



# KLOE-to-SAND progress report



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for SAND-ECAL WG

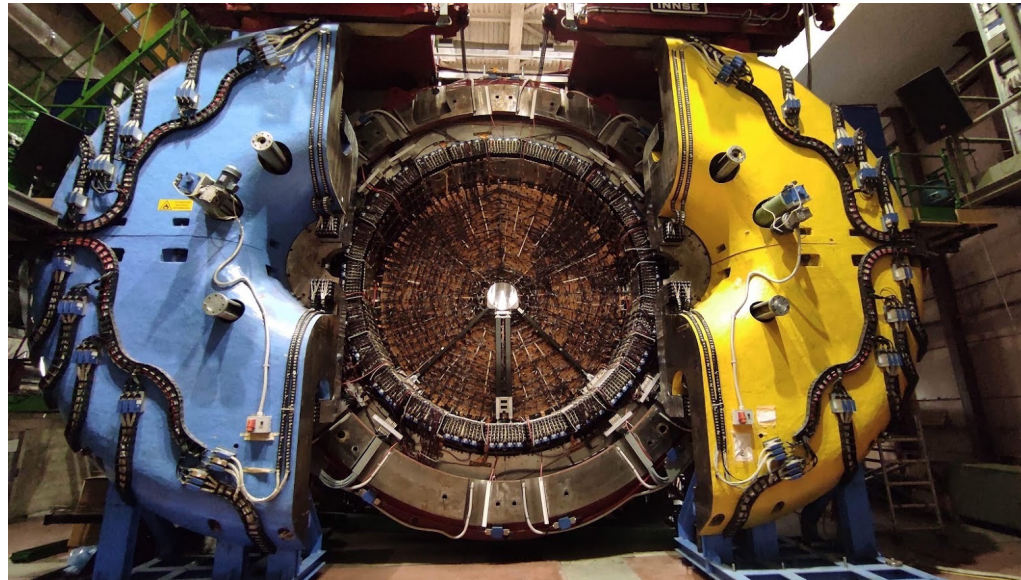
Danilo Domenici

INFN-LNF, Frascati, Italy

Giovanni Delle Monache

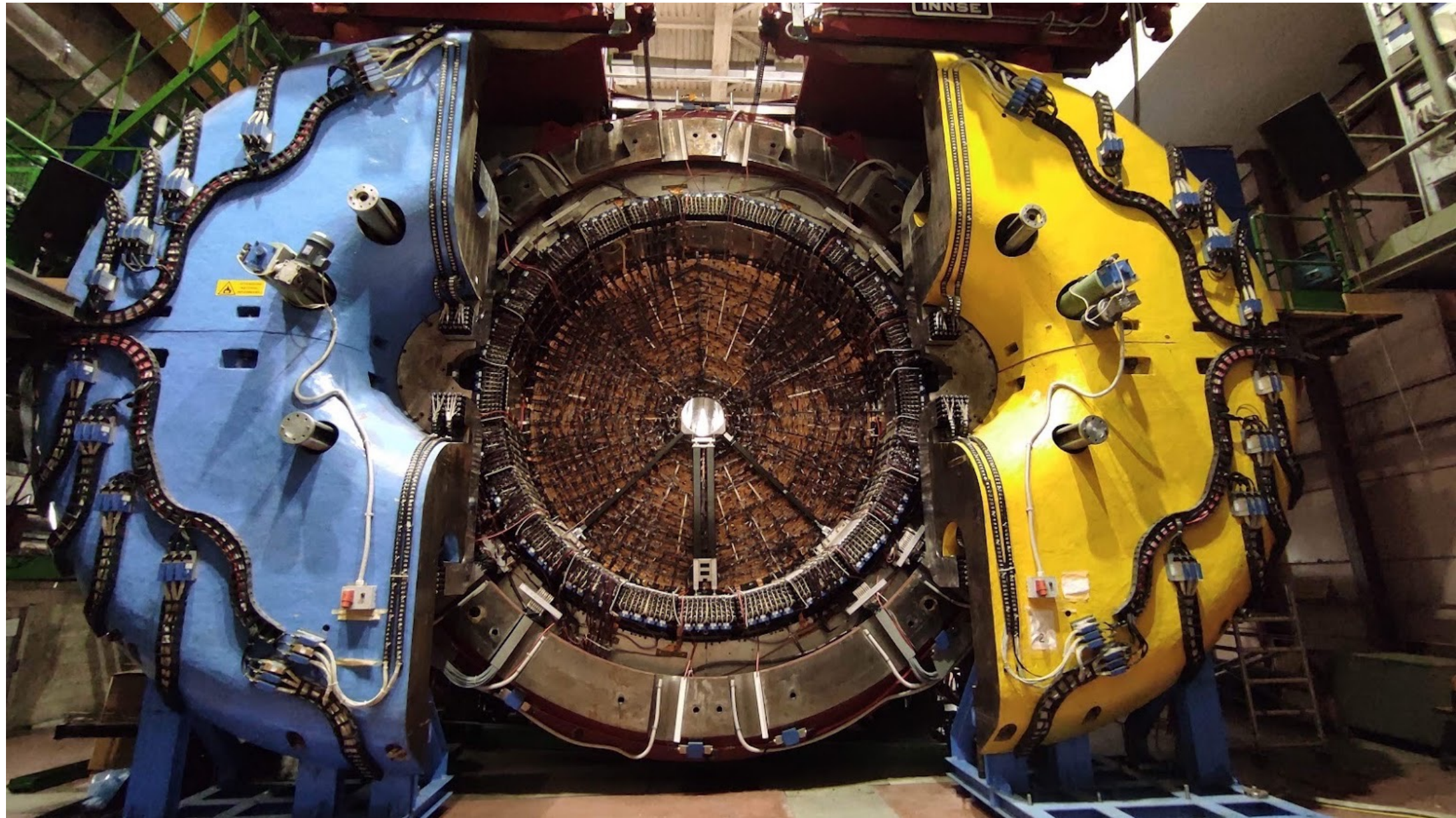
INFN-LNF, Frascati, Italy

for SAND-Magnet WG



SAND technical meeting 7 June 2022

# The KLOE detector



# KLOE-to-SAND: dismantling of KLOE

## List of operations:

1. survey, revision and design of mechanical tools
2. Unplugging and cables removal
3. extraction of KLOE Drift Chamber
4. extraction of ECAL barrel modules
5. dismantling of ECAL endcaps
6. extraction of coil
7. dismantling of iron yoke



# Start of the operations

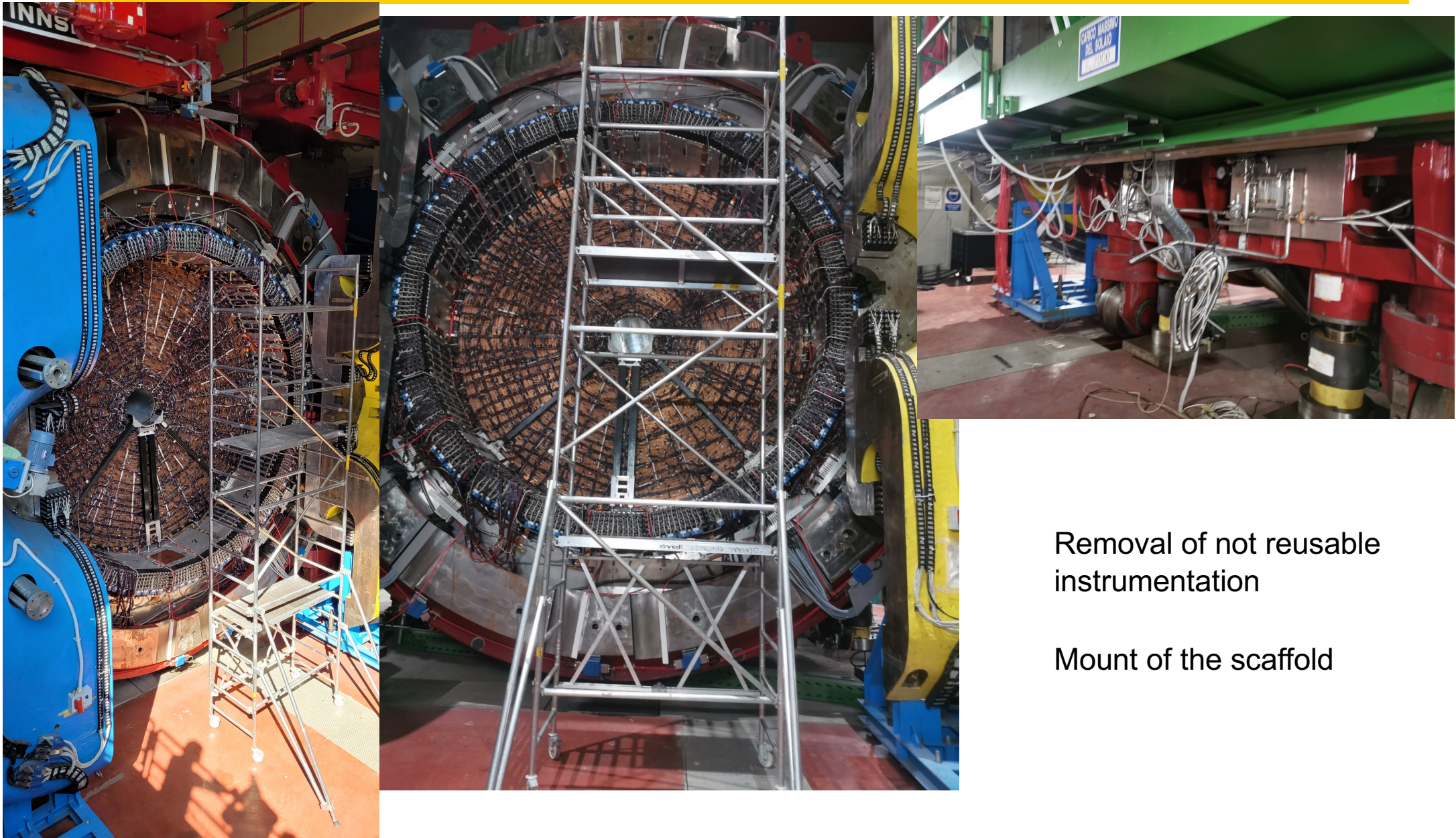
After several meetings and interactions with LNF Director and LNF Safety and Protection head the dismounting procedures to be applied according to laws and regulations have been formally endorsed. The first operations for preparation and cleaning of the area started on May 9th.



old mechanical tools:  
recovery, storage, delivery for refurbishment



# Start of the operations



Removal of not reusable instrumentation

Mount of the scaffold

# Operations in progress



# Operations in progress





Dismounting cryogenic services turret



# ECAL operations in progress



Valve control panel  
weight = 120 kg



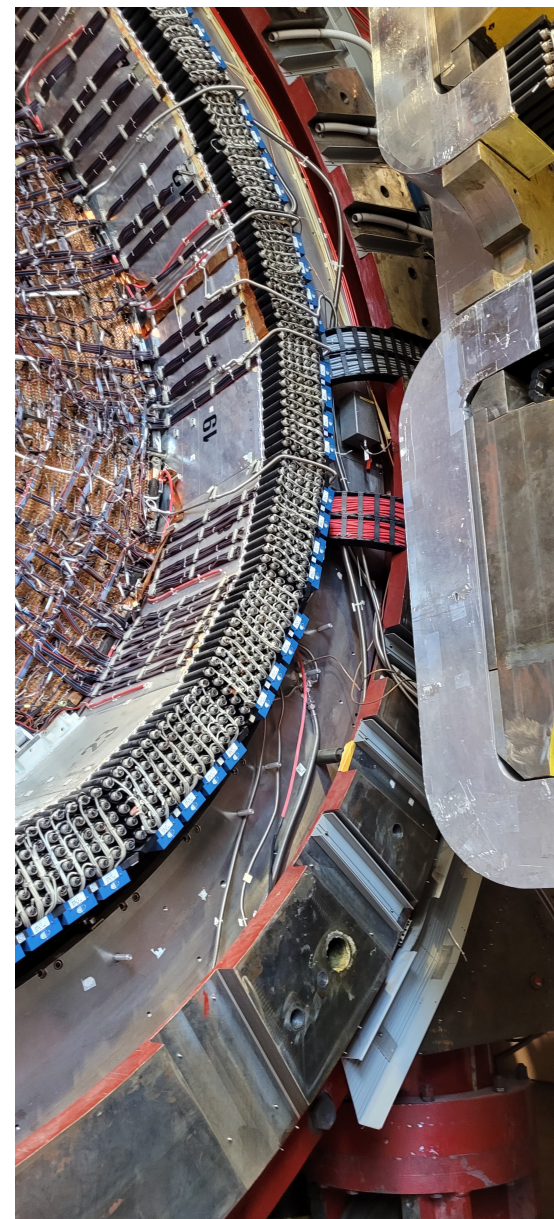
Pump  
weight = 300 kg

Tot = 880 kg



Service Turret = 460 kg

# ECAL operations in progress



# SAND ECAL cable removal



- The updated technician shifts list can be found here:

<https://docs.google.com/spreadsheets/d/1Nq3XuTErrKPR9QoanmTGRWJj5VFoXV14/edit#gid=738169974>

	6 lun	Riccardo Lunadei (RM1)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	7 mar	Riccardo Lunadei (RM1)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	8 mer	Riccardo Lunadei (RM1)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	9 gio	Riccardo Lunadei (RM1)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	10 ven	Riccardo Lunadei (RM1)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	11 sab			
	12 dom			
	13 lun		Carlo Pinto (LE)	Massimo Corrado (LE)
	14 mar		Carlo Pinto (LE)	Massimo Corrado (LE)
	15 mer		Carlo Pinto (LE)	Massimo Corrado (LE)
	16 gio	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Massimo Corrado (LE)
	17 ven	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Massimo Corrado (LE)
	18 sab			
	19 dom			
	20 lun	Riccardo Lunadei (RM1)	Giulio Pancaldi (BO)	Luca Beretta (PI)
	21 mar	Riccardo Lunadei (RM1)	Giulio Pancaldi (BO)	Luca Beretta (PI)
	22 mer	Riccardo Lunadei (RM1)	Giulio Pancaldi (BO)	Luca Beretta (PI)
	23 gio	Riccardo Lunadei (RM1)	Giulio Pancaldi (BO)	Luca Beretta (PI)
	24 ven	Riccardo Lunadei (RM1)	Giulio Pancaldi (BO)	Luca Beretta (PI)
	25 sab			
	26 dom			
	27 lun	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Giorgio Rizzo (LE)
	28 mar	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Giorgio Rizzo (LE)
	29 mer	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Giorgio Rizzo (LE)
	30 gio	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Giorgio Rizzo (LE)
luglio	1 ven	Riccardo Lunadei (RM1)	Carlo Pinto (LE)	Giorgio Rizzo (LE)
	2 sab			
	3 dom			
	4 lun	Giulio Pancaldi (BO)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	5 mar	Giulio Pancaldi (BO)	Claudio Calì (LNS)	Maurizio Castro (LNS)
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	8 ven	Giulio Pancaldi (BO)	Claudio Calì (LNS)	Maurizio Castro (LNS)
	9 sab			
	10 dom			
	11 lun	Filippo Mariani (PI)	Fulvio Calzon (PD)	
	12 mar	Filippo Mariani (PI)	Fulvio Calzon (PD)	
	13 mer	Filippo Mariani (PI)	Fulvio Calzon (PD)	
	14 gio	Filippo Mariani (PI)	Fulvio Calzon (PD)	
	15 ven	Filippo Mariani (PI)	Fulvio Calzon (PD)	
	16 sab	FINE TURNI		

# KLOE-to-SAND tentative schedule

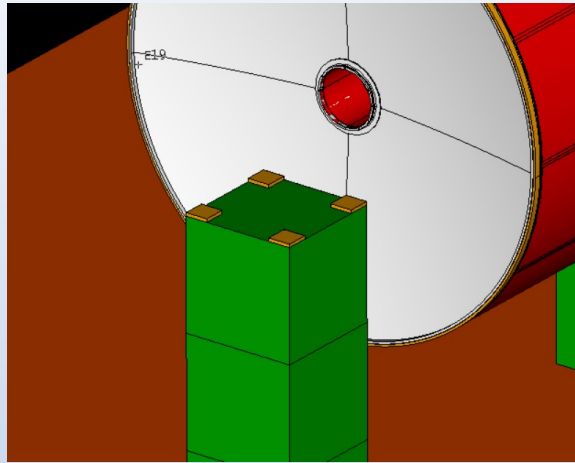
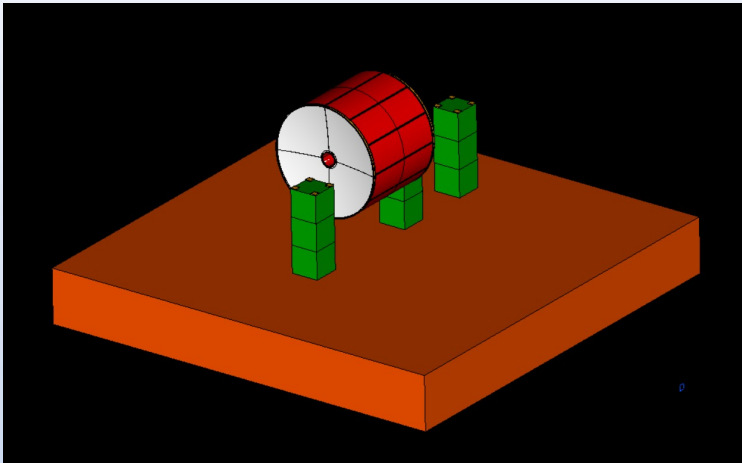
	2022								2023											
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Safety Operation Documentation																				
KLOE Hall Housekeeping																				
Unplugging and Cables removal																				
- DC cables removal on platforms																				
- DC crates removal																				
- DC cables removal on plates																				
- Cryo pump, valve box, electric panel removal																				
- ECAL SDS to TDC cables removal																				
- Trigger cables and crates removal																				
- ECAL cables unplugging																				
- ECAL crates removal																				
- Racks removal																				
- ECAL HV+Signal cables removal																				
DC Tooling Draw and Construction																				
Drift Chamber Extraction																				
ECAL Barrel tools: design, construction and refurbishment																				
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ECAL Module Test																				
ECAL EndCaps tools: design, construction and refurbishment																				
ECAL EndCaps Dismounting																				
Coil Test																				
Coil Extraction																				
Yoke Dismounting																				

# KLOE-to-SAND tentative schedule

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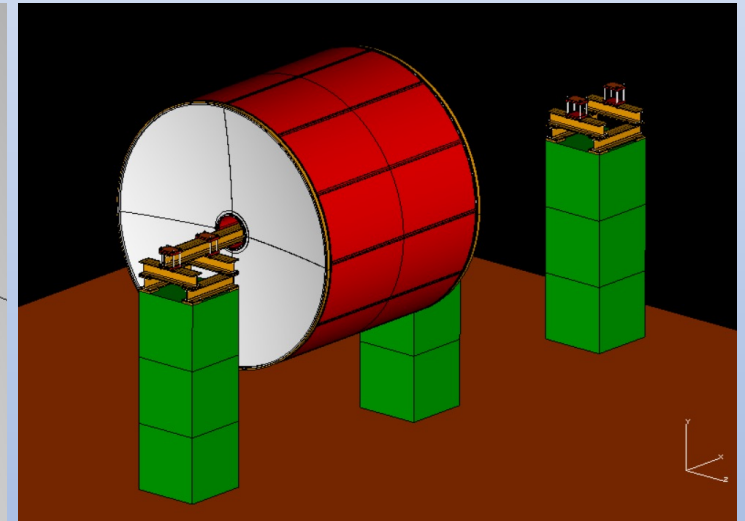
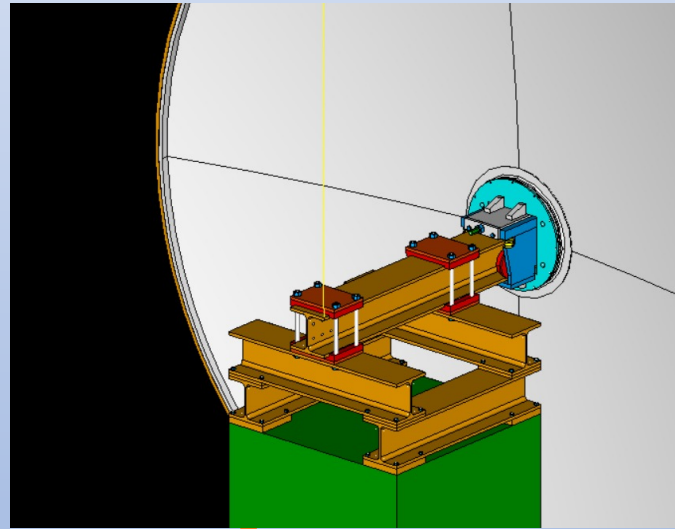
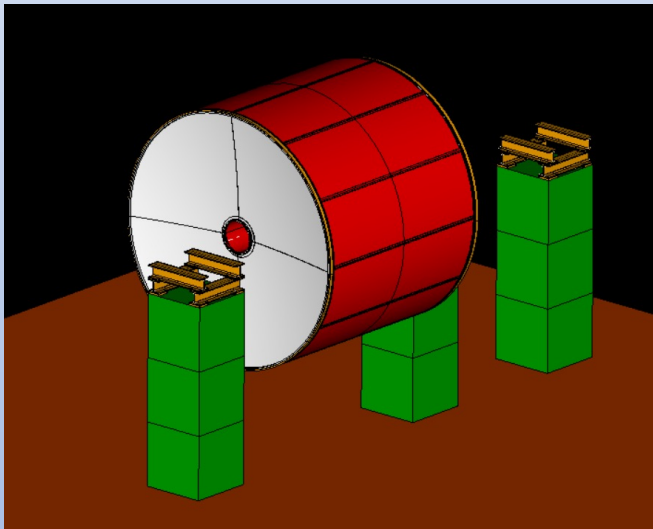
	2028												2029									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
ND hall ready and available for detector installation																						
Starting Yoke, magnet and ECAL installation in ND hall																						

# DC Extraction Mechanical Tools



**September 2022**

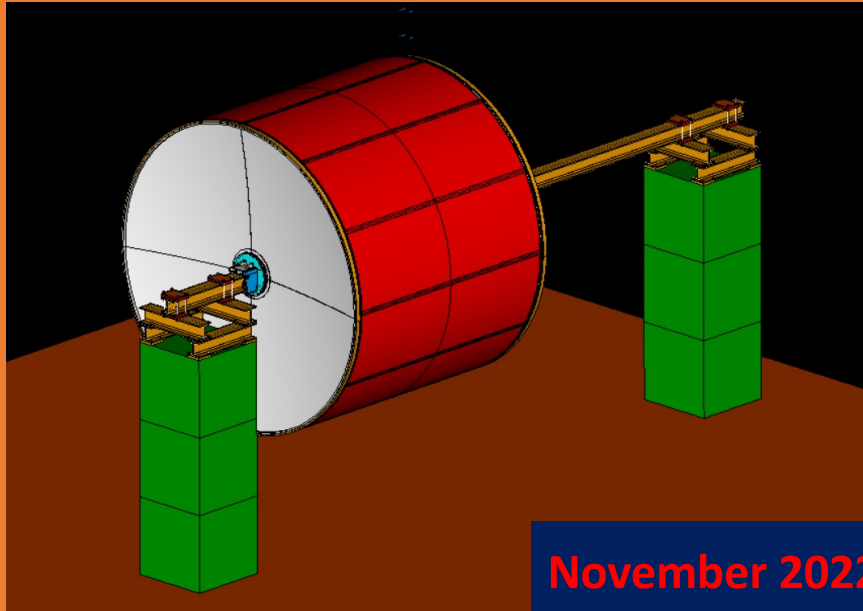
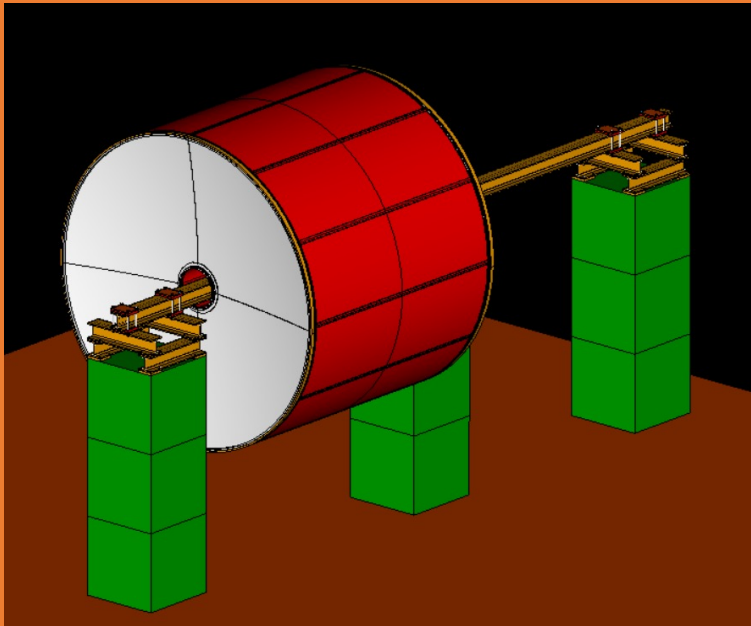
- Positioning of three concrete columns
- Mounting of plates on the upper faces



**November 2022**

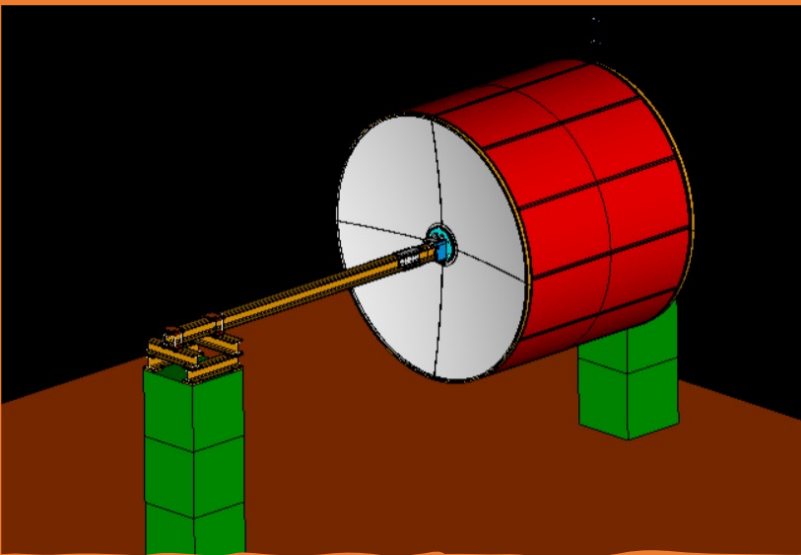
- Mounting of the support structures on the concrete columns
- Bolting of the flanges on the endplates and assembly of the trolley system
- Insertion of the 6m beam

# DC Extraction Mechanical Tools



**November 2022**

- Addition of the 4.5m beam
- Removal of central concrete column



**November 2022**

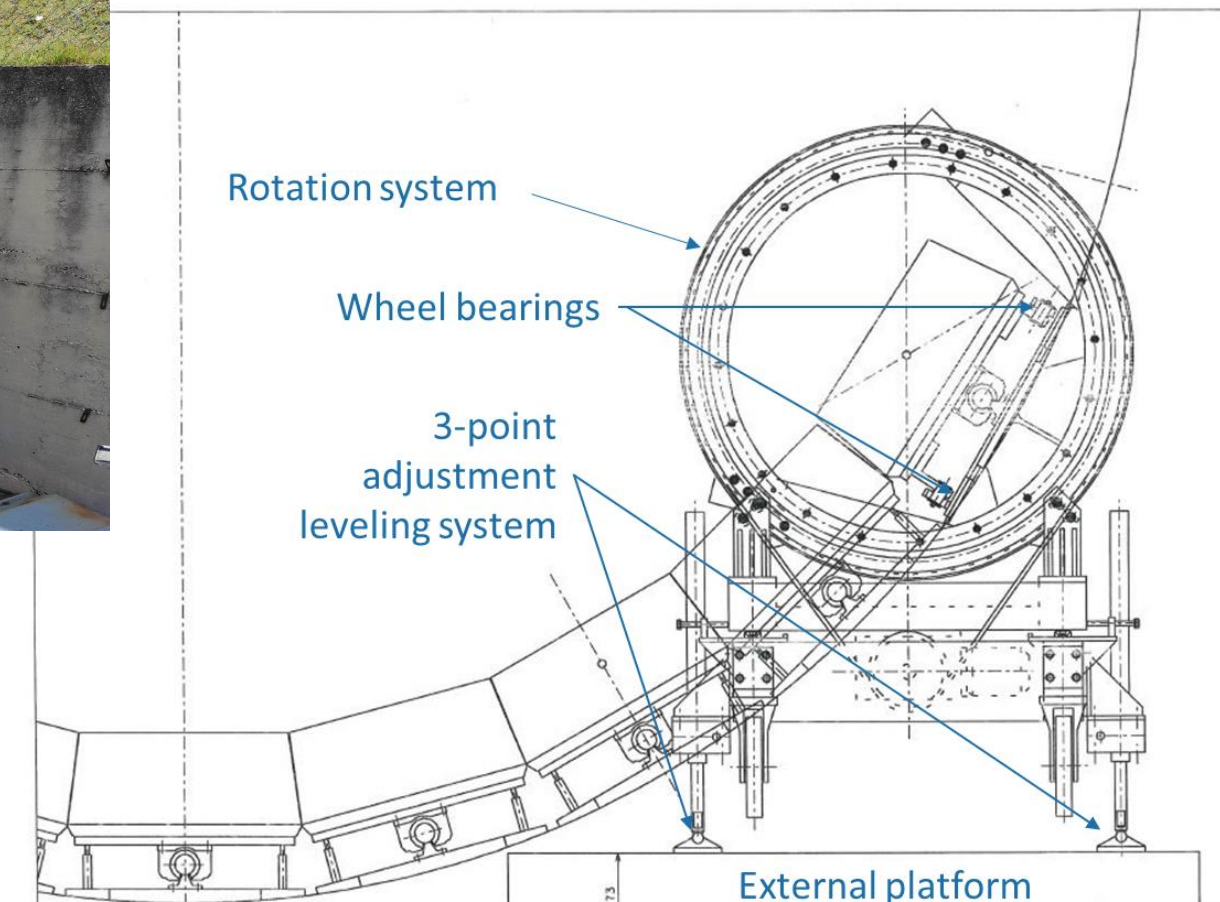
- Sliding of the chamber on the two beams
- Lifting of the chamber inside the KLOE area

A. Miccoli  
INFN Lecce

## Barrel Extraction Tool Revamping



- Total dismount
- Sand blasting and painting
- Bolts replacement
- Wheels bearing (20 units) replacements
- Chain replacement
- Aluminum supports of stainless-steel rod
- Check operation of worm reducer
- Three vertical screw lifts verification



F. Raffaelli - INFN Pisa



EndCap Module Fixing  
and Rotation tool

Original drawings available,  
re-design in progress

Tool to be revamped (structural analysis and test needed) or built anew



F. Noto – INFN LNS

# Magnet test: cooling down

KLOE SOLENOID

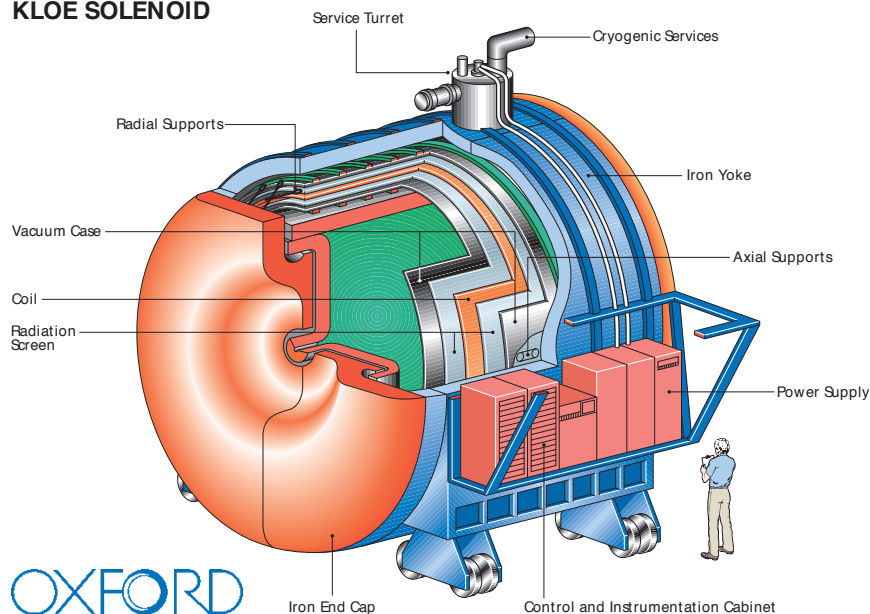


Figure 1 - KLOE schematic

## COOLING DOWN

A preliminary estimate of the LN2 and LHe quantities needed for the CD is based on the parameters of the CDs of the magnet with the Linde system.

Cool Down from 300 to 100 K - **2 weeks**

**LN2  $\approx$  26000 liters**

Cool Down from 100 to 4.4 K - **3 days**

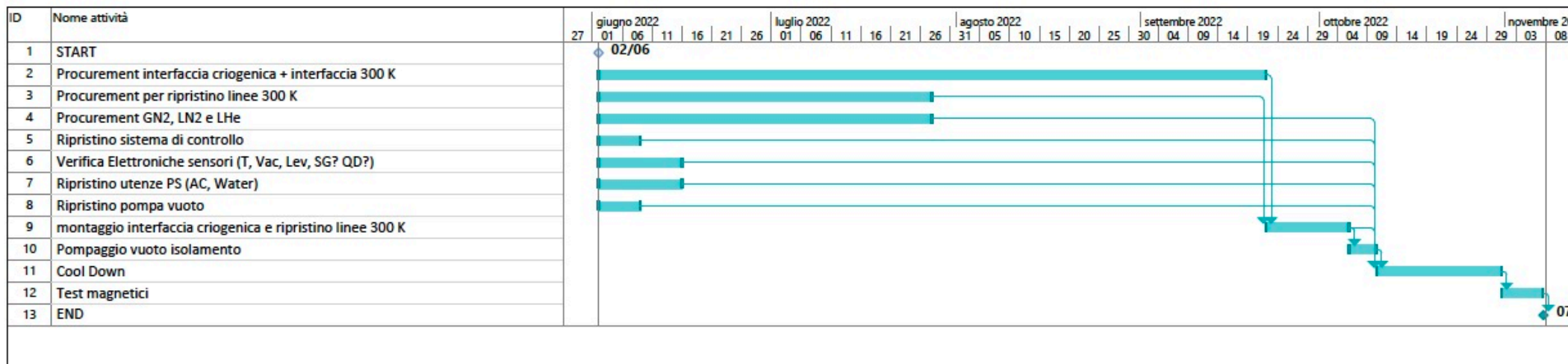
**Total LN2  $\approx$  720 liters**  
**Total LHe  $\approx$  4000 liters**

Magnet kept Cold a 4.4 K  
for **N additional days (for possible tests)**

**LN2  $\approx$  240 liters/day**  
**LHe  $\approx$  700 liters/day**

G. Delle Monache

# Magnet test: tentative time schedule and cost estimate



## COST ESTIMATE

Crio interface	50.000
LHe 6000 l x 25 Euro/lt	150.000
LN2 (4 dewar or tank rent + TL)	80.000
Services	10.000

**TOTAL ≈ 300 kEuro**

G. Delle Monache

## Magnet Movimentation Tools

Coil + Cryostat is the single largest and heavier part of KLOE  
5.8 m diameter  
43 tons



Installing cradle



Transport cradle

A. Saputi - INFN Ferrara

## Iron Yoke Dismounting

Contacts with company that mounted it, still  
available for the dismount

600 tons (34 pieces, at most 20 tons)



S. Gazzana - INFN LNF



## Electronics Platforms Modifications

upper platforms on both sides will be cut to same width of lower platforms to fit into SAND alcove

upper platform

lower platform

