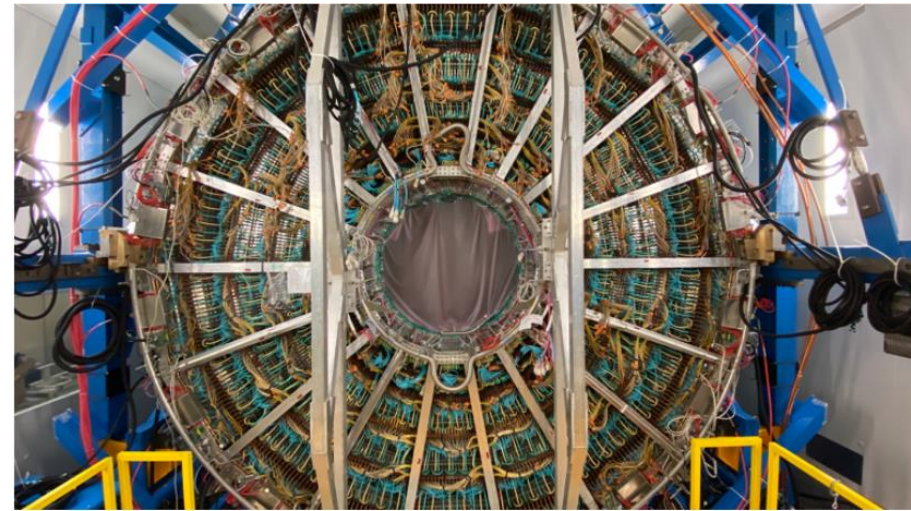


LHC experiments

CMS CSC refit lab



ALICE upgraded TPC ready cosmics



ATLAS Muon NSW



LHCb VELO RF foils installation
(partially guided remotely from Nikhef)





LHC/LS2 schedule

	J	F	M	A	M	J	J	A	S	O	N	D	J	F
LHC (3mth shift)	H/W commissioning					Training		com. w/ beam	rampup					
ALICE														
ATLAS (no NSW-C)														
ATLAS* (w/ NSW-C)														
CMS											Shielding work. needed for HL R3			
LHCb														

- ❑ Physics run could start in Nov 2021 or Feb 2022 depending on ATLAS NSW-C readiness
- ❑ LS2 schedule being discussed with machine and experiments → freeze in Nov 2020
- ❑ LHC low-intensity test run beginning Oct 2021 is a MUST if Run 3 starts in Feb 2022

23 Member States:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Serbia, Spain, Sweden, Switzerland, United Kingdom

8 Associate Member States:

Croatia, Cyprus*, India, Lithuania, Pakistan, Slovenia*, Turkey, Ukraine

* in the pre-stage to Membership

6 Observers:

Japan, Russia, USA, European Union, JINR, UNESCO

~50 ICA (International Cooperation Agreements):

with non-Member States, some with countries with developing particle physics communities (CERN mission is also to help build capacity and foster growth of particle physics worldwide).

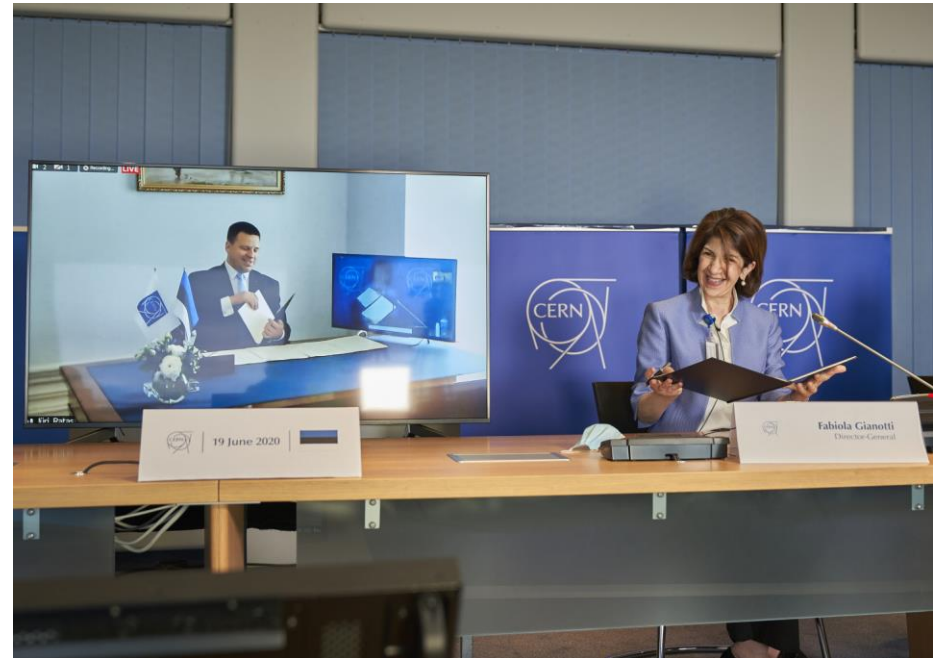
[Brazil and Latvia applied for Associate Memberships; Estonia applied for Membership](#)

Signature of agreement with Estonia

Agreement admitting Estonia as Associate Member in the pre-stage to Membership signed on 19 June → will entry into force as soon as ratification procedure in Estonia completed.

Remote ceremony for the first time in CERN's history.

Agreement signed for Estonia by Prime Minister, Mr Jüri Ratas





CONCLUSIONS

CERN succeeded so far to protect the health of personnel and prevent spread of infection on-site while maintaining the facilities up and running as long as feasible and safe.

Comprehensive Covid-19-specific health and safety measures introduced since the beginning. They have been adapted to the various phases of the pandemic, based also on advice of expert authorities.

Transition to safe mode made in a controlled manner → facilitated the smooth and fast re-start of the equipment. All needed services worked effectively during the safe-mode period, supporting the personnel on site or teleworking.

Gradual, flexible and safe re-start plan developed and now being implemented. CERN should be back to “unlimited access” by mid-Sept if everything goes well at CERN, in our Host States and beyond.

Many time-critical on-site activities (LS2, LIU, HL-LHC, upgrades of experiments) restarted. Optimisation of LS2 and Run 3 schedule being discussed with the experiments.



EXTRAS



Main lines of action since the beginning of COVID-19 (22 Jan)

- ❑ Awareness raising and communication:
 - Posters and TV screens on hygiene measures
 - Dedicated webpage set up on 29 Jan (open also to the public):
<https://hse.cern/news-article/coronavirus-information-measures-and-recommendations>
information, useful links, help lines, recommendations and measures. Updated 30 times since Jan
 - Several mails to full CERN community (up to 18,000 people) and specific categories
 - Two online meetings with personnel (17 March, 5 May): attended remotely by ~ 4000 people

- ❑ Activate support and management structures to face the emergency

- ❑ Continuous monitoring of the virus spread

- ❑ Consultation with expert authorities (Host States and beyond):
 - **Federal Office of Public Health (OFSP) in Switzerland**
 - **Ministry of Health in France**
 - **Geneva cantonal medical authorities**
 - World Health Organization (WHO)
 - Other intergovernmental organisations in Geneva with globally-mobile communities as CERN's.

- ❑ Implementation of measures proportionate to the level of risk and based on available evidence and expertise



Emergency management organisation

Crisis Management Team

Directorate (DG and Directors)

Enlarged Directorate (DG, Directors, Department Heads)

Technical Working Group

(Chair: HSE Deputy Department Head. Members: HSE, HR, IR)

Tasks: monitoring, consultation with health authorities, information-sharing, preparation of short/long-term scenarios decision by (Enlarged) Directorate

HSE= occupational Health, Safety and Environmental protection unit

- ❑ **Crisis Management Team (CMT)**: expert group (+DG) to address crises (fire, terrorist attack, epidemic, etc.). Annual training + exercise of “real cases” with external expert consultant
CMT called 7-8 March (following first confirmed case of infected person at CERN) and 15 March (to initiate Stage 3 and CERN’s transition to “safe mode”)
- ❑ **Technical WG**: put in place on 14 February → closed on 6 May
- ❑ **“Covid-19 response team”**: Technical WG + members of ED as needed; met daily/weekly from 24 Feb – 6 May → closed on 6 May
- ❑ **NEW**: Covid-19 crisis monitoring team set up on 27 May



The 3 stages of the epidemic and CERN's measures

Stage 1: 22 Jan → 8 Mar

Virus is far from CERN → monitoring situation; general recommendations

Dedicated website put in place

Hygiene measures and physical distancing recommended

Travel restrictions to “risk zones”

Telework for vulnerable people and 14 days quarantine for people coming from “risk zones”

CERN guided tours suspended

Stage 2: 9 Mar → 15 Mar

Virus approaches CERN (first confirmed case) → avoid wide circulation → reduce people on site

CERN official travels suspended

Access to CERN site by people coming from “risk zones” forbidden

Access to CERN site by users and visiting scientists only for essential activities

In-person meetings with > 100 people cancelled

Meetings with < 100 people: 2 m distance; attendance traced

CERN club activities suspended

CERN exhibitions and shop closed

Reinforced cleaning

Tracing of close contacts of tested-positive or suspected cases

Stage 3: 16 Mar → 18 May

Virus circulates in areas nearby CERN → lab goes to safe mode

Only essential people on site

Most personnel on telework or special leave

Wearing of masks on site compulsory

Strict physical distancing in restaurants



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CERN “first confirmed case”

Accommodation

Accommodation

Preparation for the various stages started from the beginning and each stage was anticipated during the previous one → we were not taken by surprise

In-plant

Measures

E.g. brought lab to “safe mode” in a controlled manner and reduced personnel on site from 6500 to 300 people in 4 days

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Health and safety measures

Comprehensive Covid-19-specific health and safety measures, adapted to risk at any given time, developed by HSE unit in consultation with expert authorities.



DG/2020-103 5 May 2020

EDMS: 2370902

MEMORANDUM

From: Fabiola Gianotti, Director-General. *Fabiola Gianotti*
 Doris Forkel-Wirth, Head of the HSE Unit *Doris Forkel-Wirth*

To: Extended Directorate,
 Technical Coordinators of the large LHC experiments,

Cc: SAPOCO Chair, President of SA, HSE-MB members, Chair of ACCU

Ref: COVID-19-related health and safety measures for the period covering the restart of CERN's activities

Date: 5th May 2020



- Supported by services in IPT, EN, SMB for PPE purchases and distribution, logistic, cleaning, transport, adaptation of premises.
- Excellent compliance by personnel!

Mandatory Covid-19 safety course to access site

Masks mandatory on site; additional personal protective equipment/PPE (safety glasses, face shields) in labs and underground; hand-gel dispensers at 90 locations over the sites

Air-conditioning units with recirculating air must be off; increased ventilation in closed spaces.

Space management in common spaces and offices to ensure distancing

Policies for people feeling unwell, vulnerable people, visitors, meetings, transport, duty travel, cleaning, ...

Etc. etc.

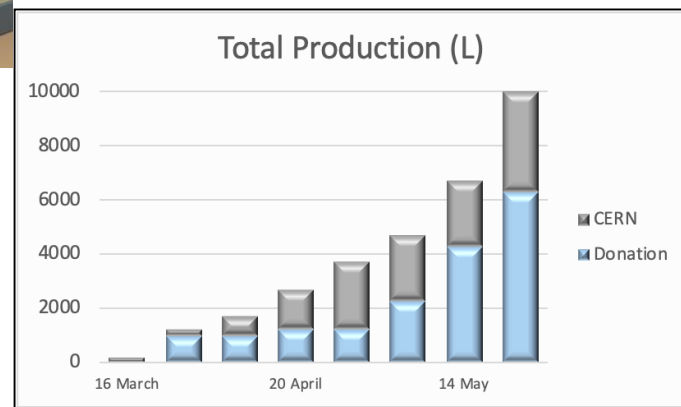
Task force established on 26 March to explore how competences and technologies of CERN's community can help society in the global fight against the virus, ensuring effective, well-coordinated action: <https://againstcovid19.cern>

Enthusiastic response: ~300 mails and ~100 proposals received, ~150 people involved. Working with WHO and various (health) research institutions worldwide.

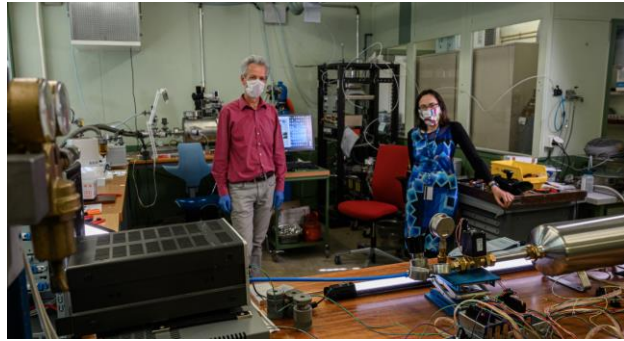
Production of masks, face shields, sanitising gel for local hospitals and authorities (and CERN personnel)



> 10 ton of sanitising gel and > 15000 face shields produced at low cost (60% of both donated)



Development of a ventilator for intensive care patients (HEV)



Initiative of scientists from LHCb experiment. Innovative, low-cost, easy and fast to build; particularly suitable for developing countries



CERN and WLCG computing resources in the service of Covid-19 research

CERN open-access repository (Zenodo) used to store and share pandemic's data

Folding@Home: CERN ranking improved from 2600 to 23 (out of > 250,000 teams) in ~ 2 months

zenodo Search Upload Communities Log in Sign up

Zenodo is continuing normal operation during the COVID-19 outbreak. All Zenodo staff are working remotely in accordance with preventive measures taken by CERN.

COVID-19 related communities

Need help uploading? Contact us

Coronavirus Disease Research Community - COVID-19

This community collects research outputs that may be relevant to the Coronavirus Disease (COVID-19) or the SARS-CoV-2. Scientists are encouraged to upload their outcome in this collection to facilitate sharing and discovery of information. Although Open Access articles and datasets are...

Curated by: Covid19_Team_OpenAIRE

Featured uploads related to COVID-19

<p>BIP4COVID19: Impact metrics and indicators for coronavirus related publications</p> <p>Thanasios Vergoulis, Ilias Kanellos, Serafeim Chatzopoulos, Danae Pia Karidi, Theodore Delamagas</p>	<p>A Twitter Dataset of 179+ million tweets related to COVID-19 for open research</p> <p>Banda, Juan M., Tekumalla, Ramya; Wang, Guanyu; Yu, Jingyuan; Liu, Tuo; Ding, Yuning; Chowell, Gerardo</p> <p>Due to the relevance of the COVID-19 global pandemic, we</p>	<p>Code for Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing</p> <p>Ferretti, Luca; Wymant, Chris; Fraser, Christophe</p> <p>This code implements the COVID-19 mathematical</p>
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Folding@home

Team Monthly Team Donor OS Stats

Team: CERN & LHC Computing

Date of last work unit: 2020-06-11 16:56:56
 Active CPUs within 50 days: 1,311,921
 Team ID: 38188
 Grand Score: 38,664,150,343
 Work Unit Count: 9,562,124
 Team Ranking: 23 of 253929
 Homepage: <http://public.web.cern.ch/public/>
 Team page URL: <https://app.foldingathome.org/cernstats/team38188.html>

Team members

Rank	Name	Credit	WUs
23	CMS-Experiment	15,283,980,803	2,919,221
36	ATLAS_CPU	12,033,276,379	2,725,372
229	LHCbHIT	2,950,071,986	415,608
277	ALICE-FLP	2,481,756,890	216,578
332	DESY-ZN_GPU	2,072,389,849	15,194