Km3

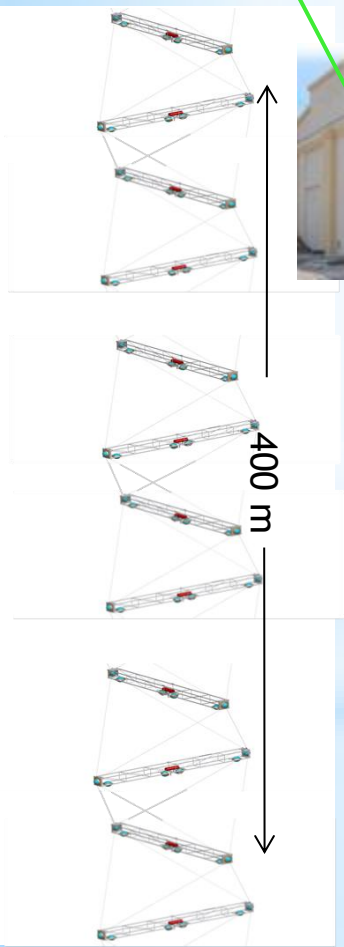
- Prima fase Finanziata con vari contributi europei: 20 M€ PON-Italia, ~10M€ fondi regionali francesi, ~10M€ NIKHEF.

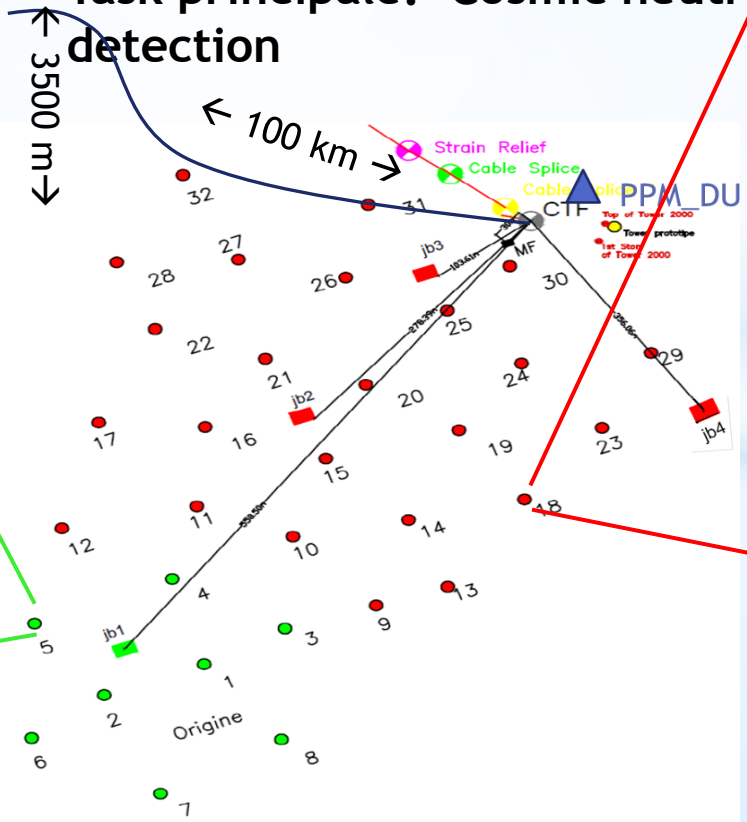
- Due siti prescelti: ex-ANTARES (-2500m), Capo Passero (-3500m).

- Due disegni di Detection units:
  - Torri a 14 piani (motivi storici.., constraint temporali, numero limitato)
  - Stringhe munite di 18 Digital Optical modules

Km3- sito Italiano-
ARCA: Astrophysics Research with Cosmic in the Abyss

- Situato a3500 m di profondità al largo di Capo Passero
- Primo blocco di Detection units in fase di realizzazione (8 torri e 24 stinghe)
- **Task principale: Cosmic neutrino detection**

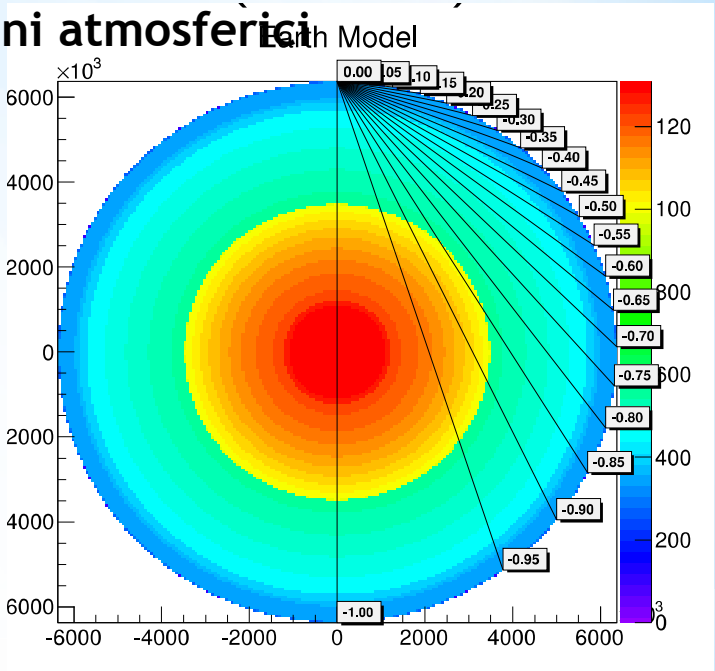


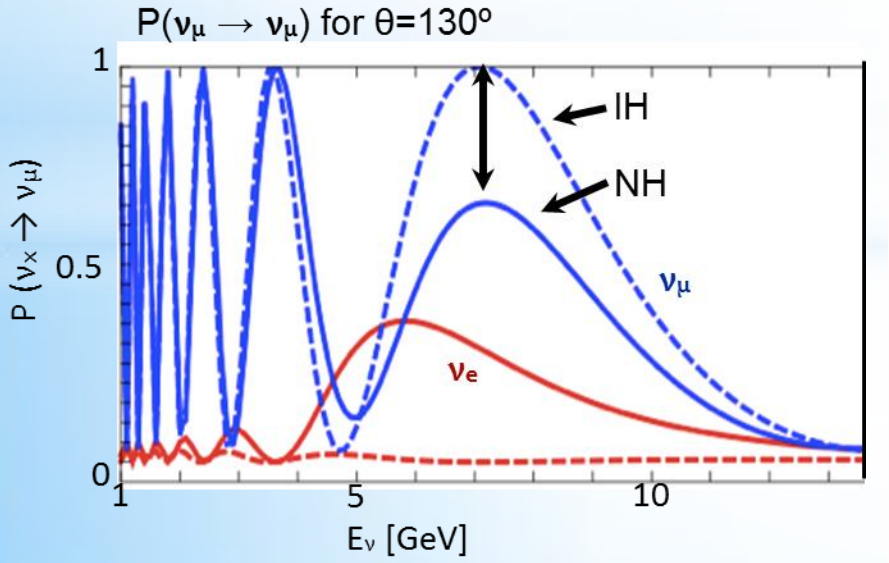


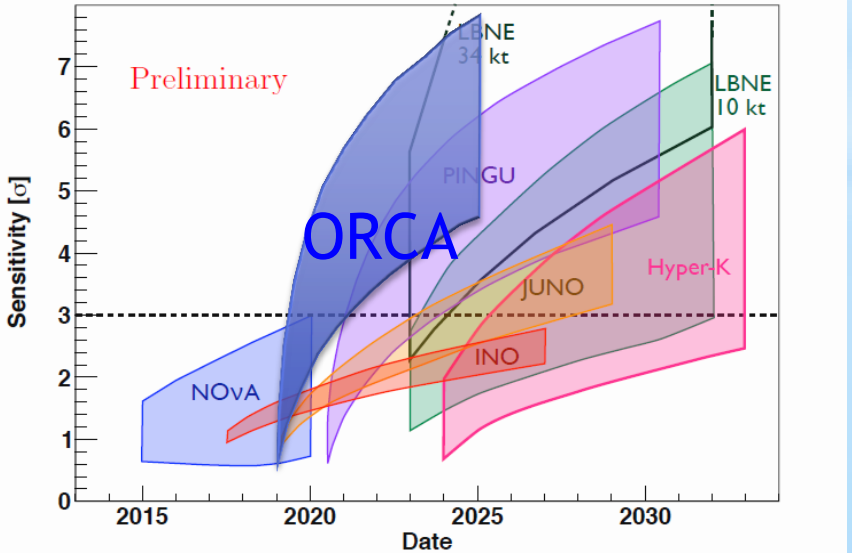
Km3- sito Francese-ORCA: Oscillation Research with cosmic in the Abyss

Misura della gerarchia di massa con i neutrini atmosferici

- Fascio ‘gratis’ di ν_μ e ν_e
- Range della base line e dell’ energia esteso (1000-10000 km, GeV-PeV).
- Pattern oscillazione distorto da effetti di massa (hierarchy-dependent).
- Effetti opposti su anti-neutini MA differenze nel flusso e nella sezione d’urto.



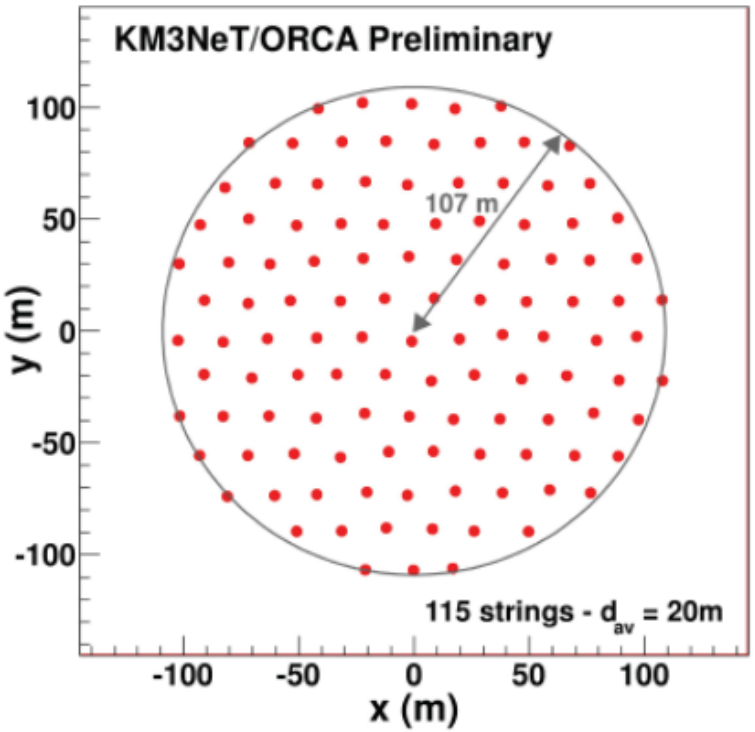




Km3- sito Francese-ORCA: Oscillation Research with cosmic in the Abyss

Detector Layout

Simulations are performed for this new configuration

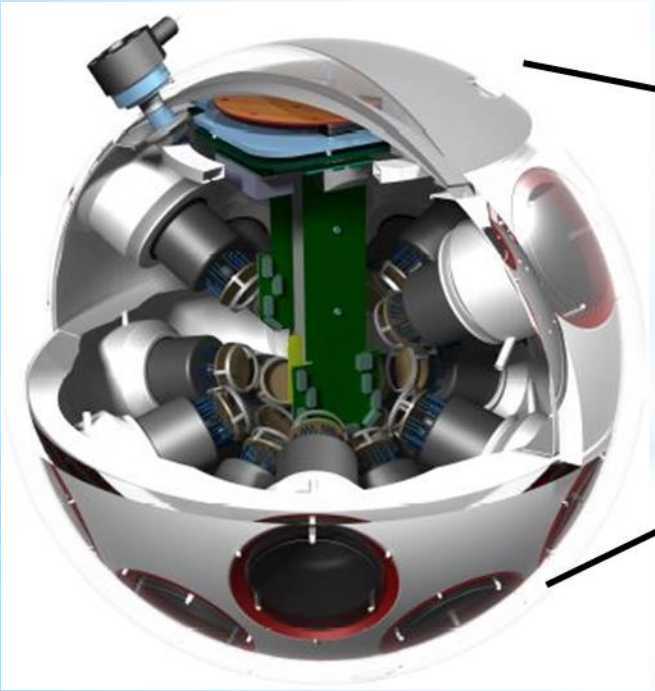


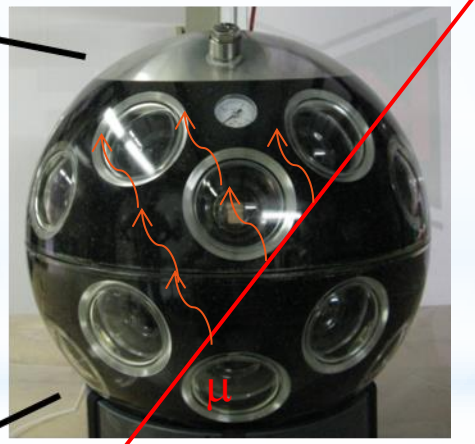
Multi-PMT DOM
31 small PMTs
Almost uniform coverage
Photon counting
Direction of photon
All electronics inside

115 lines, 20m spaced,
18 OM/line 6m spaced
Instrumented volume ~3.8 Mt, 2070 OM

Il ‘mattone’ del rivelatore: the Digital Optical Module (DOM)

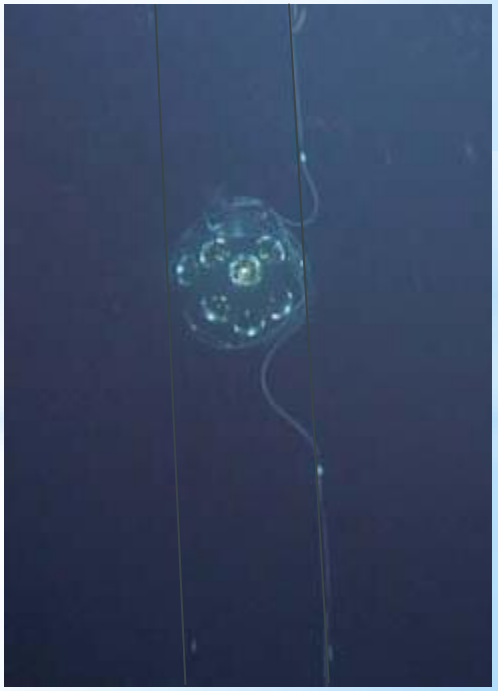
- Rivela i fotoni Cherenkov prodotti dal leptone carico
- 31 PMTs da 3 ‘’ contenuti in una sfera di veto,
- Control Logic Unit (CLB): realizzata in Sezione, basata su FPGA
  - misura il time over threshold dei 31 impulsi di anodo,
  - legge e il tilt, il compass e segnali acustici con idrofono, setta tensioni e soglie su ciascun PMT
  - Pilota LED beacon per calibrazione
  - Data to shore via UDP, sincronizzazione con White Rabbit (subnanosecond)





interazione

ν_μ di altissima energia (> TeV)



…e in mare

Phased Implementation

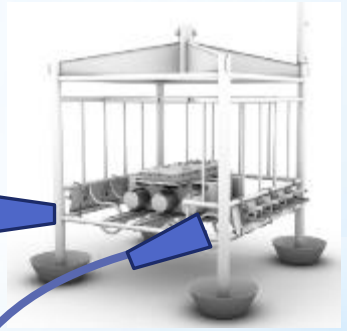
Phase	Blocks	Primary deliverables
1	0.2	Proof of feasibility and first science results (6 ORCA strings/24 ARCA strings by end 2016)
2.0	2 *ARCA*	Measurement of neutrino signal reported by IceCube; All flavor neutrino astronomy
	1 *ORCA*	Neutrino mass hierarchy
3	1+6	Neutrino astronomy including Galactic sources

The status on January 2015: off-shore

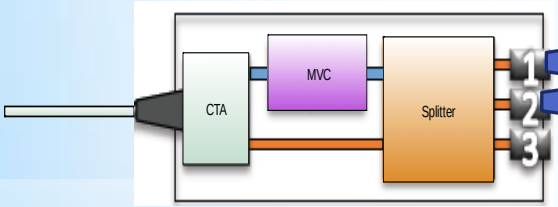
PPM-DU

3 DOMs

The Junction box
for the towers (JB1)



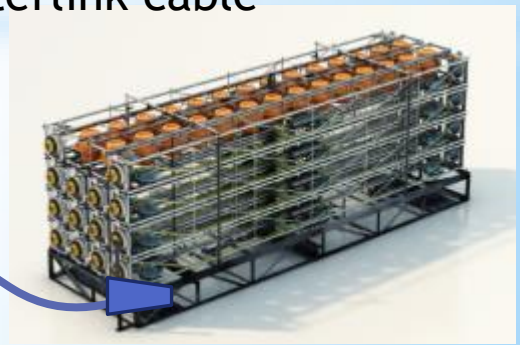
Cable termination frame)



600m long,temporary
(14AWG), Interlink cable

200m final
Interlink cable

14 storeys
Tower



Status on April,2015

- The tower was recovered to inspect the origin of a short circuit. Short due to water inlet in backbone cable.
- A recovery-reconfigure-redeploy plan for JB1 had been scheduled during the same operation.
- The operation to disconnect and recover the JB was fast and easy manageable.
- Inspection on-board evidenced a corrosion problem on two (over seventeen) connectors on the JB manifold. Consequently the JB was brought back at the lab.
- The cause of the corrosion is ascribed to the severe scratches on the anodization of the Aluminum manifold vessel. Scratches were produced during connector assembling.
- Dedicated tools and specific assembling procedure have been developed to prevent the problem in the future

Next marine operations…

The first will start on July, 14

- Recover, replace and redeploy Cable Termination frame (CTF).
- Replace the 600m cable to JB1 (JB1: for tower).
- Redeploy JB1.
- Deploy JB2 and cable to connect JB2 to CTF.

The second on September

- Deploy JB3 and cable to connect to CTF.
- Connect string (DU2) to JB2

Attività svolta da Genova

- Disegno, prototipaggio, realizzazione, test delle Control Logic Board (Cresta, Hugon ,Musico, Orzelli);
- Disegno e realizzazione camera buia per test MO torre (Cereseto);
- Disegno, realizzazione, test di parte della JB di Km3-IT (Orzelli, Vigo);
- Quality control/Documentazione (Pratolongo, Orzelli);

- Ray-tracing simulation di moduli ottici Antares, NEMO, Multi-PMT(Hugon);
  - sviluppo di «thin-layer» model per il fotocatodo
  - proprietà ottiche (scattering) acqua
- Neutrino detection in ANTARES during a GRB (Sanguineti)
- Data analysis della torre NEMO (Hugon)

Per l'anno prossimo:

- Disegno e realizzazione camera buia per test MO stringa (Rossi, Vigo)
- Disegno e test nuova versione DC-DC converter per striga (Cresta, Musico). Integrazione e test stringhe a Catania (Cresta)
- Quality control/Documentazione (Pratolongo)

- Analisi dati ANTARES e KM3, turni
- Rivelazione di neutrini da SN con un rivelatore alla ORCA (Hugon, Critelli)

KM3-GENOVA

FTE:4.5
M.Anghinolfi staff
M.Brunoldi staff
G.Critelli laureanda
C.Hugon assegno
M.Sanguineti dottorando
Tutti al 100%

M.Taiuti chair IB km3

P.Musico staff 50%

RICHIESTE 2016

Utilizzo servizi sezione (mesi)

- Progettazione meccanica 2
- Elettronica 6
- Officina 5