

# NEWS COLLABORATION MEETING

NAPLES, 27-28 OCTOBER

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Università "Federico II" and INFN Napoli



# NEWS short term plan @LNGS

Stefano Gazzana

September 7, 2016

# Area Ex-BAM

Stefano Gazzana

- ✓ On June 1, during the refurbishment of the Hall for NEWS R&D an incident occurred, luckily no major damage inflicted the personnel and the infrastructure, only a ventilation unit was destroyed.
- ✓ A deep analysis of the conditions and the facts started, in the meanwhile we open a discussion with LNGS insurance for to cover part of the costs.
- ✓ A detailed plan how to recovery the hall (ex-Bam) is defined and ready.
- ✓ At the moment we are still waiting the final green light from insurance (foreseen in this week).
- ✓ From the moment we can restart the activities few weeks are necessary to be ready for the new works needed by NEWS.
- ✓ The design of the rooms are almost defined. installation time of NEWS are in order of 8 weeks.
- ✓ The costs must be covered
- ✓ As back-up plan the NEWS R&D can use the existing facility in Hall B up to February 2017.

# Detector

Stefano Gazzana

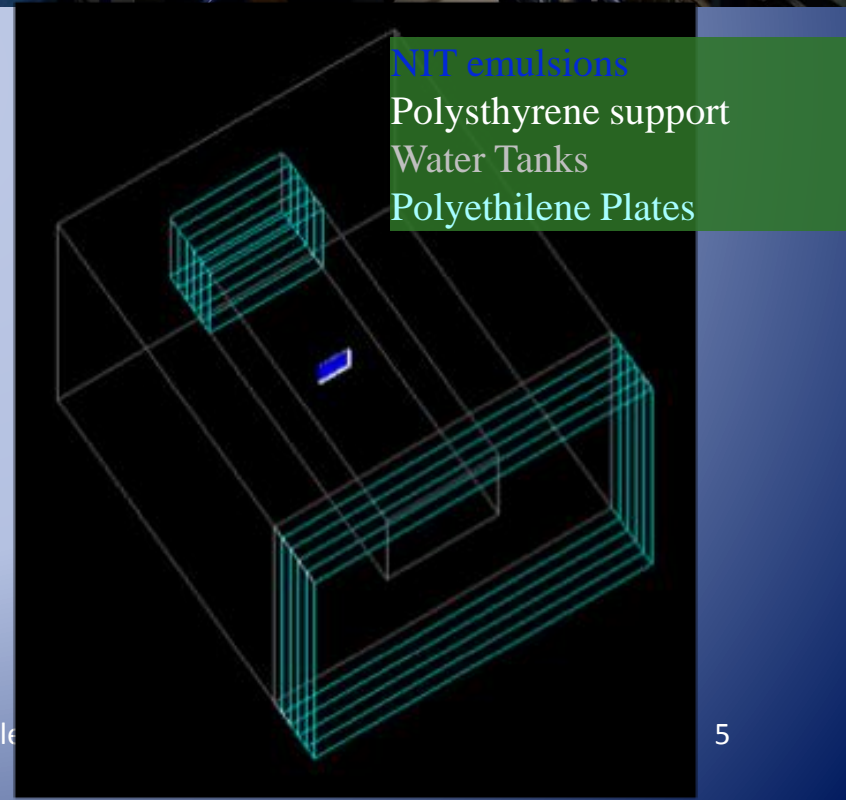
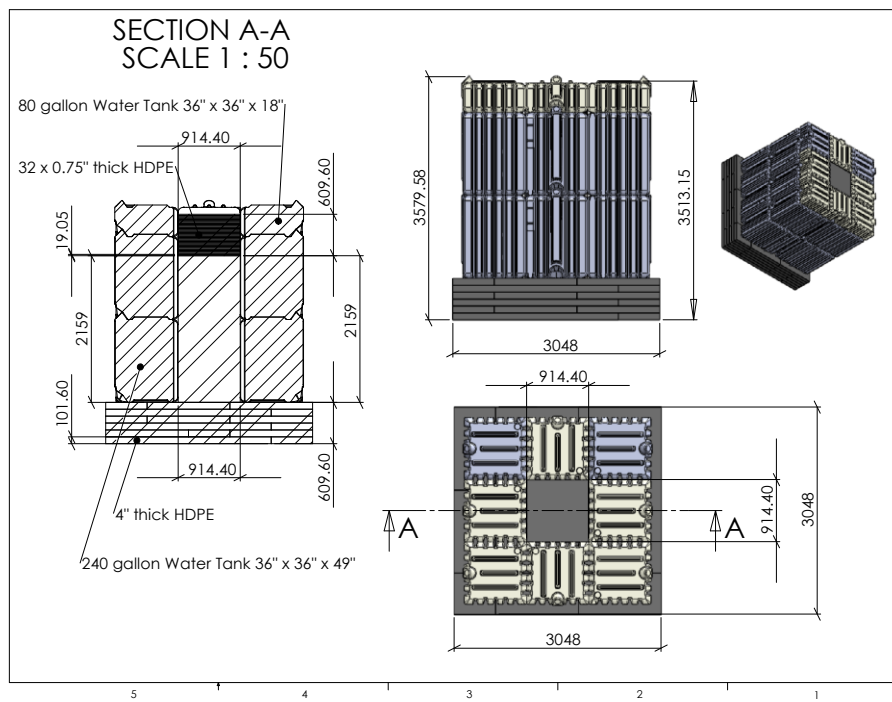
There are problem to use the DarkSide10 structure in the actual position, a backup plan must be discussed and approved.

We have to define needs of the Collaboration and a tentative schedule of the measurements taking in account the constrains and the working conditions in underground labs

A series of meetings will be organised by LNGS starting in the next days in order to finalise it before end of September.

# d) Measurement site with shielding at LNGS

- About 1m of water-equivalent
- $\sim 4\pi$  shielding
- Interference with SABRE





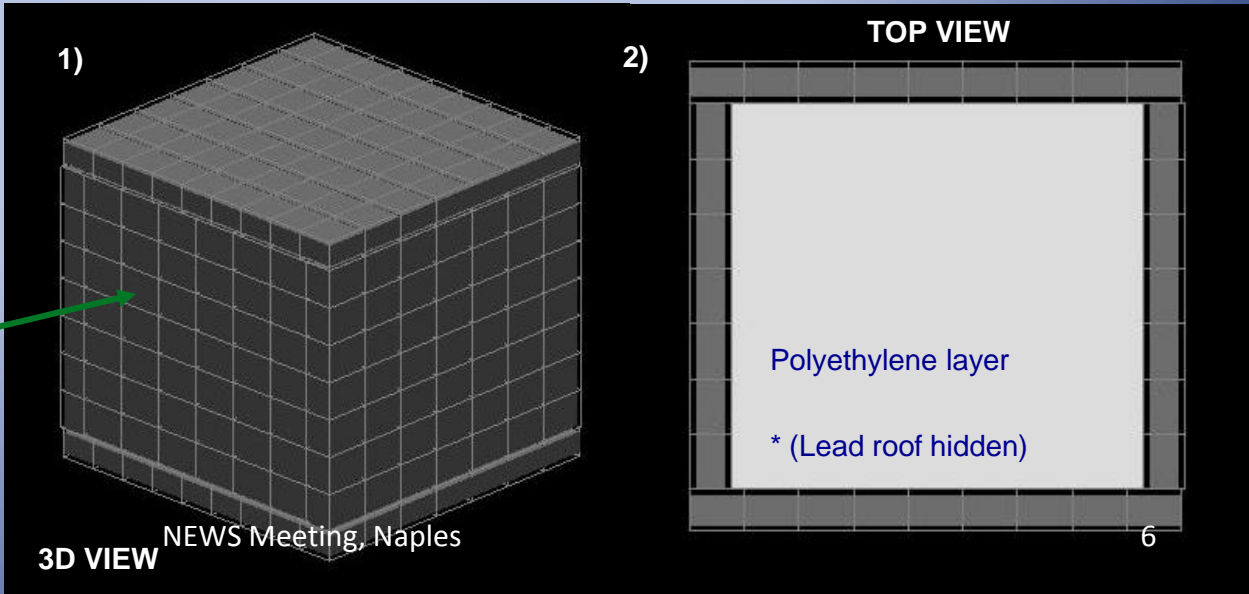
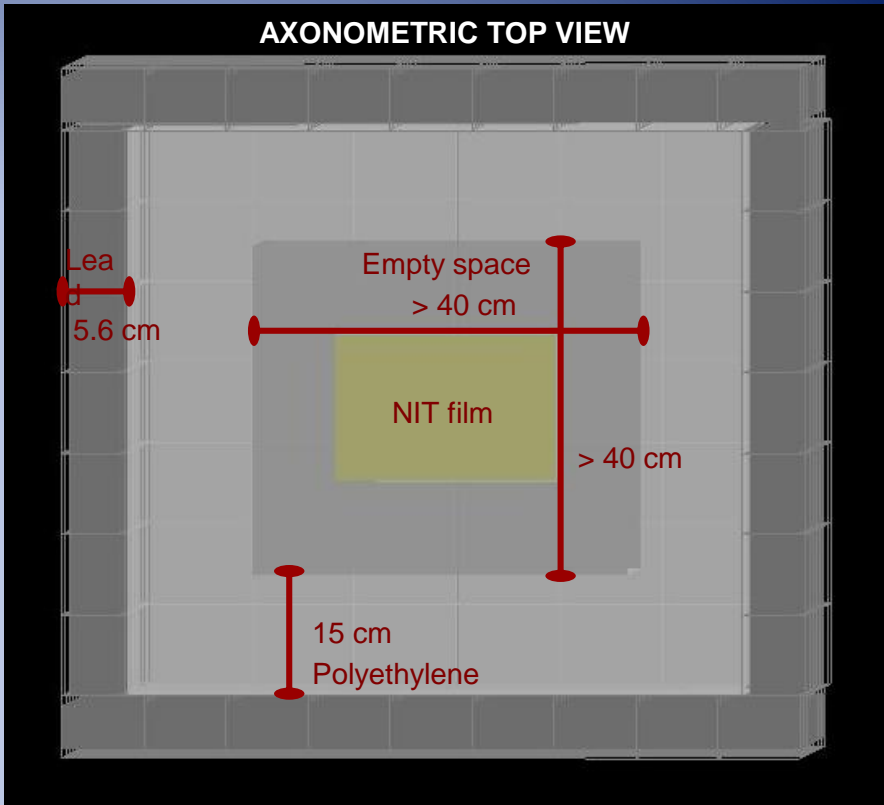
# LEAD SHIELD OPTION

## Valerio's (old) simulation

Volume  $\sim 1 \text{ m}^3$   
Surface  $\sim 1 \text{ m}^2$   
Weight  $\sim 3.5 \text{ ton}$  ( 2.5 lead + 1 polyethylene)  
(+ support)

**NIT emulsion**  
Lead  
Polyethylene

No. of bricks  $\sim 308$



# Present situation of the facility underground

- After the fire accident on June 1<sup>st</sup> in the ex-BAM (now Hall F) tunnel, refurbishment works stopped for >3 months, restarted ~ 1 month ago
- Use of the current OPERA facility granted until February 2017
- The construction of the facility required some additional funds (35k€ received by INFN for that)
- The movement to the new facility foreseen within February
- Experimental area assigned: Hall B, behind Xenon
- Dark-side-10 shield: large tanks not available but we may use the supporting structure and the polyethylene sheets
- Use polyethylene plates, after reshaping some of them, and add a layer of lead all around, see Nicola and Valerio's talks
- Dark Side-10 pieces should be moved there ~November 15<sup>th</sup>

# Toward the background test

- Timeline: next few months
- Design (finalise at this meeting) and construct the shield
- Finalise the box containing the emulsions at this meeting (Nicola)
- Start the first test (Valeri)
- Goal of the test: measure the overall background and demonstrate  $< 1$



# Background budget

- Neutrons from intrinsic radioactivity totally negligible
- Neutron-induced background negligible
- Electrons from  $^{14}\text{C}$   $\sim 10^8/\text{kg}/\text{year}$ , requires a rejection power for 10g and 1month exposure  $\sim 10^5 \div 10^6$  at least
- In perspective ( $\sim \text{kg year}$ ) requires  $\sim 10^8 \div 10^9$  and more
- Dust after filtration, measure with un-sensitised films. Lever arm with polarisation analysis, but we need a conclusive estimation  $\rightarrow$  measure
- Fog (single grain from thermal excitation), sensitised but unexposed films: need a conclusive estimation

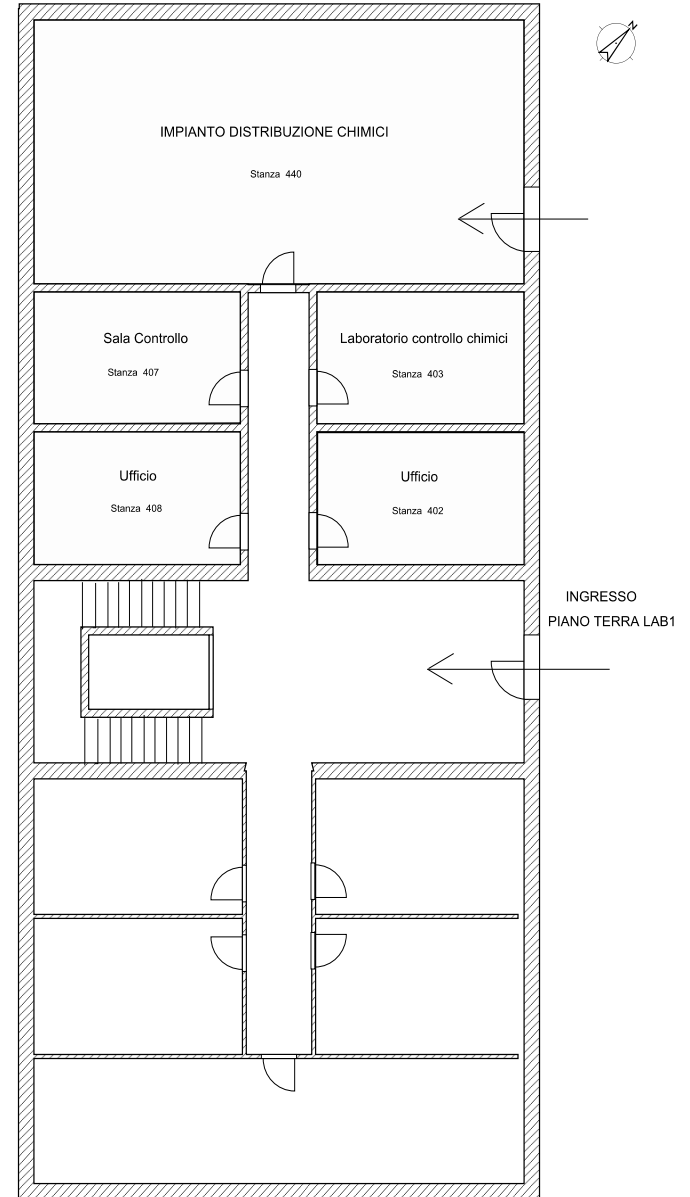
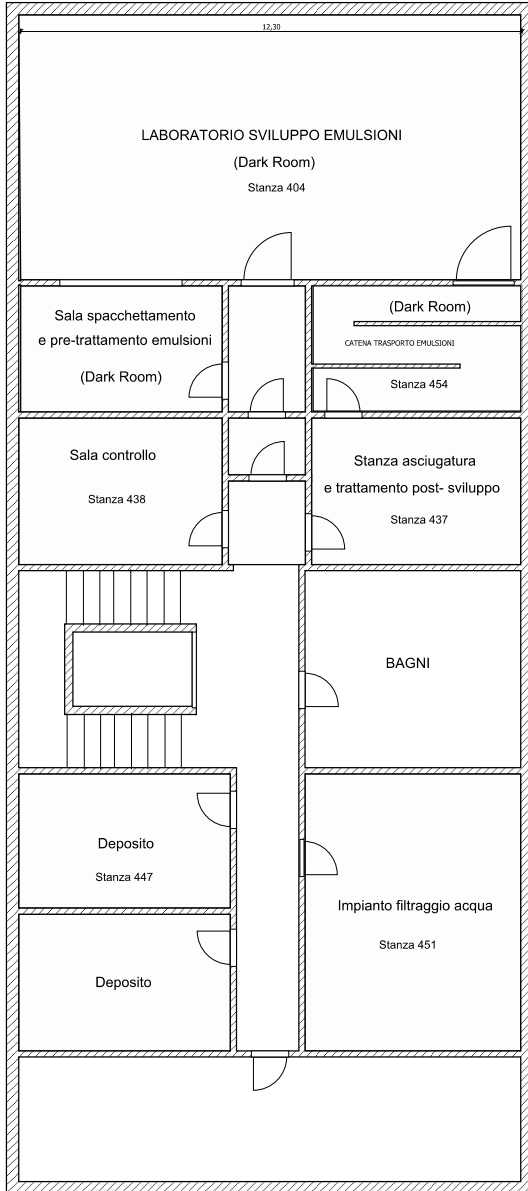
# Analysis chain (see Andrey's) machine learning can improve it

- Threshold for fired pixels
- Cluster reconstruction (2D gaussian fit)
- Grain reconstruction (3D object)
- Tracking at all angles (useful to identify “long” alpha tracks and discard their grains for further analysis)
- Isolated grains → best cluster → parameter fit
- Ellipticity cut
- Polarisation analysis
- Colour analysis
- ...

# Activity in 2017

- Movement from the old to the new facility
- Continue the tests
- Analyse the data
- Prepare TDR for the experiment
  - Clear evaluation of background
  - Design equatorial telescope
  - Establish the film production line (clean room)
  - Prepare a scheme to minimise the time without shield: from sensitization to exposure, from exposure to development
- Proceed with R&D in parallel

# Facility at Lab 1



~300 OPERA films/batch → ~1kg/batch

# NEWS name

A message from Gilles Gerbier (NEWS = New Experiment With Sphere),  
October 17<sup>th</sup>

Dear Giovanni,

From what I Giomataris said to me from your discussion in July , you would tackle the point of identical names of two experiments at a board meeting of your collaboration. Did you come to some conclusion ? We should go ahead and solve this question I think.

As of question of first appearance of this acronym in public for us, it was at WINDOWS conference in Vietnam august 2013 and TAUP september 2013 and in paper in arXiv:1401.7902.

Let me know where you are up to.

Best,  
Gilles

My recommendation would be to modify slightly the name without loosing the original spirit



# The NEWS Collaboration



Italy

Bari  
GSSI  
LNGS  
Naples  
Rome



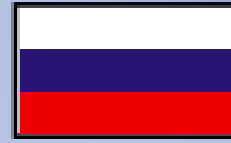
Japan

Chiba  
Nagoya



Korea

Jinju



Russia

LPI RAS Moscow  
JINR Dubna  
SINP MSU Moscow  
**INR Moscow**



Turkey

METU Ankara

Welcome to INR!

<http://news-dm.lngs.infn.it>

# Next meetings and Committees

- Gran Sasso Scientific Committee, Oct 18<sup>th</sup>
- Written report required, no oral presentation
- Meeting with referees