

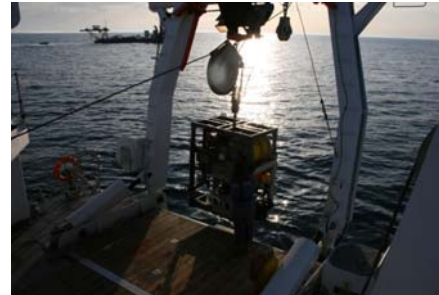
# NEWS from KM3NeT-international

- **Development plan:**
  - **PPM-DOM (singolo DOM montato in ANTARES)**
  - **PPM-DU (mini-DU con 3 DOMs)**
  - **Deployment tests (full-size DU with 18 spheres)**
  - **Eng-DU -> first DU**
- **Italian DOMs**
- **Planning**

**Not discussed here: infrastructure issues (layout, schedule, etc.)**



## ppm dom



- ☐ Connected on April 16th
- ☐ Run coordination: Alexandre Creusot (APC)
- ☐ # 120 runs taken so far
- ☐ Only one "manual" action on the shore station crate (OFF/ON) was needed on 16/05/2013  
Idea: install a web controlable power switch
- ☐ Standard Runs: Increase statistic & follow ANTARES.  
Piezo ON / BIOCAM OFF  
Default HV & thresholds
- ☐ Special Runs: various objectives: next slide...

22/05/2013

Sylvain Henry - SC KM3NeT Phase 1

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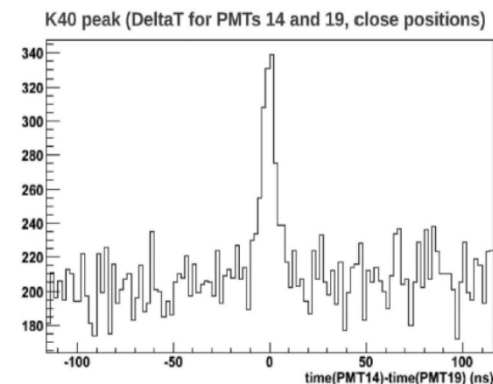


## ppm dom

- ☐ Gain tuning  $f(\text{HV}, \text{Threshold})$  to be done
- ☐ Work on Scripts (compass, dB transfert,...)
- ☐ Analysis soft to be modified

**definitive**

- ☐ No result so far on Time Offset from 40K
- ☐ No result so far on absolute efficiency from 40K



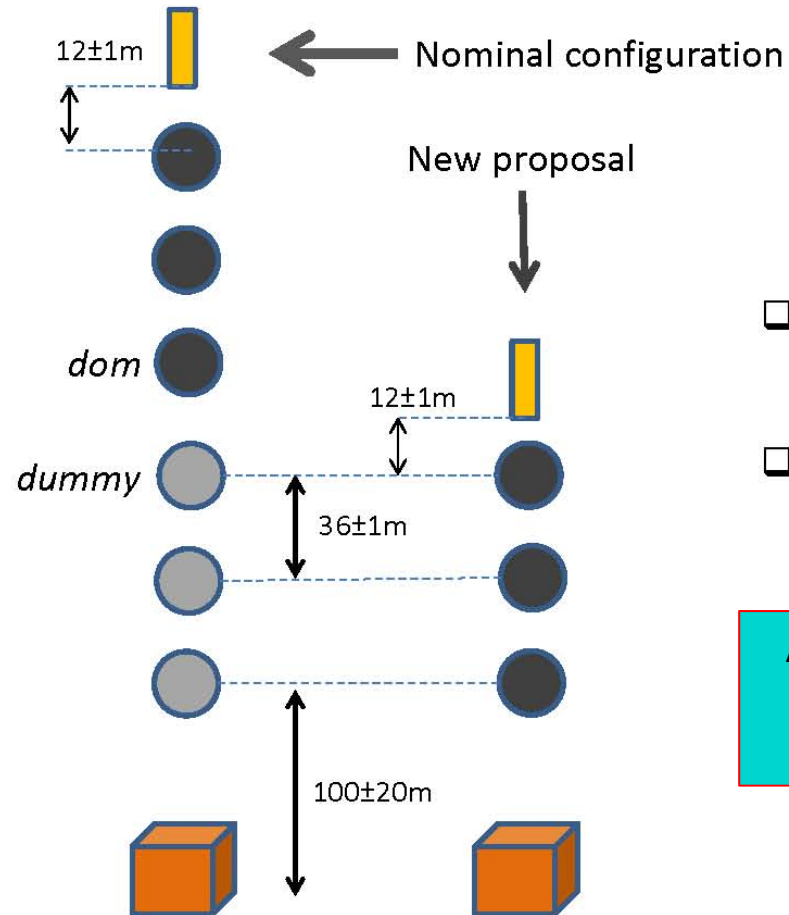
Cose da capire (MC personal view):

- Time offsets (discrepanze dark room del CPPM e NIKHEF)
- Time calibrations con LED beacon, nanobeacon, laser beacon
- Plot di molteplicità degli hits
- Saturazione del TOT a 150 ns?
- Rates, thresholds & HV (incl. high-rate inefficiency?)

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## ppm du: *configuration*



- ☐ Externa hydro on each DOM ?  
Input & details needed for VEOC/BEOC int.
- ☐ New PPM DU PBS based on general DU PBS

Approvata configurazione semplificata  
(no dummy DOM),  
con 72 m tra base e primo DOM

22/05/2013

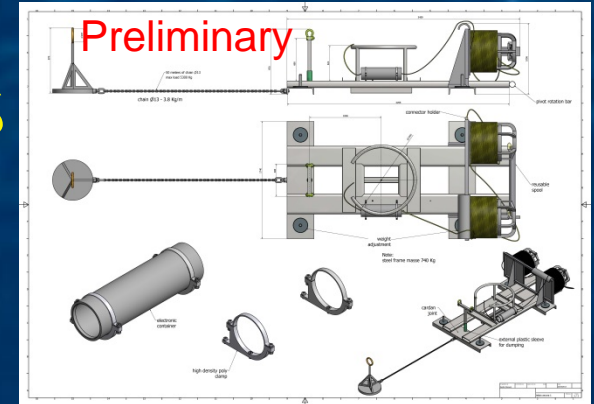
Sylvain Henry - SC KM3NeT Phase 1

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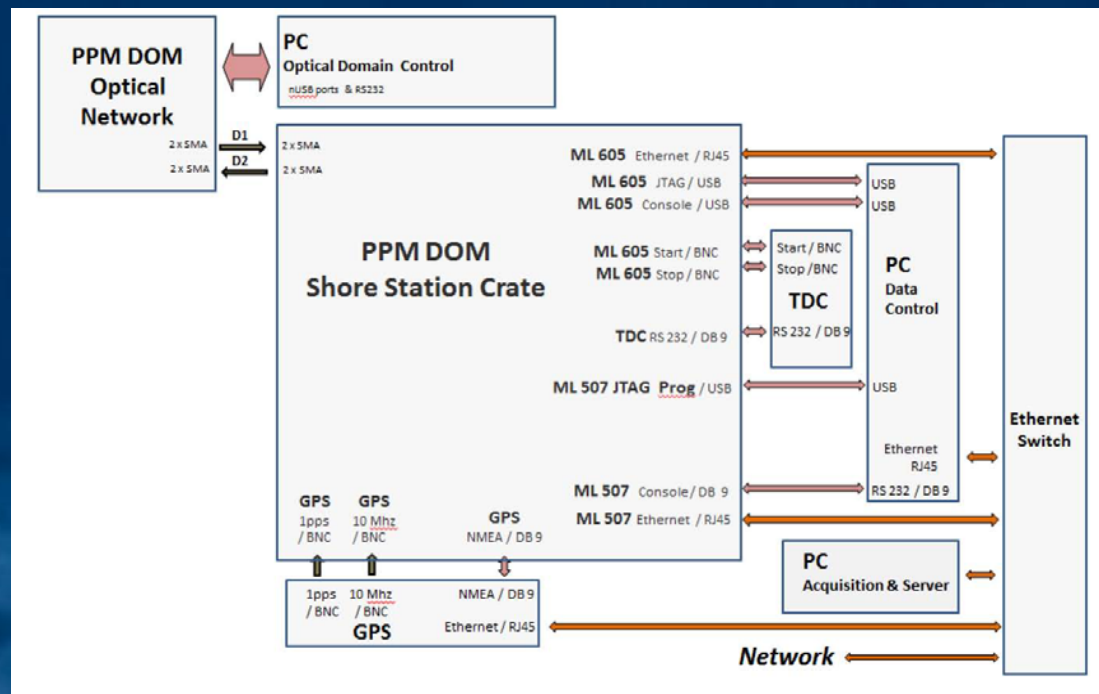
# PPM-DU: general remarks

- **Installazione a Capo Passero**
  - **Deployment opportunity in October (too early?)**
  - **Line to be removed in time for infrastructure upgrade**
  - **No calibration devices on anchor (idea is to try to use what already available on the Phase-2 tower)**
  - **Implications:**
    - **Anchor being optimized for Capo Passero (single piece – no release system)**
    - **Shore station to be set up (see later)**
    - **PC farm (same as for KM3-IT?) – remark: data to be transferred to CC-Lyon**
    - **Jumper di 100 m avvolto su bobine – recuperato da mini-linea**
    - **Base container to be built in Italy**
    - **Power control? (Use the same board as for the towers?)**
    - **Help required on: check of the optical system, help on implementation of shore station optics, pressure gauges for DOMs, help on gel issues, pressure tests?**
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# PPM-DU shore station

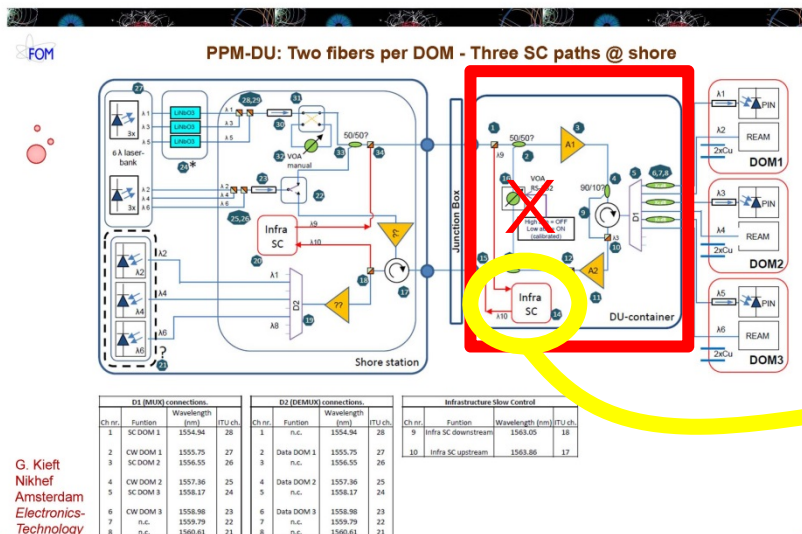
- Long-standing issue: one or three electronic crates? (One crate requires broadcast communications to the three DOMs – in progress)
- Reference scenario is with 3 electronic crates
- Open points:
  - Dedicated GPS receiver with RS232-fanout?
  - TDC Multiplexing?
  - 3 PC for control of the three crates?



Hardware for PPM-DOM

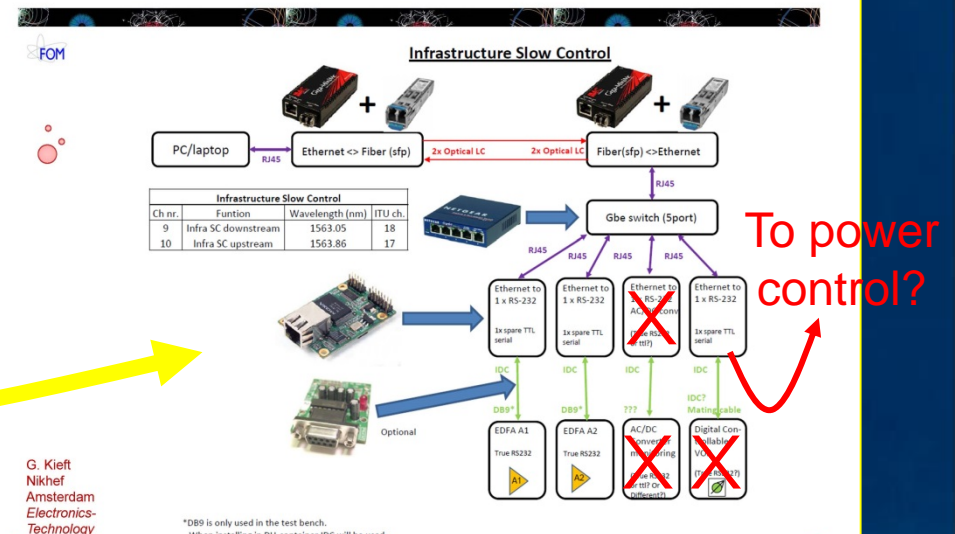
# PPM-DU base container

- Contents: optical components + slow control + power control
- Power control should include a switch to turn on/off the DOMs?
- Modification of flange, internal crate arrangement, power conversion, check of heat dissipation: to be done



22 May 2013 Steering Committee Meeting

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22 May 2013 Steering Committee Meeting

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Slides from Gerard Kieft's presentation at KM3NeT-Int SC meeting of May 2013



# PPM-DU schedule issues

- Penetrators to be qualified before integrating the DOMs
- VEOC to be qualified under pressure
- Shore station/test bench under development
- 2 DOMs to be built and tested at NIKHEF, 1 DOM to be integrated at Erlangen (and tested at NIKHEF?)
- Internal structure made with 3D-printing – gel pouring and bubble problems to be checked

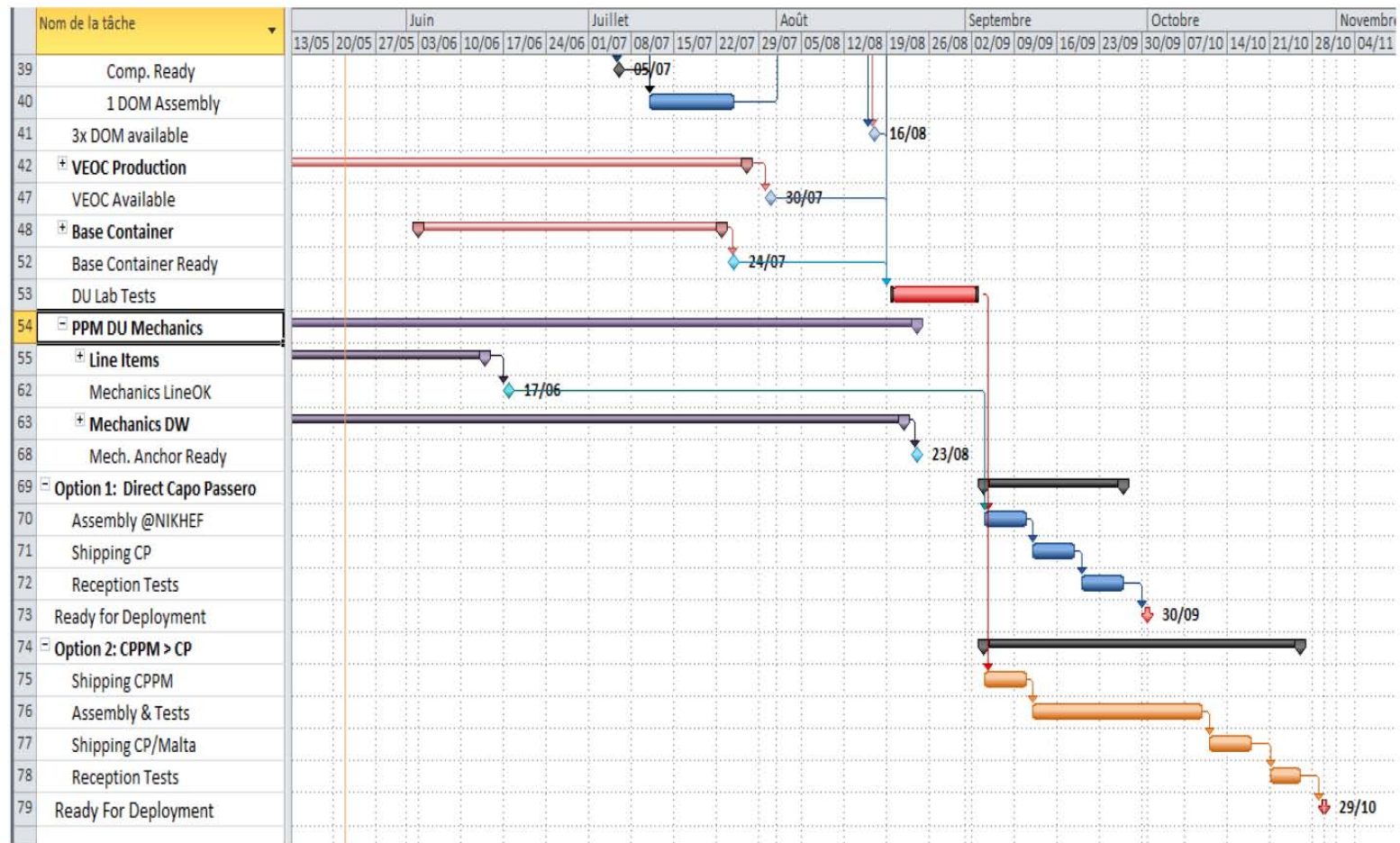
## Expectations:

- All parts (DOMs, VEOC, test bench) available at end-July
- Integration at NIKHEF (maybe in time for deployment in October) or CPPM? (probably no chance to do it for October)





# ppm du: *planning*



# Deployment tests

## Programme

- 9 deployments from 2 to 12 April at a depth of 1000 metre 20 miles off the coast of Motril Spain;
- Two LOMs (one old one new)
- 3 cables
  - VEOC 1A-B copper no pressure test
  - VEOC 2A-B copper with pressure test
  - VEOC 3A-B copper and fibre, up to 8 penetrators with fibre loop. (last 3 deployments)
- Tests
  - Continuity of copper
  - Pressure difference between oil and sea at top and bottom of 2A and 2B
  - Attenuation of fibres
  - Inspection by ROV
  - Measurement of 3D compass and 3D acceleration on each DOM x2 (10Hz)
  - Measurement of 3D compass and 3D acceleration on the three rotation axes of LOM x2 (10Hz)
  - Filming release from anchor
  - Filming from DOM



First 6 deployments

## Achieved Programme

- Five deployments
  - 2 with VEOC 1A-B
  - 2 with VEOC 2A-B
  - 1 with VEOC 3B and VEOC 1A
  - All tests except filming from DOM
- Reason
  - Assembly of LOM took longer
  - Scan using ROV took longer
- Schedule
  - Deployment in morning
  - ROV scan in afternoon
  - Recovery following morning
  - LOM swap in afternoon

Slides from Paul Koiijman's presentation at KM3NeT-Int SC meeting of May 2013

Reminder: agenda and presentations for all meetings is at <http://agenda.cern.ch>

# Deployment tests

Slides from Paul Kojiman's presentation at KM3NeT-Int SC meeting of May 2013

## Conclusions

### Positive

- Unfurling works fine even when starting badly
- If spacers are intact then no twists
- BOBs compensate for airbubbles
- Cable is robust → could handle three surface recoveries
- All copper only penetrators survived
- Loading of the LOM takes about 1.5 days, 3 people
- Splicing can be done in parallel (JK)
- Rope stretches 5% or more but DOMs are horizontal

### Negative

- Three of the five fibre penetrators leaked
- Spacers were badly designed
- Clip to hold cable to rope totally inadequate → needs designing

## Why penetrator leaked

DOM in Antares	↔	LOM test
Horizontal gluing	↔	Vertical gluing
Insulation far from glue	↔	Insulation touching glue
Curing time 24 hrs @ 80 C	↔	Curing time 6 hrs @ 80 C

New penetrator produced with old method → 600 bar ok

Plan: Produce at least 20 and pressure test each one

## Conclusions

- FIND OUT WHY PENETRATOR LEAKED
- Design spacers to fall inside cable trays
- Ledge for spacers to rest on
- No tiewraps
- Check fibres when come home
- Cable loop on sphere not useful
- DESIGN CLIPS → determined behaviour rather than random and must never release cable.
- Possibly release LOM from below so starts rolling immediately → VEOC routing easier and easier to get ropes same length.

### Decisions:

- Penetrators to be qualified
- New deployment test (tentatively in fall with Castor)



# Critical/pending items

## Critical for planning:

- new electronics (CLB-V2)
- tests (electronics, PMT, DOM, DU)

## Critical for qualification:

- Penetrator
- DOM internal structure
- VEOC?

## Pending points:

- Choice of instruments (hydrophone/piezo, tiltmeter, compass)
- CU vs. DU
- Sea floor layout



# Italian DOMs

- Budget allocated for DUs (~6 MEuro) should be enough for 16 DUs (~300-350 kEuro/DU)
- (This requires that the rest of the Collaboration provides an equivalent investment for installation at CP)
- Are we in time for building 16 DUs within the PON timescale? Probably not
- Alternative scenario: Italy provides DOMs (for up to 32 DUs) while the rest of the Collaboration provides the remaining parts of the DUs
- Remark: current design foresees 2 fibres for 4 DUs and 220 W/DU. Hence maximum limits for CP infrastructure are: 26 DUs for power, 24 DUs for fibres (if 3 JB's are used, each equipped with 4 fibres)
- Conversions: 16 strings with 18 DOMs each = 288 DOMs = 8928 PMTs (arrotondato: 300 DOMs, 10000 PMTs)
- PRR required for all mass productions (PMT PRR started)

## Schedule ingredients/doubts

### **DOM production (~300 for 16 DUs):**

- **PMT production: 6 months tender (after PRR concluded) + 3 months leading time**
- **PMT tests: in batches of 31 PMTs (including base mounting); 1 day/batch; 2 test sites => 8 months**
- **Electronics production: how to pass from prototype to mass production?**
- **Electronics tests: reception test or no reception test?**
- **DOM integration: 4 DOM/week; 2 integration sites => 9 months**
- **DOM tests: ½ day/DOM (included in DOM integration)**

### **Line production:**

- **VEOC qualification pending**
- **Deployment qualification pending**
- **VEOC production speed?**
- **Tests of DU during assembly?**
- **Integration speed: 1 DU/week?**
- **Various LOMs needed for optimizing installation**
- **First opportunity to install a DU is in spring 2014 (MEUST)**

M. Circella, Critical issues, priorities, etc., KM3NeT SC meeting, 23 May 2013

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# Schedule for DOM production

