



Istituto Nazionale di Fisica Nucleare



Magnet and ECAL Shipping at FNAL

Meeting DUNE-Italia

10/Nov/25 - LNF

D. Pasciuto and **D. Domenici** on behalf of the collaboration

What to ship

➤ Magnet

- Superconductive magnet
- 5.3m x 5.6m x 5.7m, 45Ton

➤ ECAL

- 24 modules + 4 EndCap
- 60cm x 30m x 4.5m, 4Ton
- 13.6Ton

➤ Yoke

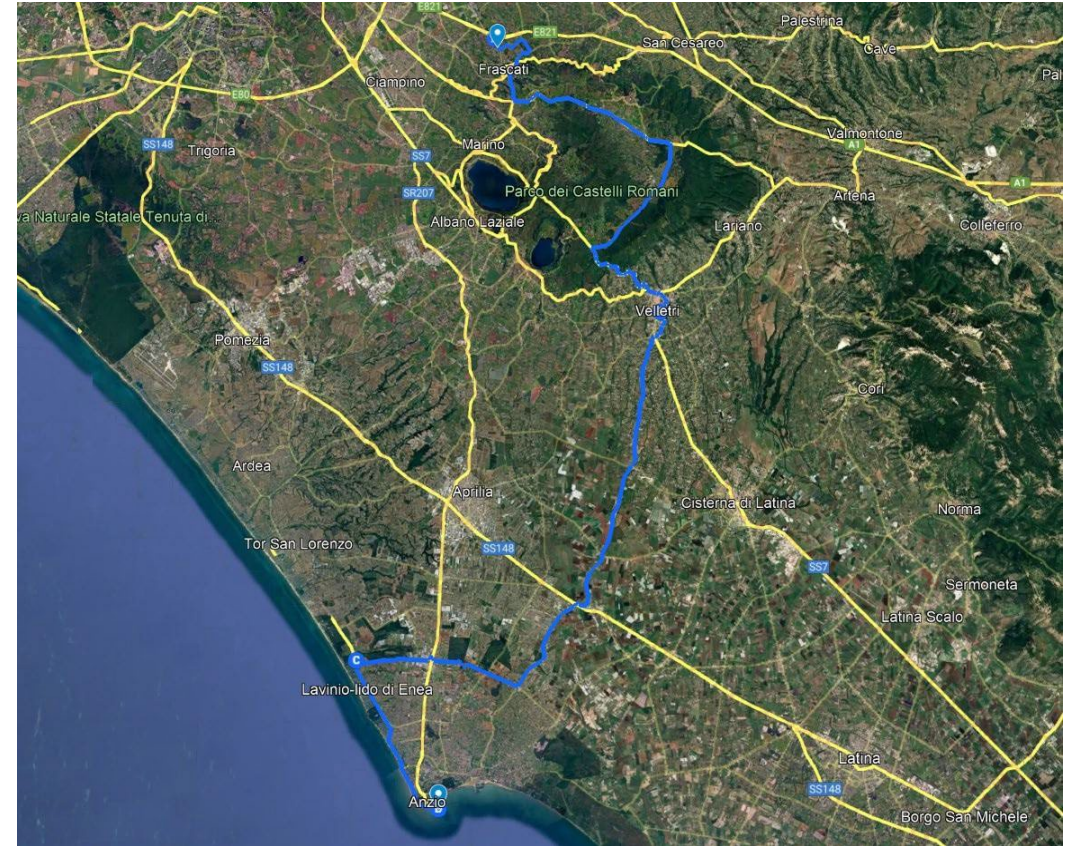
- 34 steel components
- $\approx 10\text{-}30\text{Ton}$ $\approx 2\text{-}5\text{m}$



Shipping Route (Magnet)

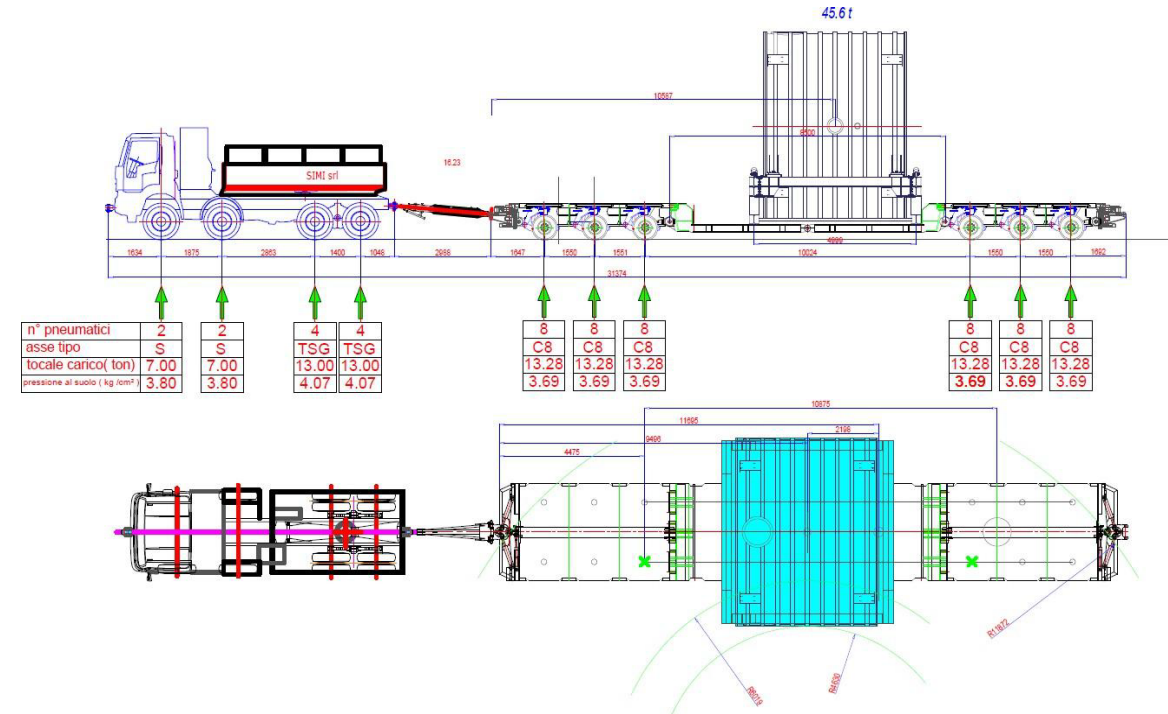


- **Fantini SUD** and **MDL** were in charge to study a preliminary route
- **Frascati (LNF) to Anzio Harbor (by truck)**
- Anzio to Civitavecchia (by barge)
- Civitavecchia to Chicago (by boat) through Great Lakes of North America
- Chicago to Romeoville (by barge)
- Romeoville to FNAL (by truck)



Shipping Route Remarks

- Ground transportation system identified
- Ground route identified and analyzed
- **No major issues found**



No. 1 x 6 Assi Rimorchio Modulare
No. 1 Tavola da 8.500 mm
No. 2 Motrici 6x8
No. 1 Capo Servizio
No. 3 Operatori

Shipping Route Remarks

- Verification, updating and monitoring of vertical and horizontal **signage**
- Management of interferences with **urban traffic**
- Preventive **pruning of trees** along the route
- **Structural verification** of infrastructures
- Operational coordination and safety
- Planning of transport time windows



12 months required for the managing activities

ECAL and Yoke

- ECAL modules and Yoke components will go **directly from LNF to Civitavecchia**
- Both ECAL and Yoke don't require special transportation system
- Magnet, ECAL and Yoke will meet at the harbor
- This will require coordination for all the movements
- Have a **dedicated boat for the international travel** (MDL has usually available a transportation system for our purpose) (expensive)
- ECAL and Yoke will go **directly from Chicago to FNAL** with ordinary GTS

What happen at FNAL

- The Magnet will be delivered to SBND front door
 - The company will be not in charge to bring the magnet inside the building
 - This operation will be performed by Fermilab personnel and equipment
 - Testing of the magnet will happen there
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- The Yoke components will be probably stored in CDF area parking lot
 - We are still figuring out where to store the ECAL modules and the endcaps. Experimental set-up and crane needed.
 - Several options have been identified (thanks to Jonathan). We are considering D0, SBN-FD, and SiDet. Still to decide.



The road is long...

- The most problematic item to manage for the transportation has been preliminary analyzed.
- We still must have a more detailed plan for the US ground transportation
- The Magnet will require most of the planning efforts and time in advance (for the procurement and the transportation needs) (2-3 years) -> ok with the schedule (2029)
- Properly defining the Technical Specification for the Magnet for a purchase order
- We have started looking into the FNAL internal route for the magnet

Other important remarks

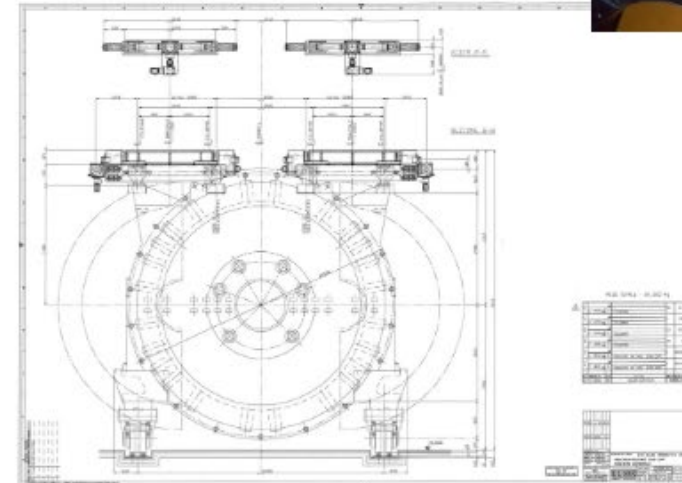
- The Lifting and Transportation equipment must be US certified to be used inside Fermilab Laboratory
- Inside the lab, Forklifts are the preferred movement system; where possible it's better to implement such way of movement

Iron yoke disassembly

- April: contact with company (the same that assembled it!)
- Available for being contractor of:
 - Extraction of magnet
 - Disassembly of iron yoke
 - Items preparation for shipping
- Estimation of work: 2 months (in Spring 26)
- All documents/drawings already shared



34 parts
total weight 800t



Thanks for your attention

