



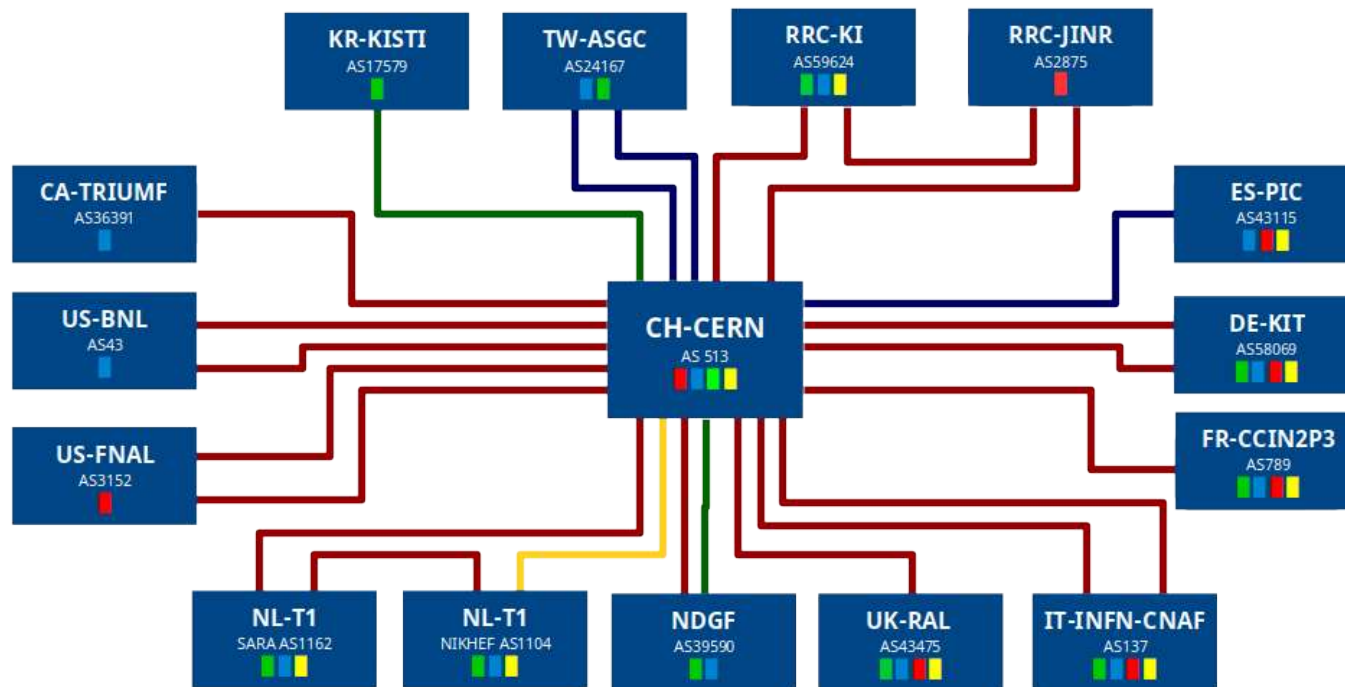
LHCOPN update

Edoardo Martelli

LHCOPN/ONE meeting #49

24th October 2022

LHCOPN



■ = Alice ■ = Atlas ■ = CMS ■ = LHCb
— 10Gbps
— 20Gbps
— 100Gbps
— 400Gbps
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<https://twiki.cern.ch/twiki/bin/view/LHCOPN/OverallNetworkMaps>

Numbers

- 14 Tier1s + 1 Tier0
- 12 countries in 3 continents
- Dual stack IPv4-IPv6
- 1.9 Tbps to the Tier0

Latest news

CH-CERN:

- Completed migration of first LHCOPN router from Juniper QFX-10002 to Juniper PTX-10001, which support 400Gbps connections
- Deployed second PTX-10001, migration of LHCOPN and LHCONE links from the other legacy QFX-10002 will start soon
- LHCONE connections to GEANT will be upgraded to 2x 400Gbps in November
- Construction of Preveessin Computer Centre is progressing well

CERN PCC at the time of last meeting



29-Mars-2022

CERN PCC today



19-September-2022



CERN PCC status

2022

- End 2022: Civil engineering and structural work to be completed
- December: Tender for first installation of servers to be adjudicated

2023

- Summer: Delivery and installation in PCC planned
- 3rd quarter: Data Centre ready for commissioning
- End 2023: Inauguration Ceremony foreseen

Ref :<https://indico.cern.ch/event/1205151/contributions/5068266/attachments/2529790/4352313/JM%20staff%20Oct%202022-vs2.pdf>

Latest news

NLT1:

- New 400G connection to NIKHEF. SARA still using the 100G link

IT-INFN-CNAF:

- Following the recent upgrade of the GARR network, CNAF has activated traffic load-balancing over their 2x 100G LHCOPN links to CERN
- CERN-CNAF DCI project is progressing. Equipment will soon be delivered at the two locations. GARR and GEANT are working in their DWDM interconnection in Milan

ES-PIC

- Still waiting for GEANT to upgrade Madrid and Geneva POP to deploy new 100G link. Using load-balancing with LHCONE to temporarily increase capacity

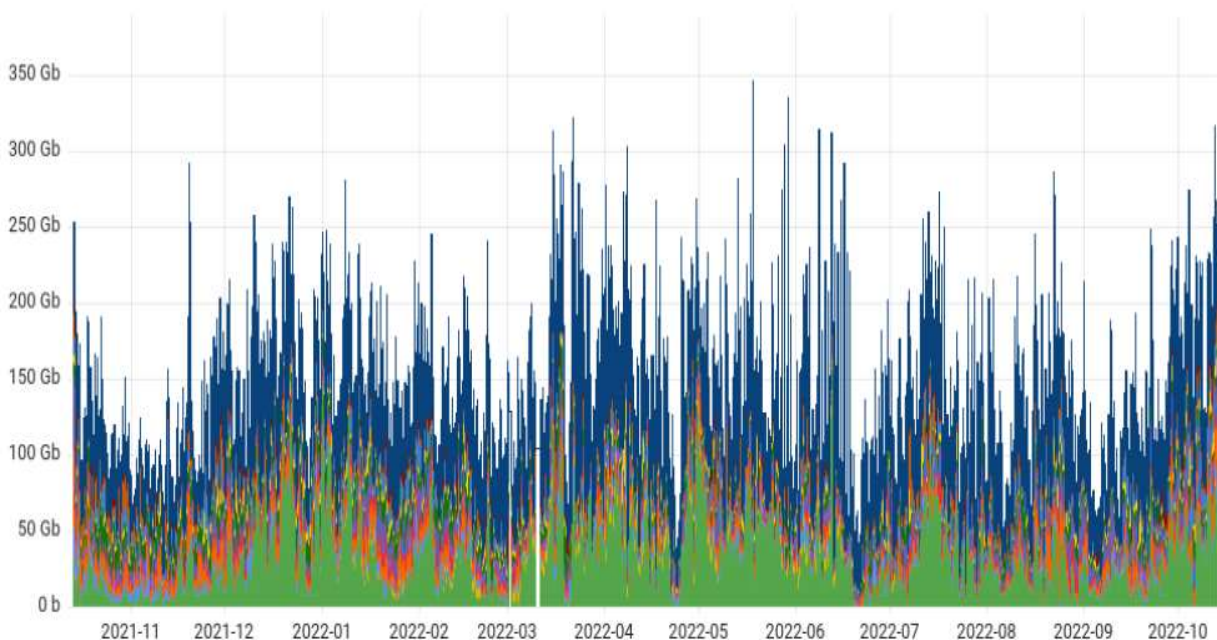
Latest news

Other Tier1s

- [input from the audience]

LHCOPN Traffic – last 12 months

LHCOPN Total Traffic (CERN -> T1s)



| | Mean | Max |
|-----------------------|---------|---------|
| Outgoing DE-KIT | 50.8 Gb | 218 Gb |
| Outgoing KR-KISTI | 1.52 Gb | 12.7 Gb |
| Outgoing RU-T1 | 4.75 Gb | 46.0 Gb |
| Outgoing FR-IN2P3 | 11.0 Gb | 73.2 Gb |
| Outgoing NDGF | 4.53 Gb | 37.3 Gb |
| Outgoing NL-T1 | 3.10 Gb | 70.3 Gb |
| Outgoing TW-ASGC | 1.71 Gb | 9.65 Gb |
| Outgoing IT-INFN-CNAF | 7.91 Gb | 98.4 Gb |
| Outgoing UK-RAL | 8.15 Gb | 35.3 Gb |
| Outgoing CA-TRIUMF | 4.36 Gb | 52.0 Gb |
| Outgoing US-BNL | 10.0 Gb | 81.2 Gb |
| Outgoing US-FNAL | 4.95 Gb | 82.3 Gb |
| Outgoing ES-PIC | 2.84 Gb | 11.8 Gb |
| Total | 116 Gb | 346 Gb |

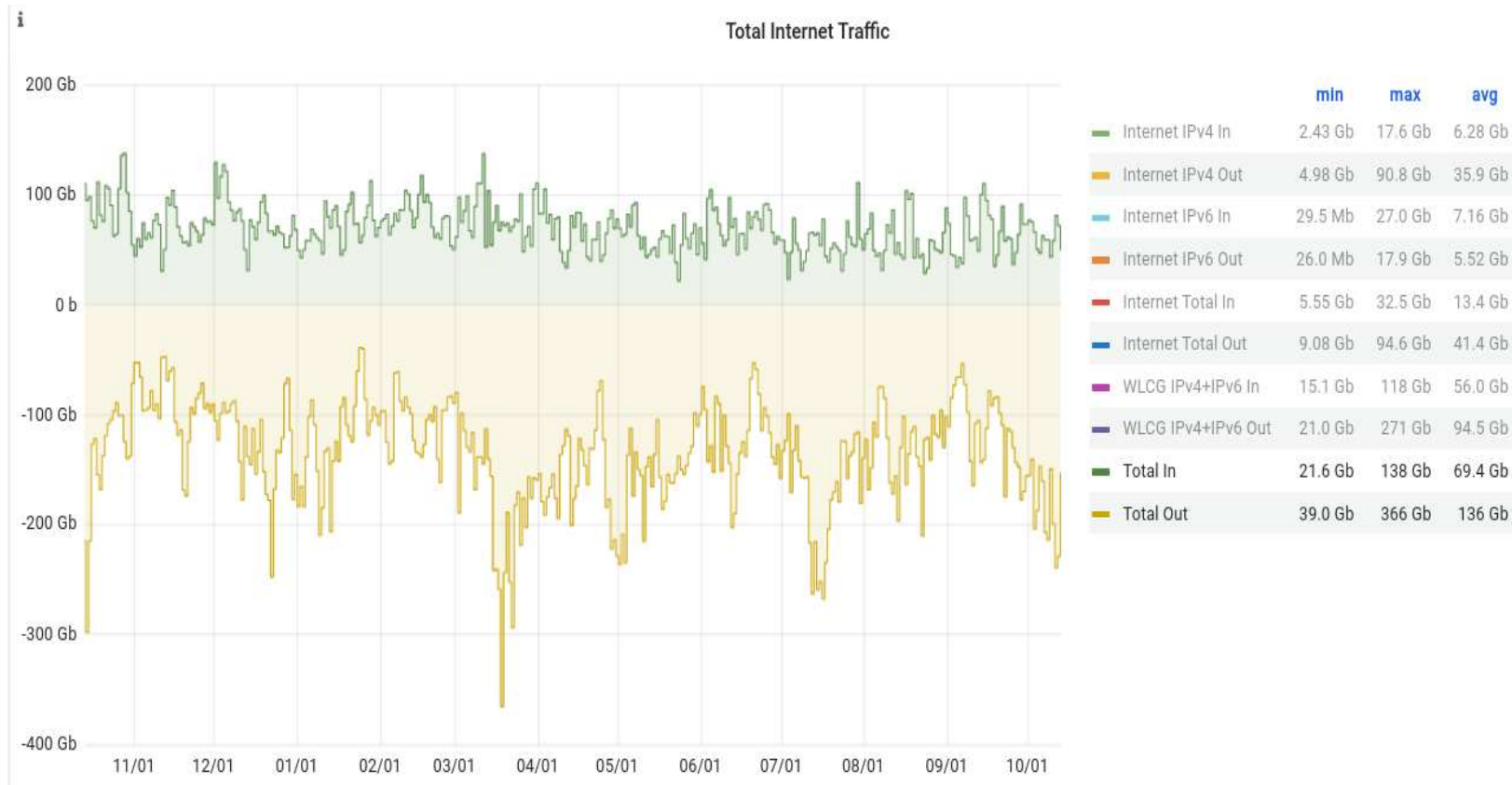
Numbers:

Moved ~457 PB in the last 12 months

+34% compared to previous year (341PB)

Peak at ~391Gbps

CERN total traffic



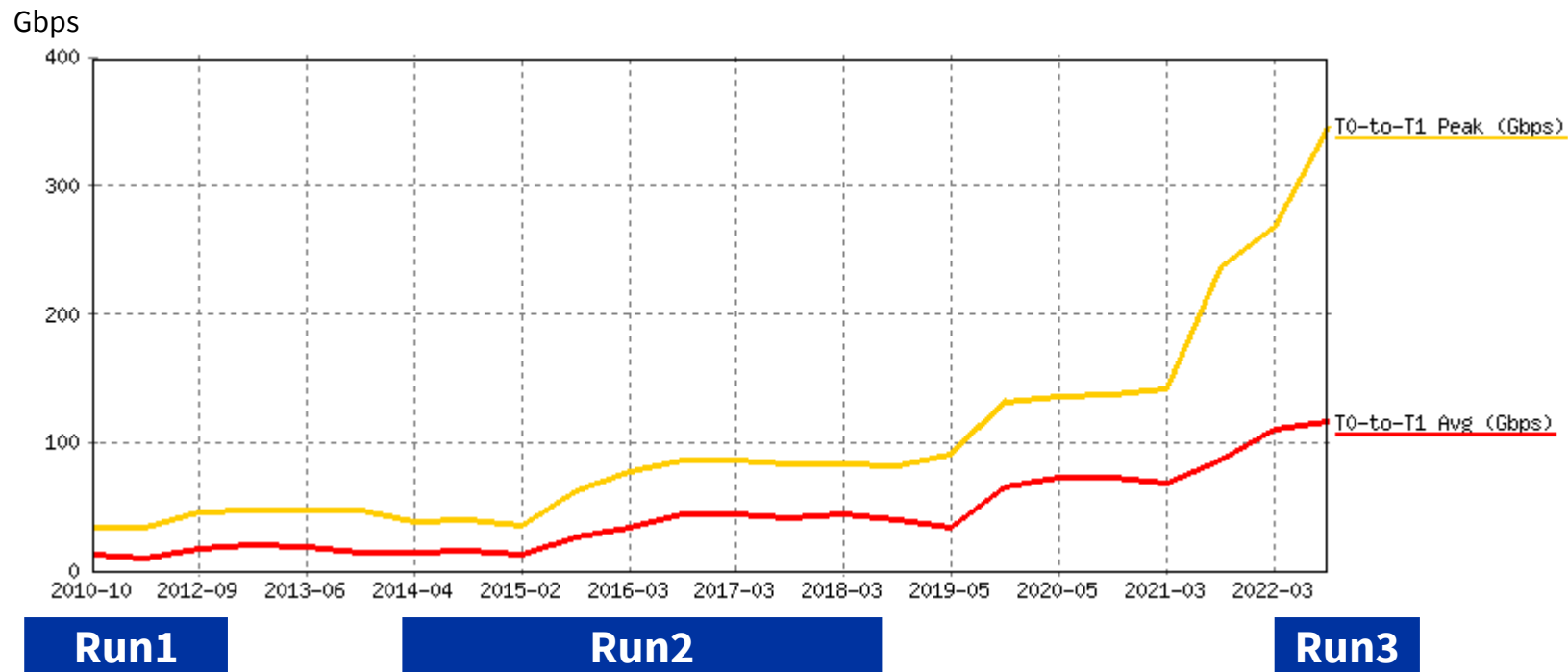
Numbers:

Sent out ~536 PB
in the last 12
months

+34% compared
to previous year
(398PB)

Ref: https://monit-grafana.cern.ch/d/cScW82Tnz/00-overview?orgId=14&var-source=long_term&var-bin=1d&from=now-1y&to=now

LHCOPN: Long-term growth

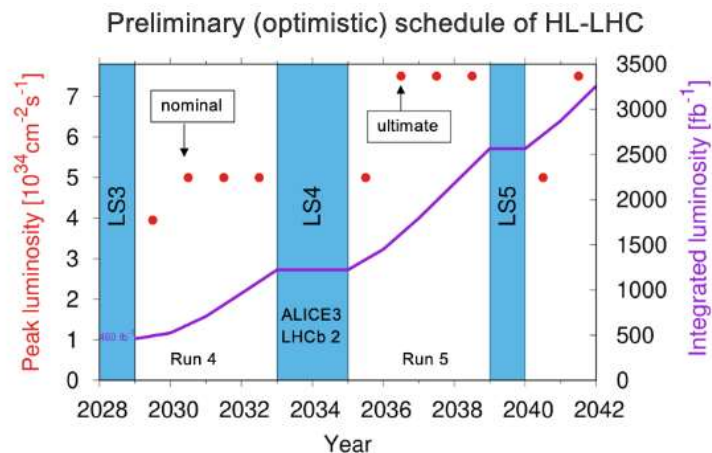


Run1: 2010-12
LS1: 2013-14
Run2: 2014-2018
LS2: 2019-21
Run3: 2022-

Y-Axis: Gbps - Average bandwidth of previous 12 months



New HL-LHC Schedule



Shown integrated luminosities include 1 month/year of HI running and no MD or special runs after 2036

LS4 extended from 1 to 2 years (in view of ALICE and LHCb upgrades)

With proposed shift and extension of LS3, and inclusion of HI runs beyond LS3:

- 2500 fb^{-1} are expected by end 2038 (current end-date of HL-LHC)
- 3000 fb^{-1} (int. luminosity goal) would now be reached in ~ 2041

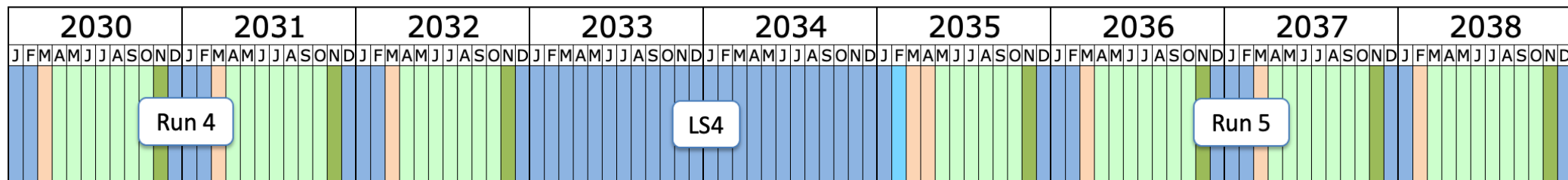
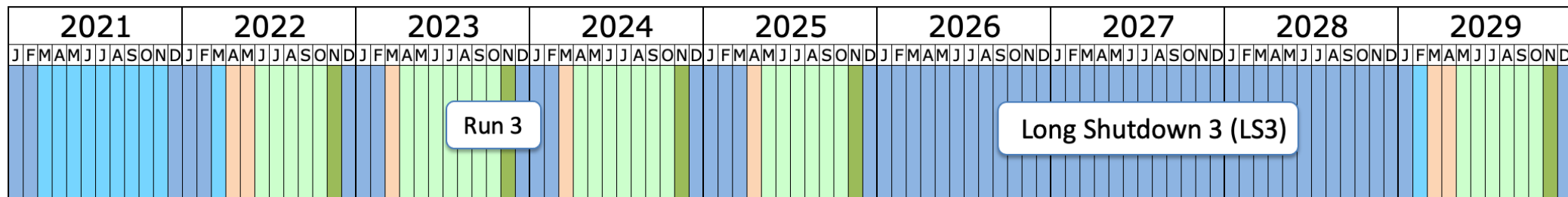
DG office, 28-01-2022: "The new schedule foresees long shutdown 3 (LS3) to start in 2026 (i.e. one year later than in the current schedule) and to last for 3 years (instead of 2.5 years)"

Measures to mitigate impact of electricity costs

- ❑ **2022 YETS** (Year-End-Technical-Stop) **starts 2 weeks earlier** (28 Nov)
→ mark of social responsibility; savings
- ❑ In **2023**, the **accelerator complex operation will be reduced by 20%** (i.e. YETS will be extended from 15 to 19 weeks)
→ mark of social responsibility; savings
- ❑ **Package of measures for 2024-2032 being prepared** (preliminary discussions at the Sept Council → will continue in Dec):
efforts from all stakeholders: savings from CERN's activities; savings on personnel costs; possible indexation of Member and Associate Member States contributions beyond 2% "ceiling".
Aim is to bring cumulative budget deficit to ~ zero in the early 2030s, so as to be able to start investment in a new big facility at CERN
- ❑ Reduced power configurations prepared to cope with possible EDF **load shedding**
- ❑ **Crisis procedures to face total (prolonged) blackouts** being prepared
- ❑ Measures to **reduce energy consumption on CERN campus** being implemented

Ref: <https://indico.cern.ch/event/1205151/contributions/5068266/attachments/2529790/4352311/DG-Oct-2022.pdf>

LHC schedule



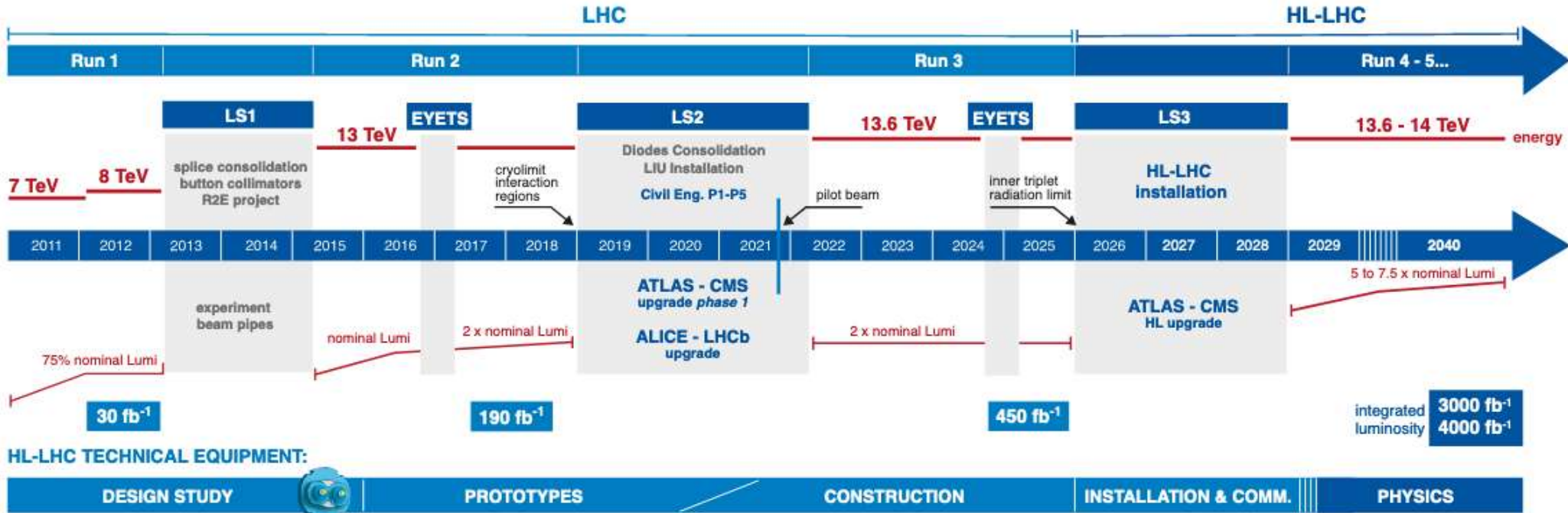
Last updated: January 2022

- Shutdown/Technical stop
- Protons physics
- Ions
- Commissioning with beam
- Hardware commissioning/magnet training





LHC / HL-LHC Plan



Questions?

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