

# ASSEMBLEA PLENARIA



## 12 DICEMBRE 2024

Registrazione a partire dalle ore 9:00

Sapienza Università di Roma

Aula La Ginestra,  
Edificio S. Cannizzaro (CU014)  
Piazzale Aldo Moro, 2

ROMA



### KM3NeT4RR

Kilometer Cube Neutrino  
Telescope for Recovery  
and Resilience

### INTERVENGONO

- Veronica Valsecchi..... WP1 Leader
- Paolo Piattelli..... WP2 Leader
- Lucio Gialanella..... WP3 Leader
- Cristiano Bozza..... WP4 Leader
- Simone Biagi..... WP5 Leader
- Pasquale Migliozi..... WP6 Leader
- Rosa Coniglione..... WP7 Leader
- Marco Circella..... WP8 Leader
- Giacomo Cuttone..... Principal Investigator
- Sebastiano Ciancio..... Infrastructure Manager
- Barbara Artivi..... Financial Officer



Agenda



Maps



Web

Seguici su



A SEGUIRE

Visita del laboratorio di  
elettronica di KM3NeT di  
Sapienza e INFN-RM1

Laboratorio Di Palma (porta 212),  
Dipartimento di Fisica,  
Edificio E. Fermi (CU033),  
Piano Secondo

Missione 4, "Istruzione e Ricerca" - Componente 2,  
"Dalla ricerca all'impresa" - Investimento 3.1,  
"Fondo per la realizzazione di un sistema integrato  
di infrastrutture di ricerca e innovazione", Progetto  
IR0000002 - KM3NeT4RR, Decreto di ammissione  
al finanziamento 123 del 21-06-2022. CUP  
I57G2100040001



# Status report about the WP6 activities in the framework of the KM3NeT4RR project

P. Migliozi  
INFN-Napoli

# WP-6 – Underwater Detector

The aim of this WP is to integrate the detection units (DUs) needed for the expansion of the KM3NeT submarine telescope located off-shore the Sicily coast. The construction of the DUs requires firstly the procurement of the needed components, secondly their integration. It is worth noticing that the procurement of the components will last several months. Therefore, in order to allow the construction in the due time imposed by the KM3NeT4RR project, their delivery is organised in batch to let the integration start as soon as the components are available.

The budget items related to this WP can be grouped into two main categories: mechanical and electro-optical components, and personnel. Therefore, the activities will mainly focus on the definition of the technical and administrative documents to launch the tenders needed for their acquisition, and their integration. Among the components to be purchased the most expensive are the photosensors and the related electronics whose cost amounts to about one third of the budget of the WP allocated for the purchase of scientific instrumentation.

The number of the fixed term personnel required by this WP has been estimated based on the current integration activities. The aim is to increase the integration capabilities of the DOMs, BMs and DUs laboratories in a way that they are compliant with the requirements of the project KM3NeT4RR. In particular, the goal is to triplicate the DOM and DU integration rate and double the BM one.

Total Budget for components about 20.000.000 €

Total Budget for personnel about 2.500.000 €

# The procurement era (dec 2022–dec 2023)

- The KM3NeT4RR project started on 1st december 2022
- About 8.000.000 € tendered by 31st december 2022
- In total, about 40 tenders have been opened and contractualized by the 31st december 2023
- All this has been made possible thanks to the close and fruitful collaboration between the INFN local administrations (BA-LNS-NA) and the INFN-AC

Personal comment, my special thanks go to A. Silvestro, P. Mileva and M. De Iorio from INFN-NA administration that daily supported me in the organization of more than 30 tenders prepared in Napoli

# The recruitment era

- In the WP6 framework, the human resources requested by the different groups were the following
  - Unicampania: 2 CTER, 1 RTDA, 2PhD ➡ OK
  - INFN-CT: 1 CTER ➡ OK
  - INFN-NA: 8 CTER, 1 Technologist ➡ OK, but only 7 CTER hired (one on them resigned since december 1st 2024)
  - INFN-BA: 3 CTER ➡ OK
  - INFN-BO: 1 CTER ➡ OK
  - INFN-LNS: 7 CTER ➡ OK
  - INFN-GE: 1 CTER ➡ OK
- Not so easy to recruit more than 20 technicians, but ...

KM3Net  
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# 6.1 Procurement of DOM&DU sensors

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	N° Int.Obj.	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18	
							APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25	
6.1	1. Procurement of DOM&DU sensors	INFN-NA	Pasquale Migliozi	IO-6.1	Photosensors: 50% of the supply	D-6.1.1	D-6.1.1 OK 50% PMT										
				IO-6.2	Photosensors: 100% of the supply	D-6.2.1											
				IO-6.3	Procurement of DOM & DU sensors	D-6.3.1											

INFN-NA: Piezo sensors	Pasquale Migliozi	Completed
INFN NA: PMT bases + Integration and coating- TITOLO FORNITURA: fornitura di 27.900 schede di elettronica e loro integrazione con i fotomoltiplicatori e realizzazione del coating nell'ambito del progetto KM3NET4RR - Lotto 2: Integrazione delle schede con i fotomoltiplicatori e realizzazione del coating resistivo.	Pasquale Migliozi	Completed
INFN NA: PMT bases + Integration and coating- TITOLO FORNITURA: fornitura di 27.900 schede di elettronica e loro integrazione con i fotomoltiplicatori e realizzazione del coating nell'ambito del progetto KM3NET4RR - Lotto 1: fornitura di schede elettroniche per i fotomoltiplicatori da 3"	Pasquale Migliozi	Completed
INFN-NA: Fornitura di 27.900 fotomoltiplicatori da 3" per il progetto KM3NET4RR	Pasquale Migliozi	Completed
INFN-NA: Hydrophones	Pasquale Migliozi	In progress – on time

# 6.2 Procurement of DOM&DU electronics

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18
						APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25
6.2	2.Procurement of DOM & BM electronics	INFN-BA	Marco Circella	Procurement of DOM & BM electronics	D-6.4.1	Ritardo del D-6.4 dal Bim13 al Bim15 (Contratto)	ritardo	ritardo	ritardo	OLD D-6.4.1	ritardo	NEW D-6.4.1			

The activity will consist of the procurement of the electronics needed to integrate the Digital Optical Module (DOM) and the Base Module (BM) of the Detection Unit (DU). The components that will be purchased are:

- Central Logic Board (CLB);
- Power Board;
- Signal collection boards (octopus);
- FMC.

INFN-BA: KM3NeT4RR: Electronics for optical modules and detection units	Marco Circella	In progress – on time
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# 6.3 Procurement of DOM mechanical components

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18
						APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25
6.3	3. Procurement of DOM mechanical components	INFN-NA	Pasquale Migliozi	Procurement of glass spheres	D-6.5.1	OLD D-6.5.1 (sfere)	Ritardo	NEW D-6.5.1 (sfere)	D-6.6.1 Ok resto						
				Procurement of DOM mechanical components	D-6.6.1										

The components that will be purchased are

- **Glass sphere;**
- **DOM internal mechanics;**
- **Light Reflector rings;**
- **Optical gel;**
- **PMT support structures;**
- **Components for DOM integration.**

INFN-NA: Glass spheres - TITOLO FORNITURA: Acquisto sfere di vetro da 17" per il progetto KM3NeT4RR e materiale necessario per la loro chiusura	P. Migliozi	Completed
INFN-NA: DOM + VEOC penetrators - TITOLO PROCEDURA: fornitura di 900 "DOM penetrators" e 50 "BM penetrators" per le linee di rivelazione di KM3NeT4RR	P. Migliozi	Completed
INFN-NA: DOM and DU Mechanical components	P. Migliozi	Completed
INFN-NA: DOM internal mechanics - fornitura di n. 900 strutture meccaniche interne dei moduli ottici nell'ambito del progetto KM3NeT4RR	P. Migliozi	Completed



# 6.4 Procurement of BM mechanical components

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18
						APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25
6.4	4. Procurement of BM mechanical components	INFN-BA	Marco Circella	Base Module mechanical components: 50% of the supply	D-6.7.1	Ritardo	Ritardo	Ritardo	NEW D-6.7.1	OK	OK	D-6.8.1			
				Base Module mechanical components: 100% of the supply	D-6.8.1										

The components that will be purchased are

- Container;
- Internal mechanics.
- Buoy blocks
- Optical splitters

Fornitura di 100 blocchi per le boe di KM3NeT4RR PIANO NAZIONALE RIPRESA E RESILIENZA (PNRR)	Rosa Coniglione	In progress – on time
INFN-BA: KM3NeT4RR: meccanica dei moduli di base-linea	Irene Sgura	In progress – on time
<b>Splitters ottici per il progetto KM3NeT4RR</b>	<b>Marco Circella</b>	<b>completed</b>



# 6.5 Procurement of DU mechanical components

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	N° Int.Obj.	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18
							APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25
6.5	5. Procurement of DU mechanical components	INFN-NA	Pasquale Migliozi	IO-6.9	Procurement of DU mechanical components	D-6.9.1			D-6.9.1							

The components that will be purchased are

- **DOM collar;**
- **Rope;**
- **Buoy block;**
- **Buoy structure;**
- **Anchor;**
- **Rope anchor connection;**
- **Components for DU assembly.**

INFN-NA: Procurement of DU mechanical components Anchors-LOTTO 4	P. Migliozi	Completed
INFN-NA: Buoy blocks - TITOLO PROCEDURA: Fornitura di buoy blocks per l'assemblaggio delle boe il progetto KM3NeT4RR	P. Migliozi	Completed
INFN-NA: Fornitura delle strutture per le boe del progetto KM3NeT4RR (TD 3352487)_ PNRR	P. Migliozi	Completed
"INFN-NA: Fornitura collari in titanio per progetto KM3NeT4RR (TD MEPA 3367358)	P. Migliozi	Completed
INFN-NA:Fornitura per la connessione delle funi con le ancore del progetto KM3NeT4RR (TD N.3352970)_ PNRR	P. Migliozi	Completed

# 6.6 Procurement of DU mechanical components

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	N° Int.Obj.	Int.Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18
							APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25
6.6	6. Procurement of power components	INFN-LNS	Pasquale Migliozi	IO-6.10	Procurement of Power components	D-6.10.1	Ritardo da segnalare su D-6.10 dal Bim12 a Bim14 o Bim15	Ritardo	Ritardo	OLD D-6.10.1	Ritardo	NEW D-6.10.1				

The components that will be purchased are

- **BPC;**
- **BPD;**
- **DUL;**
- **PS\_12V.**

INFN-LNS: KM3NeT4RR: Schede elettroniche di potenza per le detection units KM3NeT (PNRR)	Rosanna Cocimano	In progress – on time
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# 6.7 Procurement of DU mechanical components

ACTIVITY #	ACTIVITY TITLE	UO	RESP.LE UO x REND.NE	N° Int.Obj.	Int. Obj. Descr.	N° Deliverable	9	10	11	12	13	14	15	16	17	18		
							APR'24 MAG'24	GIU'24 LUG'24	AGO'24 SET'24	OTT'24 NOV'24	DIC'24 GEN'25	FEB'25 MAR'25	APR'25 MAG'25	GIU'25 LUG'25	AGO'25 SET'25	OTT'25 NOV'25		
6.7	7. Procurement of DU electro-optical components	INFN-BA	Marco Circella	IO-6.11	Procurement of Vertical Electro Optical Cables	D-6.11.1	Ritardo del D6.11 (contratto VEOC)	OLD D-6.13.1	Ritardo	Ritardo	Ritardo	OLD D-6.11.1	NEW D-6-11.1					
				IO-6.12	Procurement of DOM & BM Electro-Optical components: 50% of the supply	D-6-12.1												
				IO-6.13	Procurement of DOM & BM Electro-Optical components: 100% of the supply	D-6-13.1												

The components that will be purchased are

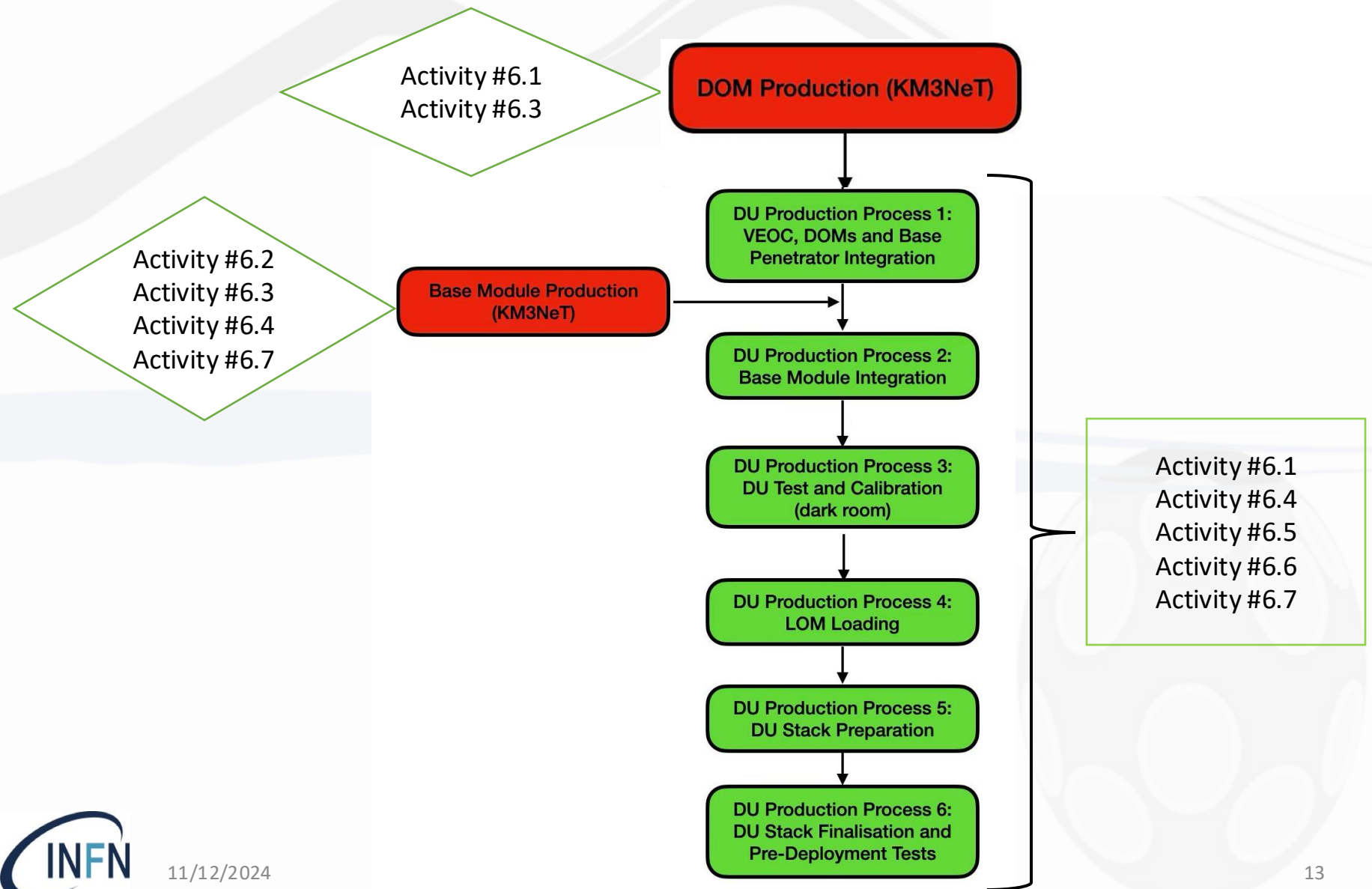
- VEOC;
- DOM electro-optical transceivers;
- TSFPs for BM;
- SCB electronic board;
- GBP electronic board;
- Components for system assembly.

INFN-BA: KM3NeT4RR: cavi di dorsale VEOC - TITOLO PROCEDURA Fornitura di 50 cavi di dorsale VEOC per le linee di rivelazione di KM3NeT4RR	Marco Circella	In progress – on time
INFN-BA: KM3NeT4RR: Electro-optical system for the detection units	Marco Circella	In progress – on time

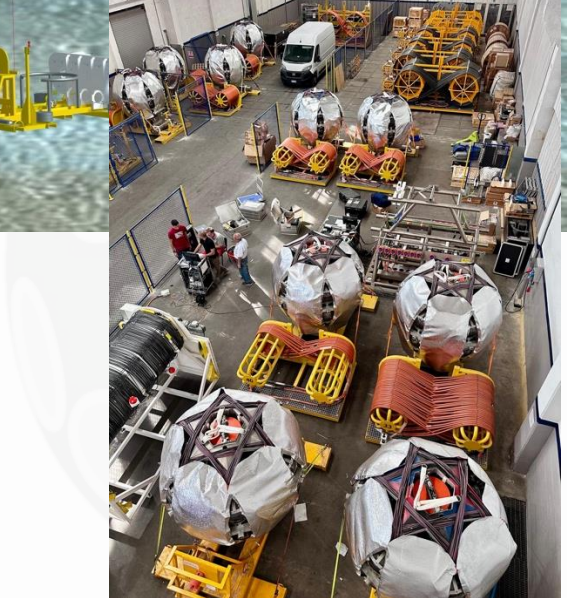
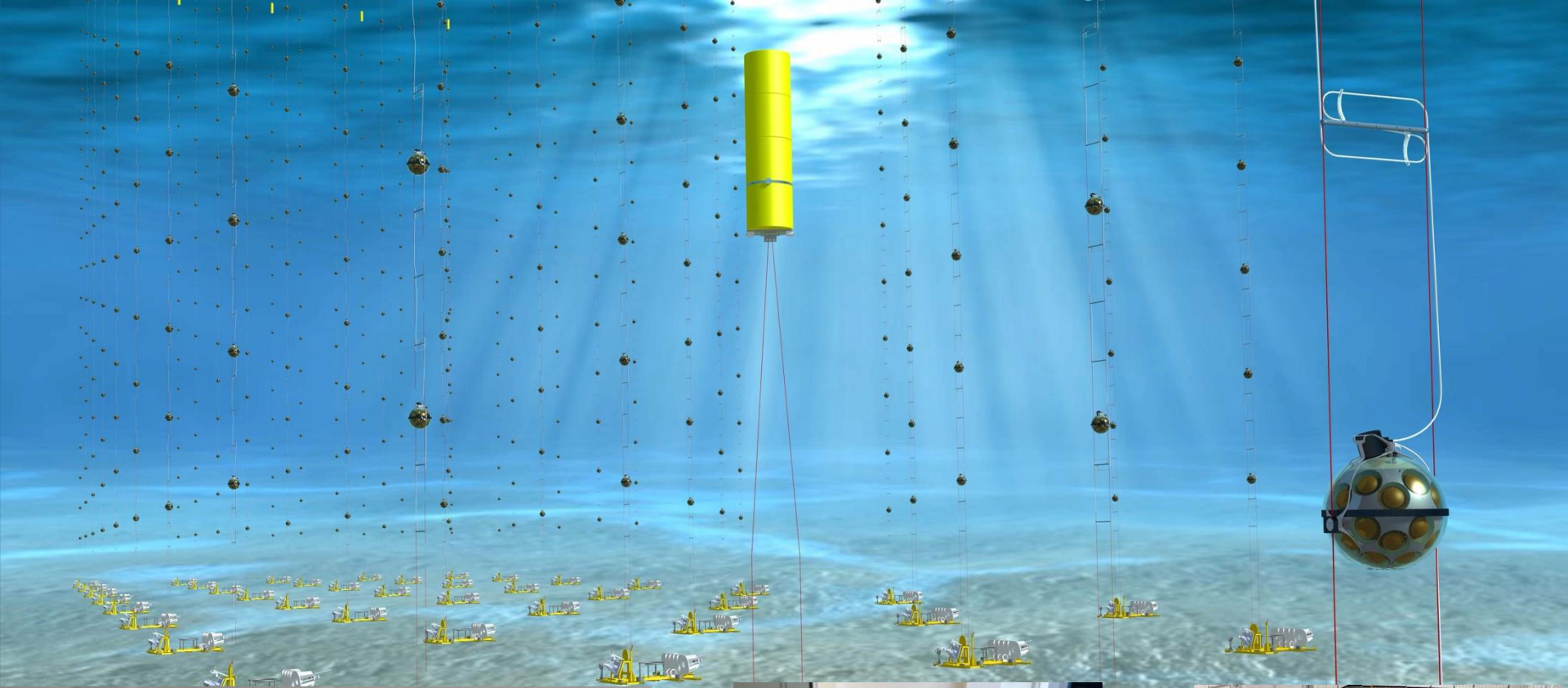
# The integration era (in progress)

- Almost all the KM3NeT4RR components are custom-made
- All the integration procedures have been developed and validated by the Collaboration
- Each integrated part of the (DOM, BM and DU) consists of dozens of components
- Training new technicians demanded extraordinary effort, which has been greatly rewarded by the excellent results we achieved in the integration rate.
- Additional difficulty: the integration sites are distributed all over Italy

# How to built a DU?

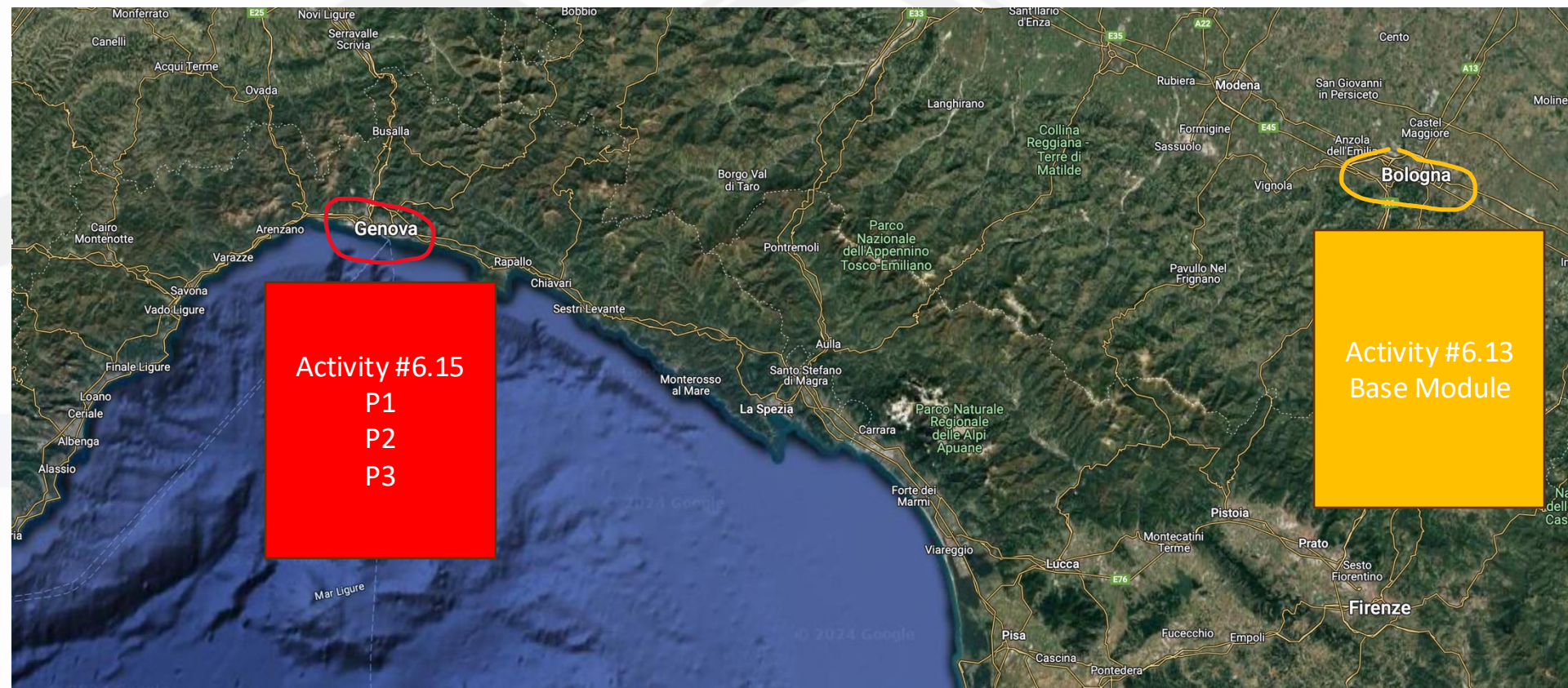






squale M





Activity #6.15  
P1  
P2  
P3

Activity #6.13  
Base Module

arca&orca



Joint effort INFN-NA and UniCampania

CAPACITY  
INFN Laboratory

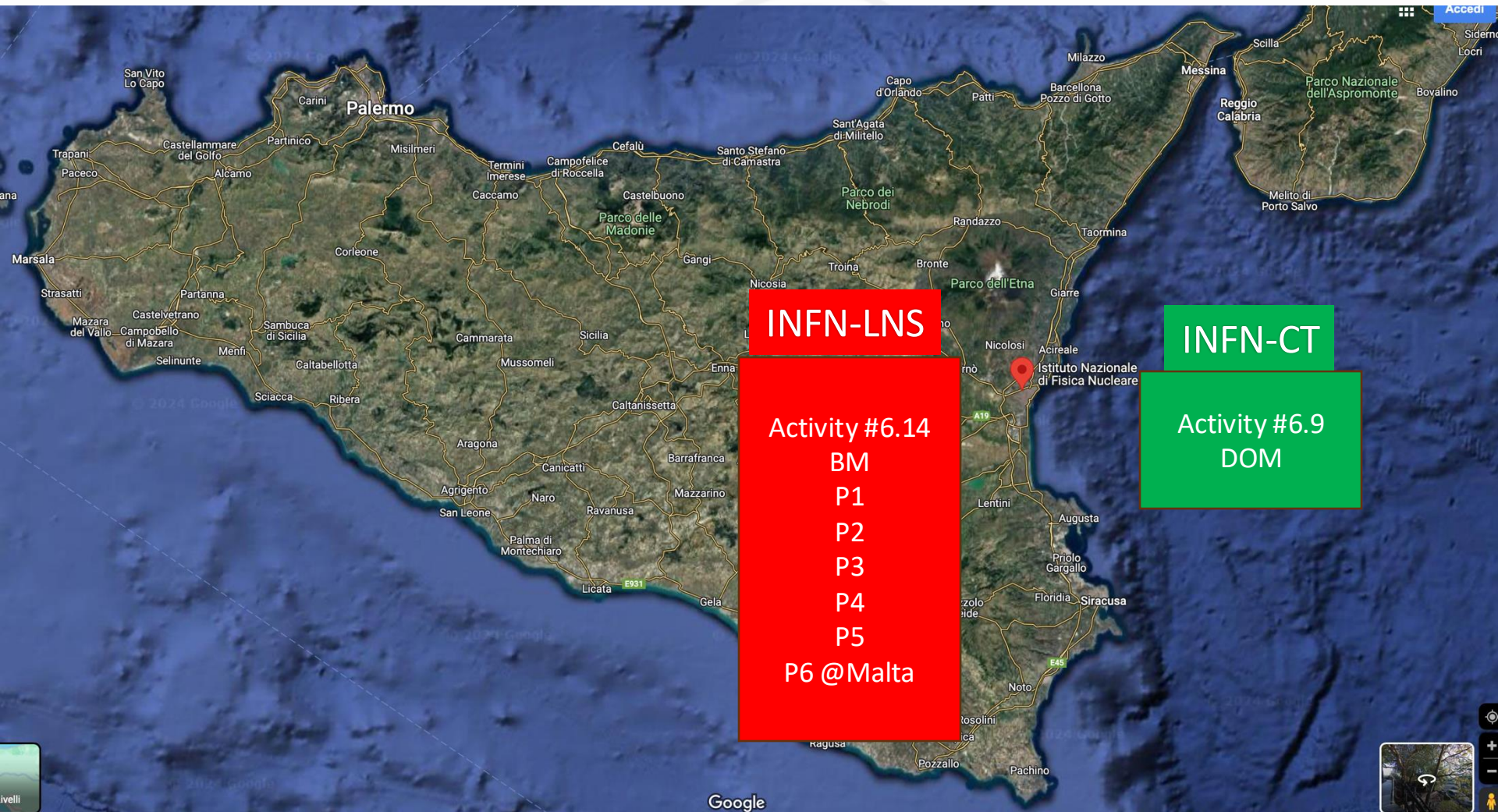
Activity #6.8  
Activity #6.10  
PMT  
DOM  
BM  
P1  
P2  
P3  
P4  
P5  
P6 @Malta

Activity #6.11  
DOM

Activity #6.12  
BM  
P1  
P2  
P3

Bari





**INFN-LNS**

**Activity #6.14**

**BM**

**P1**

**P2**

**P3**

**P4**

**P5**

**P6 @Malta**

**INFN-CT**

**Activity #6.9**

**DOM**

# Conclusion

- WP6 is a complex work package with 3 different layers
  - Procurement of components, most of them custom made
  - Recrutement of the personnel and training for the integration
  - Integration of the Dus
- Critical point: interplay time - price
- Procurement of the components
  - Tenders completed
  - Few components are on the way to our labs: available by may 2025
- Recrutement and training completed
- Integration in progress



THANK  
YOU