

Cavern Initial Requirements Prior Installation

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LBNF Cryostat, final design review

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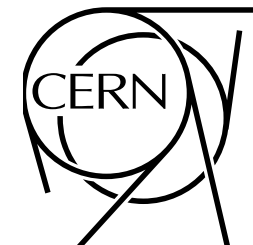


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Who Am I and Where Have I Been?

Leader of the CERN Neutrino Platform.

Liaison between CERN and Fermilab/DOE on Neutrino projects.

Member of the LBNF/DUNE Collaborations.

Technical Coordinator of the ATLAS LHC project at CERN during construction and Run1 operation, up to the Higgs discovery.

Experience includes 27 years as a project manager and technical leader of a few very large international projects. Large experience on detectors and complex systems.

Education as Particle Physicist (PhD). Physics Professor at the University of Geneva. At CERN, senior staff Research Physicist. JINST director.

Preamble

- We expect the cryostat project to be defined as an in-kind contribution to the LBNF project and following the CERN-DOE addendum
- This means that the project has to be inserted in an environment guided by the host lab, where works is possible for people coming from outside, safety rules and management are defined and all logistics and services are in place. We see this as a responsibility of the host laboratory, in term of organization and resources
- As for any international organized project, an MOU (or equivalent) should define the details and the responsibilities of the various partners in the various phases of the project.
- Non US firms and institutions efforts will be present during installation. The project should be able to handle this, without raising show stoppers. The experience we have done with the short baseline in these months, has shown to us a great need for improvements.

Needs, problems in general

- We will need an important logistic support, which includes organization of all transports from a storage place to the cavern and all the related schedule of operations and the material tracking, from storage to the cavern. This means also a way to label and mark the material arriving to the laboratory. Waste management will be an issue.
- We will have to assume the existence of basic services, which will also need intervention crews and a set of frame contracts for special material to be procured locally
 - Electrical services, which also foresee the possibility to have in some locations underground European type of electrical power (230V,50Hz)
 - Access services, which will control and help access underground.
 - Ventilation services, which will at any moment intervene in case of failures
 - Safety crews, which will monitor the work done and its preparation
 - Procurement systems to allow an effective procurement procedure for small material and tools which might be needed locally

We assume

- Prior to installation start the cavern will be equipped with
 - a light system, which will provide the necessary amount of lumens in all areas of the caverns and nearby drifts. This includes also an emergency light system.
 - a ventilation system in the cavern and in the drifts, which might be temporary until the cryostat is fully installed, and will then be upgraded to the final one.
 - a power network, which also includes 230 V distribution, for connecting all tools and infrastructure items (including welding devices and cranes). Total power to be defined
 - 3 hoists covering the center and the side of the caverns, up to 15 metric tons per hoist allowed load. Wireless commands.
 - a grounding network to connect the various structures and tools (welding tools for example) during installation and later during exploitation.
 - a survey network, to allow positioning the various components.
 - an underground evacuation system, also in the caverns, which includes acoustic alarms, signalization, sector and fire doors.
 - a GSM phone antenna and wireless network to allow an effective working environment and safety.
 - an access system which will monitor and quantify the amount of people in the various underground facilities.

We assume

- All movements of material from the surface to the caverns doors, will be under the responsibility of the host lab
- A storage place just outside the cavern doors will be provided as temporary buffer for the material needed for the following 2-3 days
- Somewhere underground we will need a mini mechanical workshop to allow quick corrections and fixes. Functionality and material to be defined.
- Somewhere underground a small recreation area, where people can rest and have some drinks and food should be provided, as well a small emergency room in case of small medical problems or small injuries.

We assume

- We will need to contract several local firms and services and for this we will need help from the lab in establishing frame contracts or special orders at the market price:
 - ✓ Scaffolding
 - ✓ Electrical lifts
 - ✓ Welding and bolting equipment
 - ✓ Wood plates
 - ✓ Cleaning firms
 - ✓

We assume

- Non US people or firm arriving to the lab will need assistance for
 - ✓ Visa and invitation letters
 - ✓ WWW based safety trainings
 - ✓ Equivalence for major trainings (working at hight, driving nacelles, ...)
 - ✓ In case the possibility to get in situ some relevant training
 - ✓ Housing
 - ✓ Travels organization
 - ✓ Medical facilities access
 - ✓

This as an host lab support!

Technical Coordination and Configuration control

- A project of this size and complexity will need a well established technical coordination in situ which includes:
 - Drawings and CAD models exchange system and management
 - A configuration control office to guide the integration of the various components
 - A safety organization in situ which will guide and overview all activities
 - A well established in situ logistic office
 - A technical coordination office to which all teams active will refer for decision and problems solving.
 - A schedule officer which will maintain a complete detailed schedule of all activities
 - A sign off procedure for quality and as built follow up

Documents and references

- WWW link covering this review material
<https://twiki.cern.ch/twiki/bin/view/CENF/LBNFProjectCryostats>

Summary

- Most of the requirement we have relates to the duty of the host laboratory, towards the crew arriving to the far detector facility
- Prior to installation a basic infrastructure has to be provided to allow the installation crews to organize the working place
- Logistics support will be one of the biggest issue
- Storage of material on the surface, will be very important and will be a strong basis for the success of the project
- A strong technical coordination in situ will be fundamental