REPORT FROM LNF

Fabio Bossi – LNF
107 PECFA Meeting, November 19, 2020
Four phases:

A. 8 March – 4 May: Full Lockdown
B. 4 May – 15 September: Mild re-opening
C. 15 September – 30 October: Mild Recovery Phase
D. 30 October – now: New partial slow-down

A. Only «basic services» guaranteed about 10% personnel on site
B. About 30% personnel on site. Only strategic activities allowed
C. 50% → 70% personnel on site (*). Restart of all activities
D. < 50% personnel on site. Only strategic activities guaranteed

(*) in order to guarantee safe social distancing
We have elaborated a plan for the allocation of the available resources with clear short-term priorities.

Accelerator activities are the core business of LNF.

For this reason, the technical staff of the DA has been kept on site more than the LNF average; it was at the level of 70-80%, during period C, now ~ 60%.

Shifts and technical support to the internal experimental activities have been guaranteed during all periods B-D.
Two running accelerator facilities

DAFNE and BTF system

SPARC_LAB
BTF operation and BTF2 installation

All activities shifted by two months due to period A stop

After that, facility operated according to the schedule

- May-June: BTF1 line recovery
- June-July: PADME engineering run
- September-present: PADME physics run. Dead-line: November 30

Safety limit set to 6 persons in DAFNE CR; 3 operators per shift + possible Linac experts, all with FFP2 masks.

BTF2 installation and DAFNE 2021 run preparation scheduled to start after PADME run end. Collider operation scheduled to start in January 2021
• Declared goal: $5 \times 10^{12}$ POT
• Present acquired luminosity: $4.1 \times 10^{12}$ POT
• Goal reached by the end of November
SPARC Lab operation

First results on plasma acceleration obtained just before first lockdown

All activities shifted by two months due to period A stop

After that, experiments slowed-down by limited access for operators. Limit set to 3 people in SPARC CR. Still:

- July-August: complete characterization of accelerated witness
- September-present: preparation for new experiment
**SPARC Lab operation**

- Obtained 7 MeV acceleration in 3 cm plasma with 350 pC driver
- \(\sim 233 \text{ MV/m}\) accelerating gradient
- Energy spread of 0.26%, still orders of magnitude lower wrt previous experiments
- 99.4% energy stability
- Emittance of 3.7 \(\mu\text{m}\) (rms) during acceleration
- Now preparing for transport to undulators for FEL emission experiment
Eupraxia project

Operation of SPARC_LAB are preparatory to our next big challenging enterprise: Eupraxia@SparcLab

- Work on the design of the new building ongoing: final design expected for the end of 2020
- ESFRI application submitted on September 9, 2020. Outcome expected by summer 2021
- Political support obtained from Italy (lead country), Czech Republic, Hungary, Portugal, UK
- Financial commitment from Italy (108 M€)
- Consortium agreement signed with 38 Institutes and 10 observers, to proceed with the technical studies

More details in tomorrow’s talk by R. Assmann
Support to external experiments (in particular the LHC ones) is the other major pillar of LNF Science.

Despite a reduced presence of personnel (we reached a maximum of 50% of non-DA personnel on site) we were able to complete some important construction work, most notably a relevant part of the new muon forward spectrometer of the ATLAS experiment.

We are also regularly (albeit cautiously) sending scientific and technical personnel at CERN for essential installation work for ATLAS, LHCb, ALICE, CMS, NA62.
OUTREACH AND DISSEMINATION

Our Education and Public Outreach Service makes routinely use of many popular web communication channels (Facebook, YouTube, Instagram..) so the present pandemics did not affect our dissemination effort.

**5 March**
- **PARTICLE LAND**
  - Partner: Presidenza INFN
  - 1 lezione dal Bruno Touschek
  - Visitor Centre
  - 990 persone connesse in live

**30 March – 3 April**
- **INSPIRE**
  - Scuola internazionale di fisica moderna
  - Partner: FrascatiScienza
  - 10 lezioni in lingua inglese
  - circa 150 partecipanti durante la live
  - Relatori: ricercatori LNF e di altri enti

**April - May**
- **RESEARCHERS @ HOME**
  - 6 lezioni
  - In media 500 spettatori durante la live
  - Relatori: ricercatori LNF

**6-10 July**
- **Bambini 8-10 anni**
  - Le mie GigaNano vacanze estive
  - Partner: Rai Radio Kids
  - 10 lezioni
  - In media 30 spettatori durante la live
  - Relatori: ricercatori LNF e di altre sezioni INFN

All in all we have posted about 60 videos in the first 10 months of 2020.
CONCLUDING:

• We have tried to minimize the impact of the Covid-19 crisis on our science production by identifying high-priority activities and putting all available manpower on them
• Unavoidable delays in our programs of \(0(2-3\text{ months})\) due to phase A lockdown
• Still, amazing physics results have been obtained
• We look forward to doing even better during a hopefully brighter 2022!