

NEWSdm COLLABORATION

MEETING

ANACAPRI, 29-30 MAY 2018

Giovanni De Lellis

Università “Federico II” and INFN Napoli

Underground facility

- Emulsion facility in Hall F being finalized
- Water supply and electric system being prepared
- It should be ready by the first half of June



Underground facility

- Ventilation system in Hall F to be improved. Tender still being finalized, ready not earlier than October
- Facility to host also the emulsion production machine and the climatic chamber
- Facility with ISO 8 class (100'000) rooms and the possibility to upgrade one room to ISO 6: equip this room with 2 filters providing similar local conditions
- These filters should allow operation in the facility even before the completion of the ventilation system

Key points towards an experiment

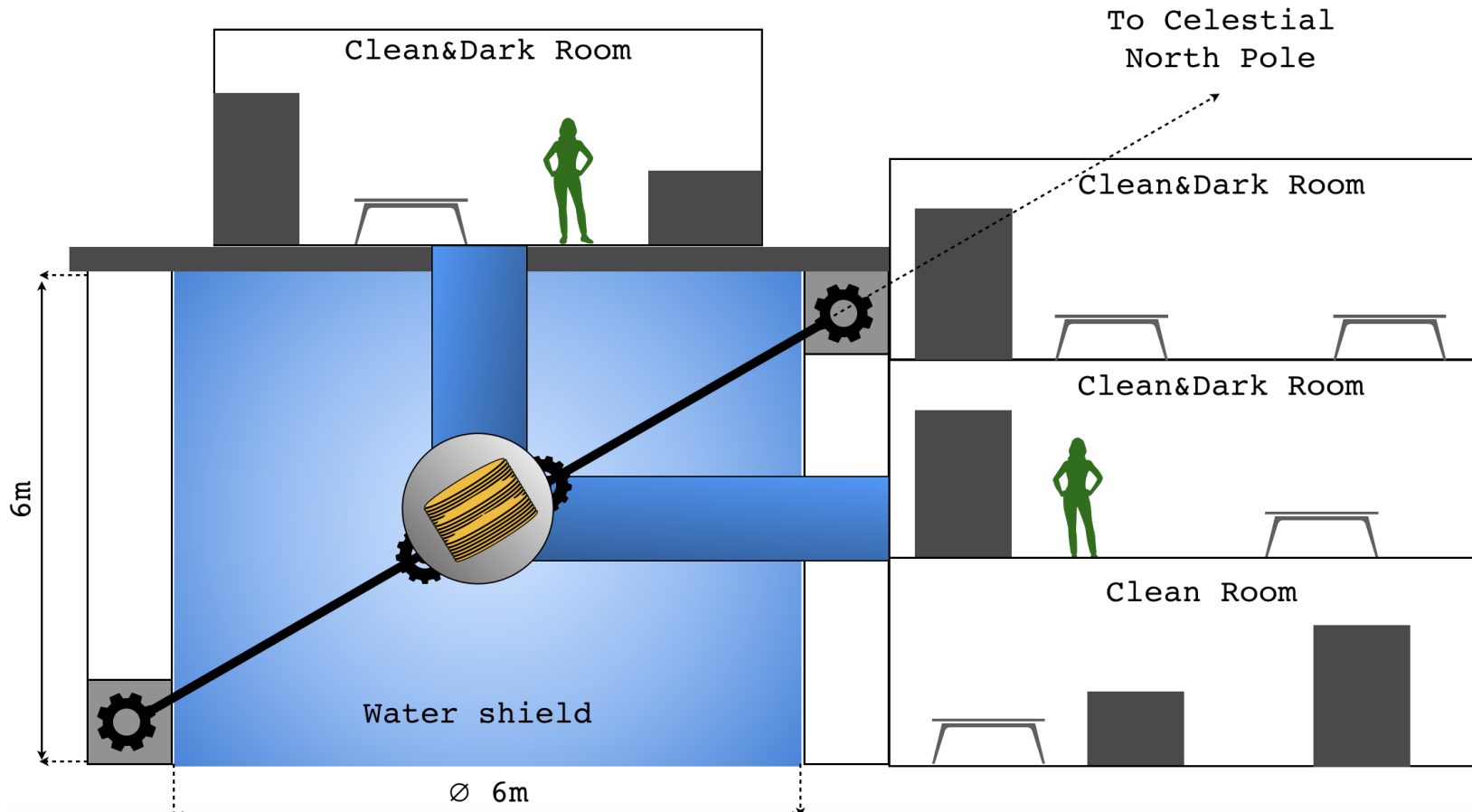
- Signal:
 - capability to see nano-tracks demonstrated;
 - Need to measure track parameters: length, sense..
 - Important calibration with SEM
 - Improve optical microscopy: colour camera, fast scanning
 - Improve sensitivity → lower size grains, enough optical contrast
- Background reduction:
 - Fog
 - electron recoils from $^{14}\text{C} \sim 10^8/\text{kg}/\text{year} \rightarrow$ rejection power for $10\text{g} \times 1\text{month} > 10^5 \div 10^6$. In perspective ($\sim\text{kg year}$) requires $\sim 10^8 \div 10^9$ and more. Synthetic polymer?
 - Low temperature conditions (-80°C), check electron sensitivity at low temperature
 - Use machine learning technique for signal/background discrimination
- Emulsion production underground in a clean room
- Design appropriate shield with equatorial telescope

Experimental program in near future

- Assemble the new facility with new equipment including the emulsion gel production by July
- Prepare the cooling system for the emulsions inside the shield at -80° Celsius (Nicola by mid June)
- Technical tests between July and September
- Prepare the films and expose them inside the shield, physics test to measure background, September
- Analyse the films, starting from October

Detector and facility

Mechanical draftsmen at INFN Naples to help designing



Minimise the time without shield: from sensitization to exposure, from exposure to development

SNOLAB interest

Expression of Interest for a New Opportunity at SNOLAB



1. New Opportunity

Project Name:	Nuclear emulsions for WIMP search with directional measurement
Project Title:	NEWSdm

Invited for a talk at the Scientific Committee on March 8th at the University of Toronto. EAC chair Stewart Smith on March 27th:

Dear Giovanni,

Just a short note to thank you for your exciting presentation in Toronto, and to let you know that my EAC colleagues and I were most impressed by the discovery potential of this novel approach, and by the depth and progress of your R&D program.

We look forward very much to the results of your upcoming tests, and encourage you to keep us informed so we can give appropriate consideration to NEWSdm as SNOLAB plans its future experimental program.

Nigel J.T. Smith
Director, SNOLAB

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Giovanni de Lellis (giovanni.de.ellis@cern.ch)
048 Project Representative
University Federico II di Napoli, Italy

1-May-2018

RE: GW-0 APPROVAL FOR PROJECT 048 NEWS-dm

Dear Giovanni;

Following the evaluation by SNOLAB and the Experiments Advisory Committee of your Expression of Interest submitted for NEWS-dm, I have received a recommendation that this project aligns with the scientific objectives of SNOLAB. I am therefore pleased to allocate Gateway-0, *Initiation Approval*, to your Project. NEWS-dm will be integrated as SNOLAB Project 048 and entered into the SNOLAB Project Life Cycle process to manage the development and deployment within the SNOLAB facility. At this phase of the lifecycle, space has not yet been allocated for NEWS-dm, and we will need to explore some conceptual design options to understand better what the space requirements are and what could be available. Continuation as a SNOLAB Project is contingent upon:

- Favourable progress of the Project through the SNOLAB Project Life Cycle process and other external reviews, including any required funding agency reviews;
- Continued relevance of the scientific programme as determined, at a minimum, by on-going biannual reports and reviews by the SNOLAB Experiment Advisory Committee; and
- The project and collaboration staff complying with the general requirements at SNOLAB including those related to health and safety and SNOLAB policies and procedures.

As described in the SNOLAB Project Life Cycle, NEWS-dm is now in *Phase 1: Definition*, working towards the next project gateway, *Gateway-1: Space Approval*, at which point it is anticipated that space at SNOLAB will be allocated for the Project. Brian Morissette is current assigned as your Project Coordinator, and a Project Road Map detailing the activities, reviews and approvals required to deploy and operate will be generated soon. In addition to the Project Coordination support, SNOLAB resources, such as design engineering, may be requested to assist your project, depending on availability of those resources. My understanding is that your project is funded to do some technology tests at Gran Sasso Laboratory in 2018, which will serve to define the design requirements.

We look forward to working with NEWS-dm towards a successful deployment and scientific fulfilment at SNOLAB.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Nigel J.T. Smith", with a horizontal line underneath.

Nigel J.T. Smith
Executive Director, SNOLAB

CC: Richard Ford, Director Programme Development, SNOLAB
Jeter Hall, Director Science, SNOLAB
Allan Barr, Director Operations, SNOLAB
Brian Morissette, SNOLAB Project Office Manager, SNOLAB

TDR preparation

- Discussion with LNGS Committee at the meeting in March
- Status report very well received, Committee impressed by the progress made in the signal detection
- Agreed to set the deadline for the TDR preparation in Spring 2019
- Agreement shared also with INFN referees

Next meetings and Committees

- Next meeting in September. In the meanwhile, dedicated meetings on the different items
- Next Gran Sasso Scientific Committee in Autumn