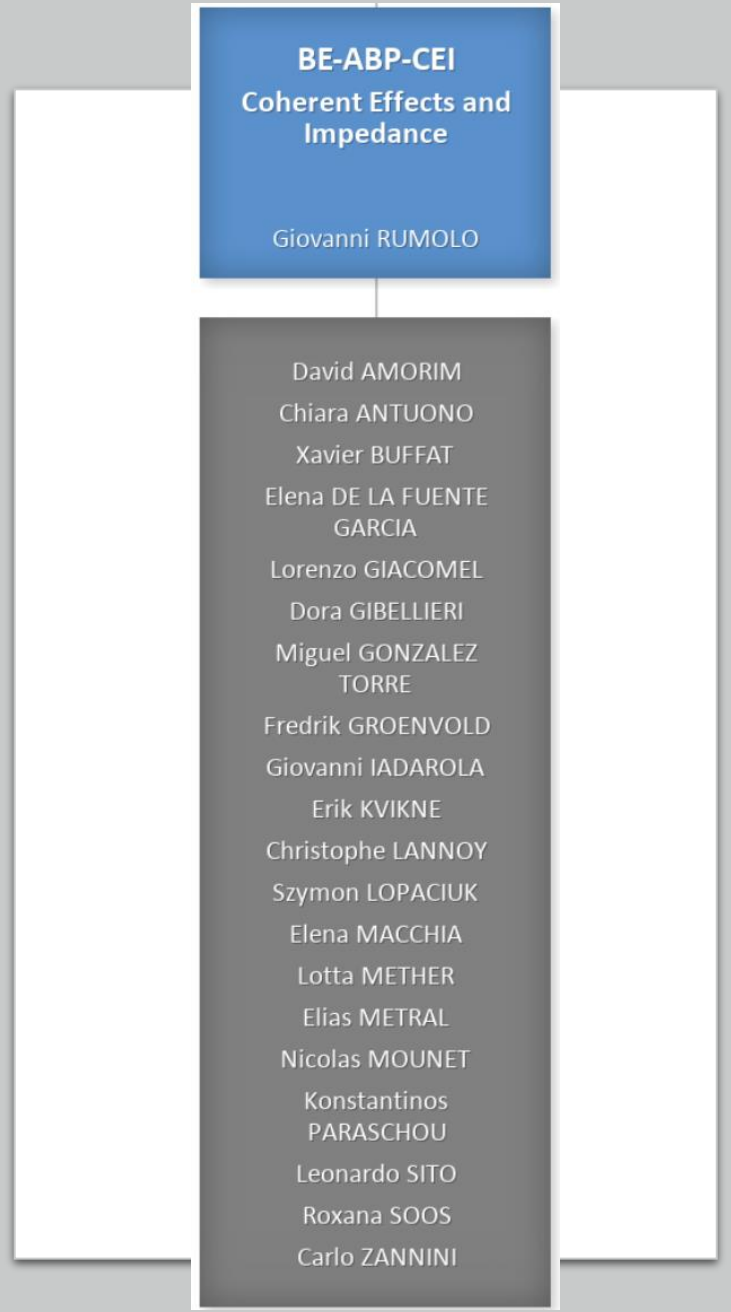


Coherent Effects and Impedances section (CEI) – general information

Giovanni Rumolo

CEI Section Meeting, 25/07/2024

Scientific secretary: Roxana Soos

https://indico.cern.ch/event/1437002/

Arising matters

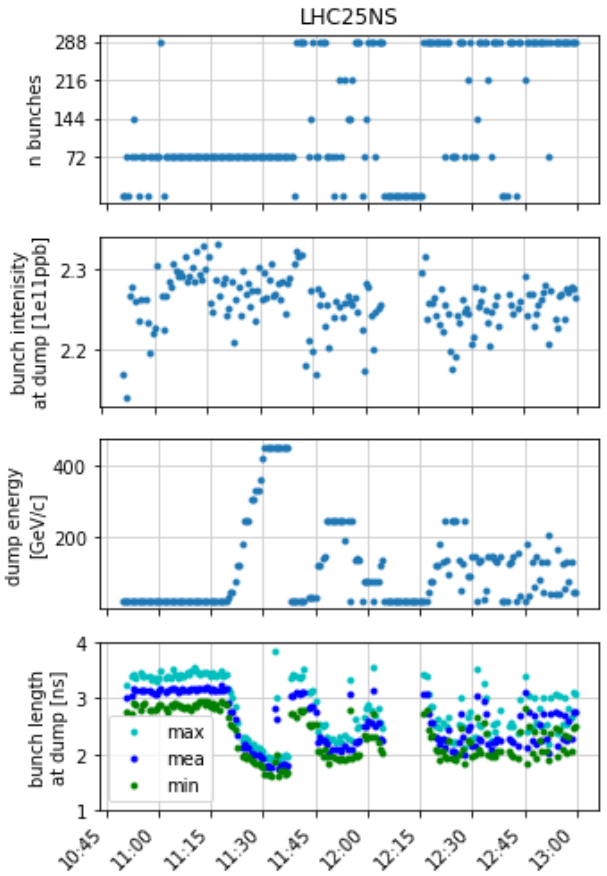
- Some logistical changes for the future CEI section meetings
  - We will **start the CEI section meetings at 13:30 on Thursdays** as of September 2024,
    - Avoid overlap with FCC meetings at 15:30 for those who need to be there and with HL-LHC TCC
  - As of January 2025, **CEI section meetings will move to 6-2-004** (larger room, window, air conditioned, finally properly equipped for Zoom meetings), same time slot
  - Aim at round table meeting (1 slide per person per minute) every ∽3 months
- Upcoming farewells ☹
  - Erik Kvikne will end his 11-month technical studentship to go back to Norway to complete his master studies – Luigia @Meyrin on Friday 26 July for those available!
  - Elena Macchia will end her 6-month traineeship to go back to Rome and complete her master studies – restaurant on Wednesday 31 July for those available!

Arising matters

- Radiation dosimeter request (email from Richard and bulletin article)
  - New procedure and change of location as of 1 August
  - If you need a dosimeter or wish to request a dosimeter for a third party, whatever the CERN status and the type of dosimeter needed, you need to complete and submit the ServiceNow form online. After your request will be processed, you will be informed that the dosimeter is ready for collection at Building 33 (no longer 55!). The form may also be accessed via the CERN Campus App, under “Campus Life”, “Dosimetry”.
  - If you already own a dosimeter, you will keep receiving annual email reminders to exchange it.
- Heat waves (mail from Stéphanie)
  - Please note that the room 6/2-004 has been booked on all afternoons in which it was available following the CERN “Heatwave Action Plan”, which allows anyone to be able to go to this room and benefit from air conditioning
  - As a reminder, access to the conference rooms is with your CERN card, which needs to be reactivated once per month at a Lock Activation Card Reader (there is one behind the building 6 cafeteria).

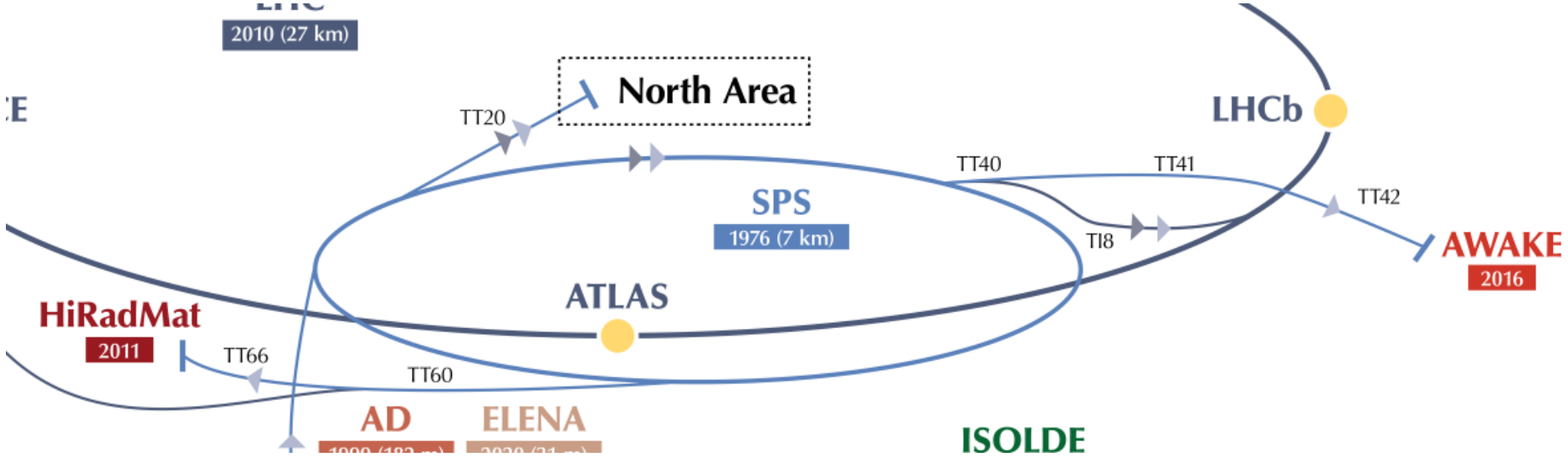
IPP meeting last Friday 19 July

- Discussion on intensity limitation for LHC beam MDs in the injectors following the 930 MHz HOM coupler in cavity 3 on 11 July (Giulia's slides)
  - Breakage did not occur at top intensities seen in the SPS: In fact, when the coupler broke we had not even accelerated 4x 72b to flat top
  - 23h total downtime beam-to-beam
  - For caution, a limit to 2e11 p/b has been enforced on LHC beams in the SPS thereafter
  - This limit strongly impacts LIU ramp-up (potentially 3d next week), HiRadMat run (in two weeks), LHC MDs (in three weeks)
  - We will likely learn more with some visual inspection of other HOMs and EM simulations (takes weeks)
  - Request to lift the limit has been made and is being evaluated



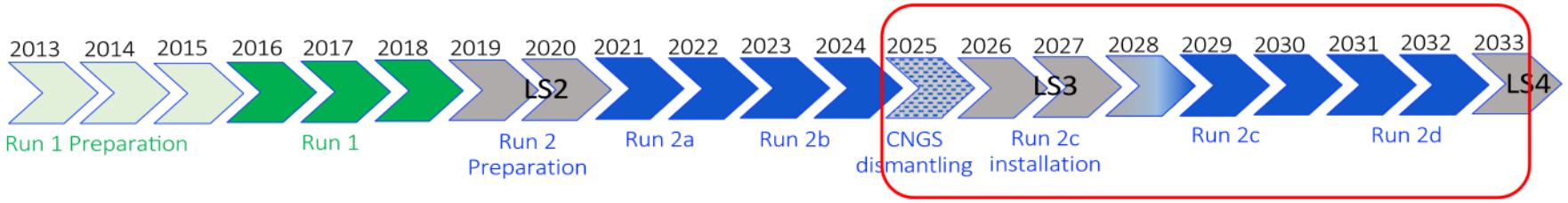
IPP meeting last Friday 19 July

- AWAKE future plans and beam requests



IPP meeting last Friday 19 July

- AWAKE future plans and beam requests
  - AWAKE Run 2c/d has been approved in this year's MTP, while CNGS dismantling was already approved in 2022
  - AWAKE Run 2 (2021 – 2033) and further
    - Accelerate an electron beam to high energies (gradient of 0.5-1GV/m)
    - Control the electron beam quality (~10 mm-mrad emittance, 10% energy spread)
    - Demonstrate scalable plasma source technology
    - Post-LS4: Develop particle physics case for first application of the AWAKE-like technology



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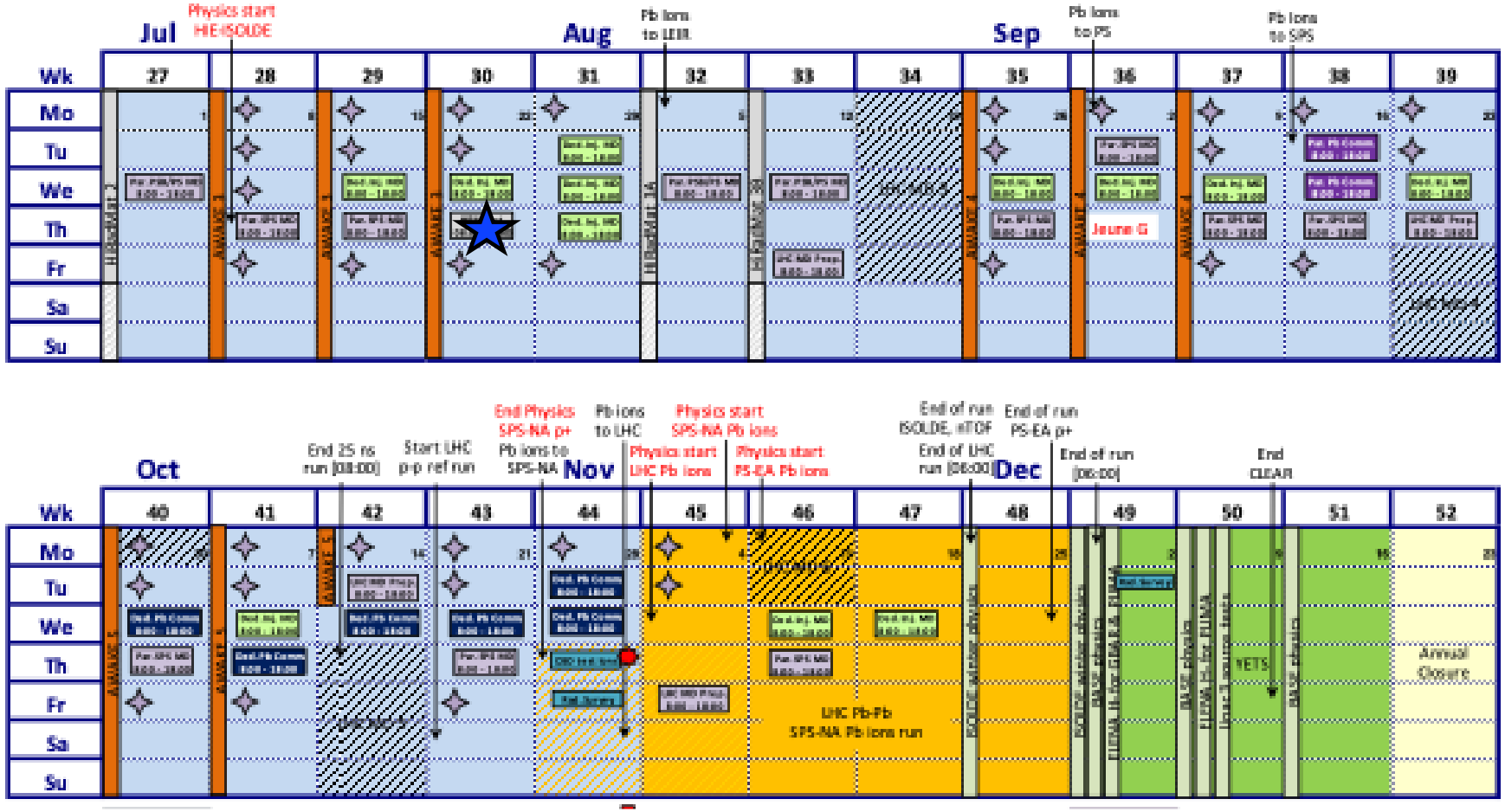
    - Post-LS4: Develop particle physics case for first application of the AWAKE-like technology
  - Beam requests:
    - 12 weeks per year, in blocks of 2-3 weeks, separated by several weeks (2/3 shifts)
    - >1400 extractions/day (same target today, but rarely achieved)
    - Shorter proton bunch length: 1 sigma ~ 100 ps (now 175 ps)
    - More protons: 0.5 – 4 x 10^{11} protons/bunch (now 0.5 – 3 x 10^{11} protons/bunch)
    - Shorter cycle? 6 s cycle length
    - Stable beam conditions for several hours, no interruptions!

IPP meeting last Friday 19 July

- AWAKE beam status in the injectors
  - Longitudinal instability at PS transition crossing prevents reaching 4 x 10^{11} protons/bunch with the target longitudinal emittance of 0.35 eVs
  - Reducing longitudinal impedance in PS (shielding of pumping ports) is expected to alleviate this limitation
  - In the SPS the lowest theoretically achievable bunch length for $\mathbf{4 \times 10^{11}}$ is 0.5 ns, compatibly with post-LS4 AWAKE requests
    - Instability at voltage drop before extraction has been successfully suppressed in operation with double voltage step

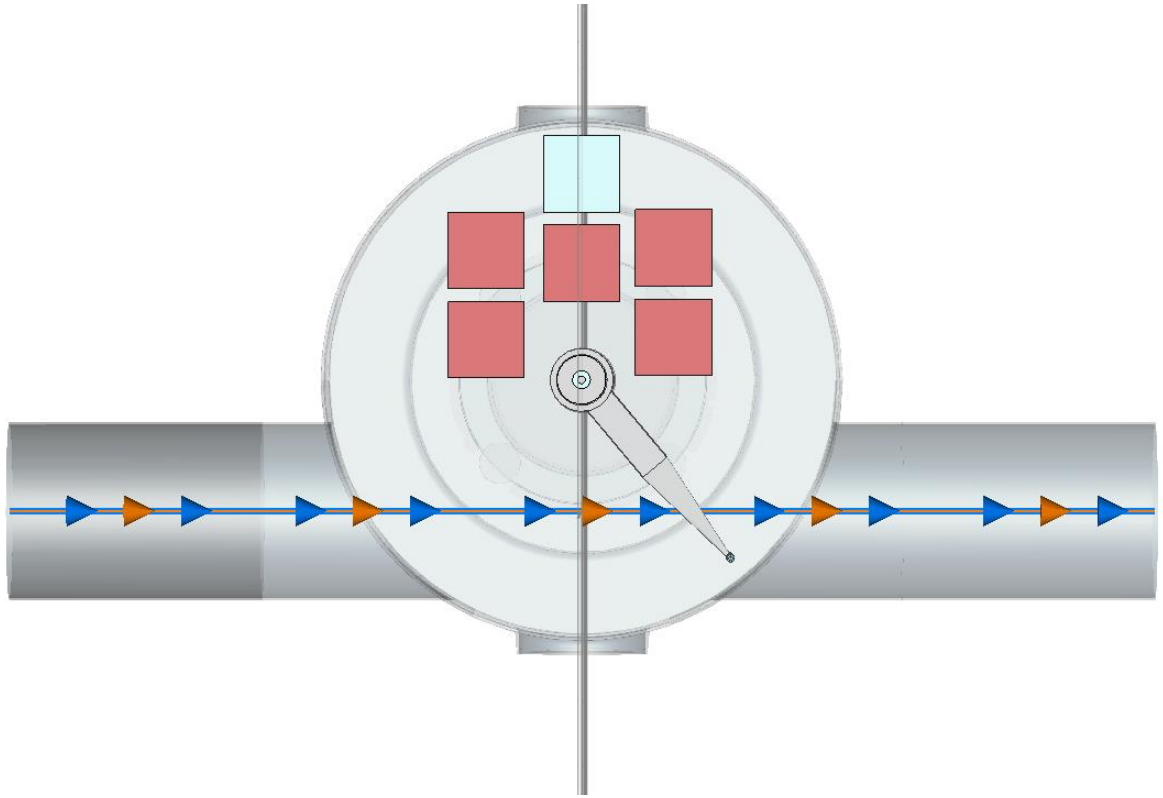
2024 injectors schedule v2.1



- Next week 3 full days for dedicated MDs in the SPS due to NA intervention
  - No extraction to NA possible, so users will basically be COLDEX and LIU ramp-up
- WS 51638H stuck (37H operational) at 2.3 rad
  - Large heating observed
  - Finally wire got burnt during Q22 cycle set-up

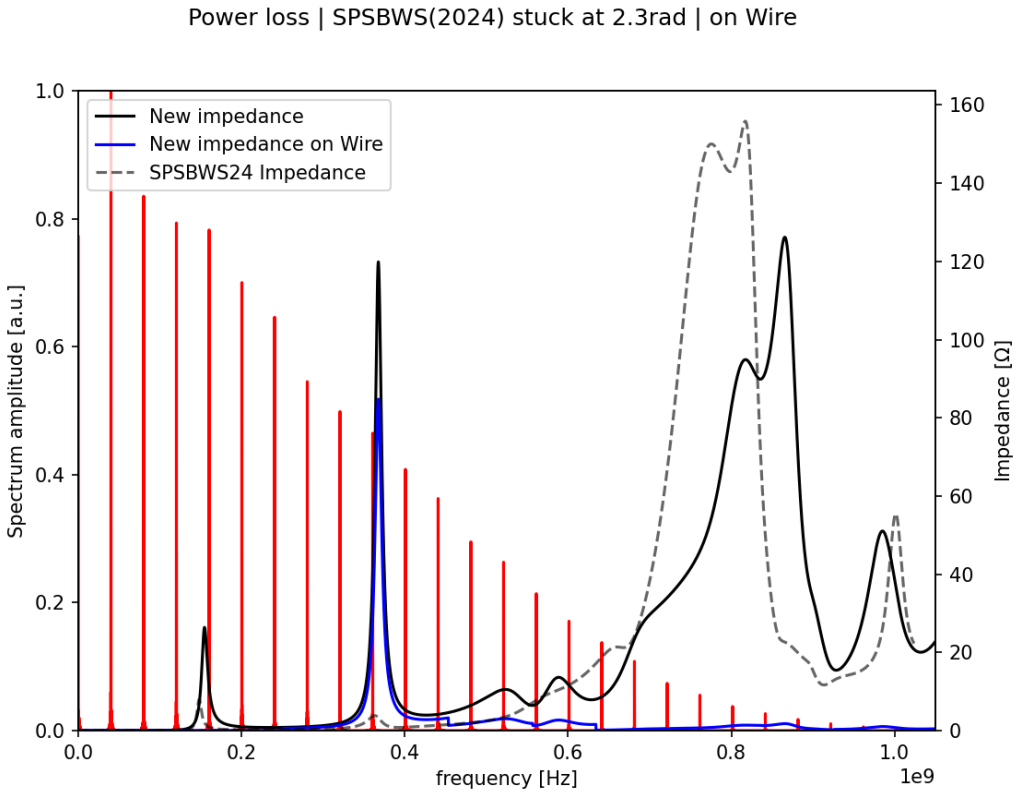
WS 51638H issue in SPS

- Position of wire – fortunately not directly in beam however grazing beam halo and closing loop around beam

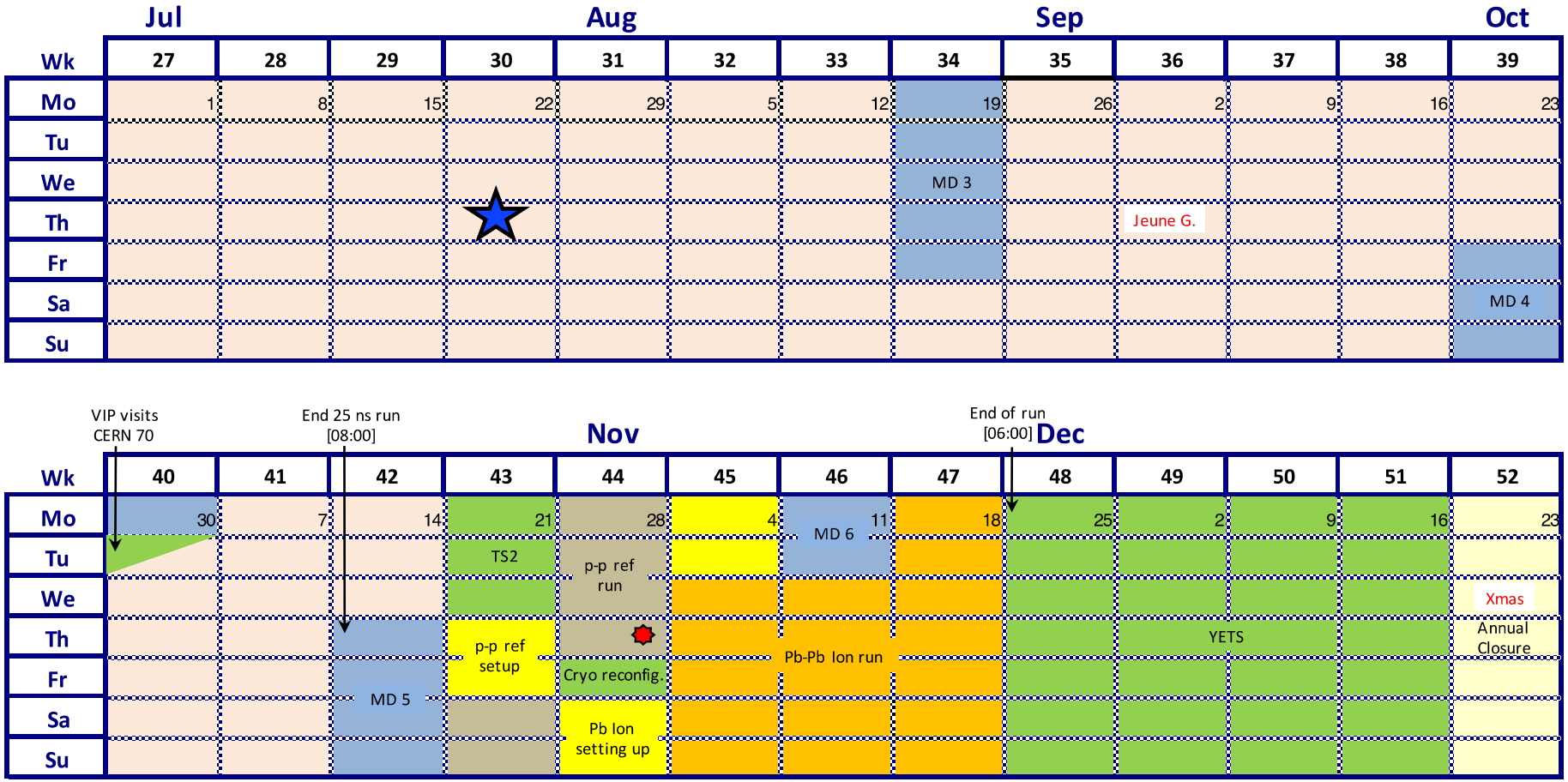


WS 51638H issue in SPS

- Position of wire – fortunately not directly in beam however grazing beam halo and closing loop around beam
- Impedance in this position shows that a large power is dissipated on the wire, reaching potentially damaging values for large beam intensity and not specially short bunches – thanks Elena and Leo for the quick feedback!
- Indeed the power loss, already close to threshold for wire burning with LHC OP beam (3x 36b, 1.6e11 p/b, 1.55 ns), became intolerable with 4x 72b 1.8e11 p/b, >2 ns
  → Wire burnt Tuesday night



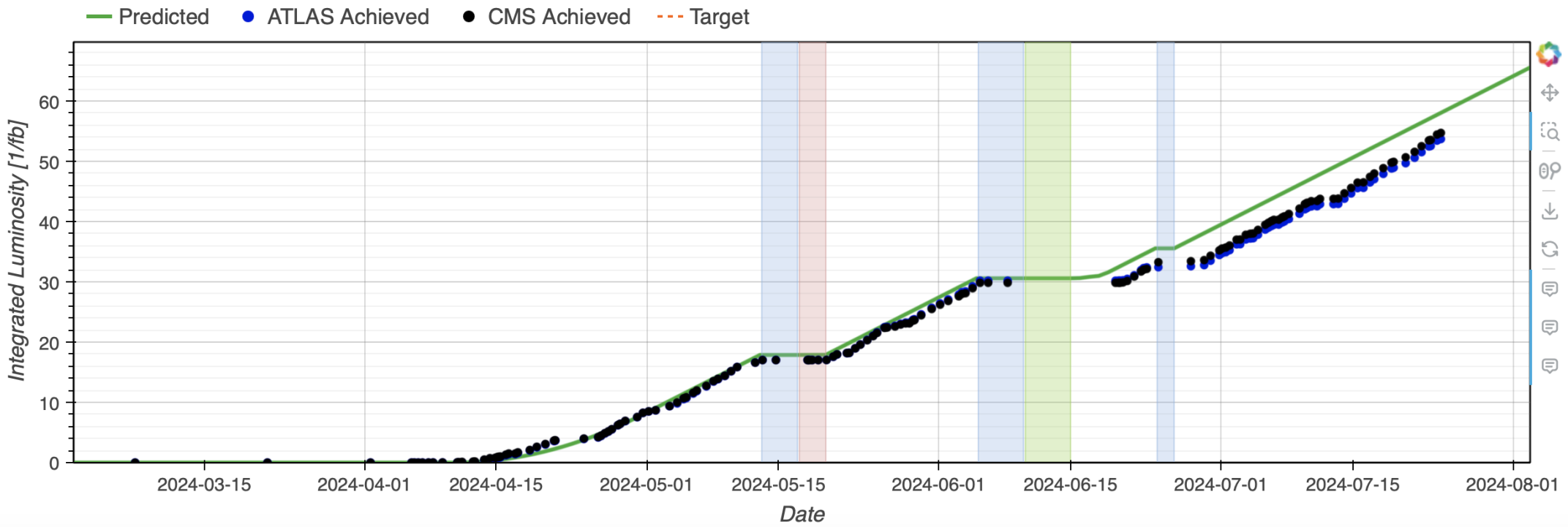
2024 LHC schedule v2.0



- Physics production with still increasing availability, which leads us closer to the target integrated lumi curve

LHC Lumi

- LHC integrated lumi still falling behind target by few days, seemed to be recovering with high availability till yesterday morning, then we lost almost 24h on access and miscellaneous problems (PSB, QPS intervention in sector 23)



LHC beam parameters

- New brighter variant of BCMS planned to be taken before the weekend