



GRENOBLE | MODANE

LSM: HPGE USERS MEETING

20240318



UGA
Université
Grenoble Alpes

Silvia Scorza

LSM EXPERIMENTAL SITE

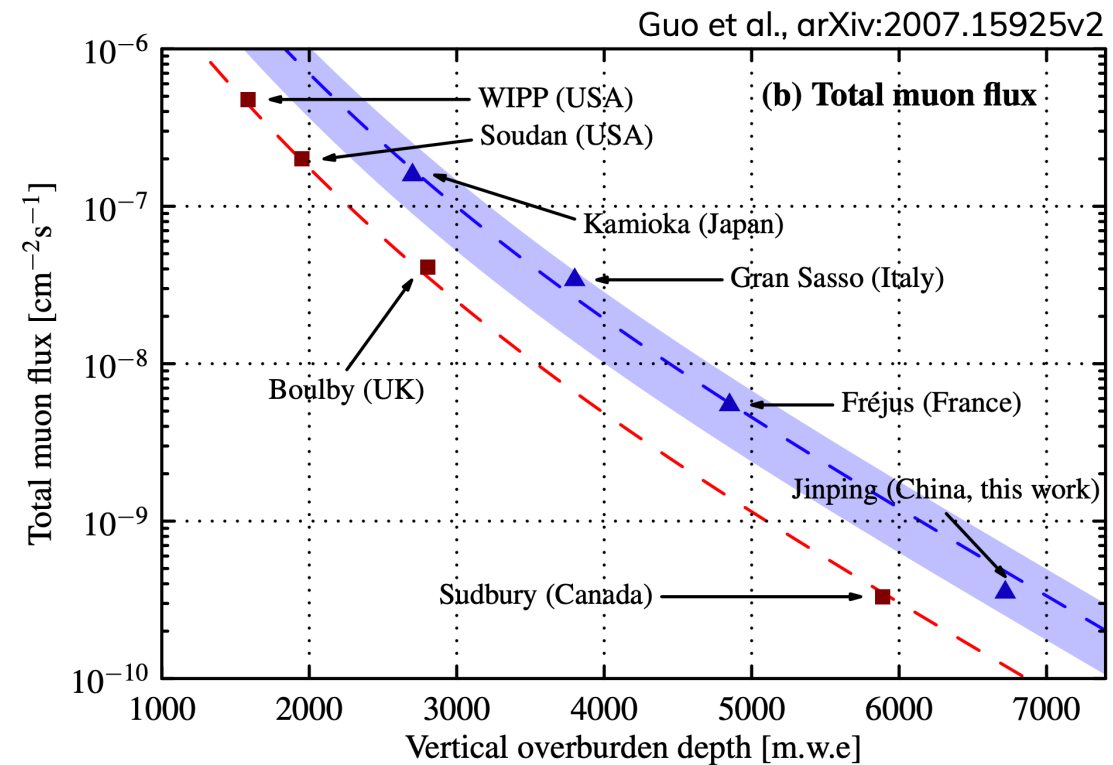
Deepest site in Europe dedicated to
Astropart., Nuclear & Particle Physics

4800 m.w.e: Muon Flux reduced by >106
relative to surface (/5.5 LNGS)

Flexible access (hall accessible to trucks up
to 9m);

Small experimental surface: 400 m² cf:
Canfranc 600 m², Boulby 1700 m², SNOLAB
5350 m², Gran Sasso 180000 m²

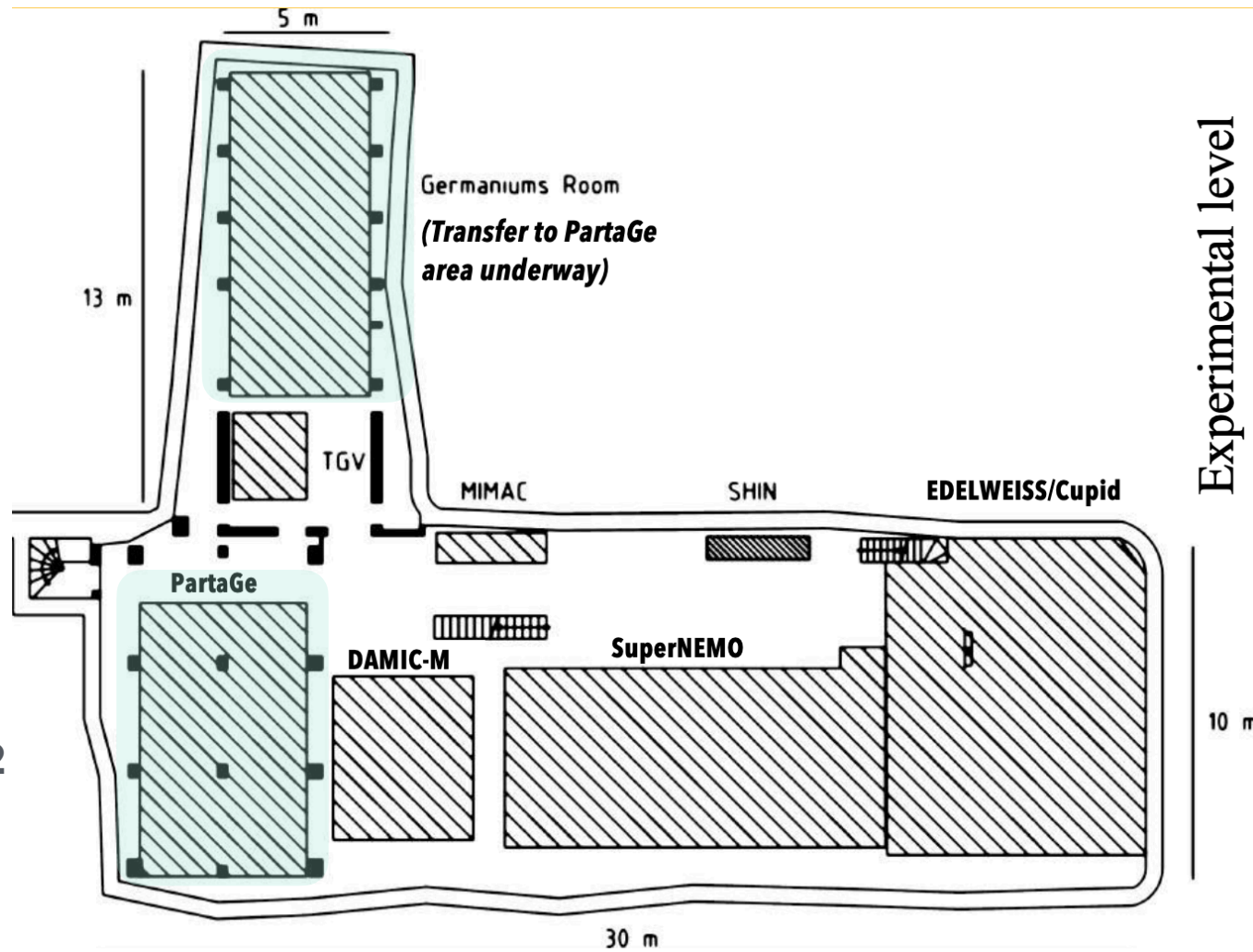
Natural radioactivity due to Radon <5 less
than LNGS et LSC



LSM FLOOR PLAN

Tight occupation of available 400 m²

Plans to install 180 m² mezzanine level (over the crane access) above experimental level



LSM MISSION

Subatomic/Astroparticle physics Platform

Hosting fundamental physics experiments, in particular those supported by IN2P3, with international, bi-national or national collaborations

Host R&D and detector physics for future experiments (larger detector deployed in larger DUL)

Provide technical support to experiments

Priority topics (well-adapted to depth+size): Light Dark Matter, R&D for bb0n

Germanium gamma-ray assaying

Very low radioactivity measurements

Associated technology developments

Opening to multidisciplinary applications

Host small experiments that can benefit from the exceptional low-radioactivity environment and the staff expertise in this domain (ex: biology, earth sciences..)

Coordination with networks of European underground laboratory

Request by APPEC

Common working groups in preparation

LSM ORGANISATION

Since 2019: national platform of the French CNRS/IN2P3, hosted and operated by LPSC (CNRS + Grenoble-Alpes University)

National status of LSM ensured by nomination of Scientific Director by IN2P3

LSM included 2022 by French Ministry on its national list of Research Infrastructures

Director of operation (N. Sauzet, LPSC)

Scientific director (S. Scorza, LPSC)

LSM Steering committee includes CNRS/IN2P3 & Université Grenoble Alpes

**LSM External Strategic Council: A. Ianni (LNGS), S. Paling (Boulby), S. Schönert (TUM), N. Smith (Triumpf), M. Davídková (National Radiation Protection Institute, Prague) ...
importance of DUL coordination in strategy discussion**

Scientific coordination of French efforts in Deep Underground Physics via DUPhy “Groupe de Recherche” (GDR): (<https://gdrduphy.in2p3.fr/>)

LSM PROJECT LIFE CYCLE

How to propose an experiment

Need to interact with LSM direction (Scorza/Sauzet) to define schedule & space constraints

Fill in the EOI <https://forms.gle/bh9hR3e13qBhYQG5A>

Setting up one expt affects (+/-) all others : optimization of use of volume, required investment by LSM (+ support from funding agencies)

Negative interferences: space, installation schedule

Positive interference: common facility (Radon-free air, joint use of cryostat)

Approval process

Contact LSM direction to present your project

Discuss with LSM to optimize (experiments needs vs integration constraints):

Preparation of agreement

Plans for major LSM use (ex: experiments in main hall) presented to the Conseil Strategique Externe, to issue recommendations to LSM and IN2P3

Next CSE meeting: 22-23 April 2023

Approval of resource uses by funding agencies (IN2P3+University)

Next Comité de Direction: 2nd April 2023.

Signature of agreement

EXPERIMENTS AT LSM

LSM Experiment	Domain	Technique	Collaboration	Activities
CUPID-Mo	$\beta\beta 0\nu$	Cryogenic LiMoO	France, Russia, Germany, Italy, USA, Chine, Ukraine	Data exploitation. Dismantling completed
SuperNEMO	$\beta\beta 0\nu$	Tracko-Calo	France, UK, Russia, Japan, USA, Czech Rep., Slovakia	Commissioning ongoing. Delays in the shield installation
BINGO	$\beta\beta 0\nu$	Cryogenic	France	Installation of cryostat in summer 2024
Obelix 82Se	ECEC2v	Ge ionisation	France, Italy, Russia, Czech Rep.	Counting of 6 kg enriched 82Se sample from LNGS started in january 2022: ECEC2v to excited states
TGV	$\beta\beta 0\nu$	Ge ionisation	Russia	Detector upgrade delayed
DAMIC-M	DM	Si CCD	France, USA, Canada, Switzerland, Denmark, Spain, Brasil, Argentina	Test chamber physics run in 2022, installation of kg-stage in 2024
EDELWEISS	DM	Ge Cryogenic	France, Russia, Germany	Data exploitation. Dismantling completed
CRYOSEL	DM	Ge Cryogenic	France	Likely installation in BINGO cryostat in summer 2024

HPGE DETECTORS

1

Wide-range program for Astroparticles, Earth Sciences (sediment and ice core sample datation), environmental safety (CEA), biology, etc...

Total of ~16 HPGe

Astroparticle physics applications:

Material assays for experiments based at LSM (SuperNEMO, EDELWEISS, CUPID-Mo, ...), and also for other experiments (ex: JUNO, RICOCHET, ...)

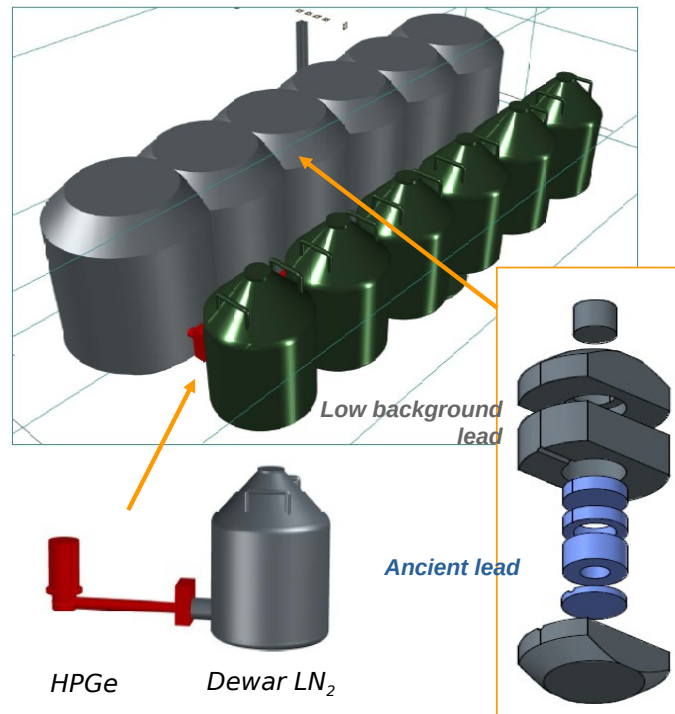
Agreement with LNGS for long term (~ year) measurement of ECEC decay of ^{82}Se (6 kg) to excited state on large (600 cc) Obelix HPGe [expired]

HPGE DETECTORS

More efficient use of space (room for up to 22 HPGe)

Shielding optimisation

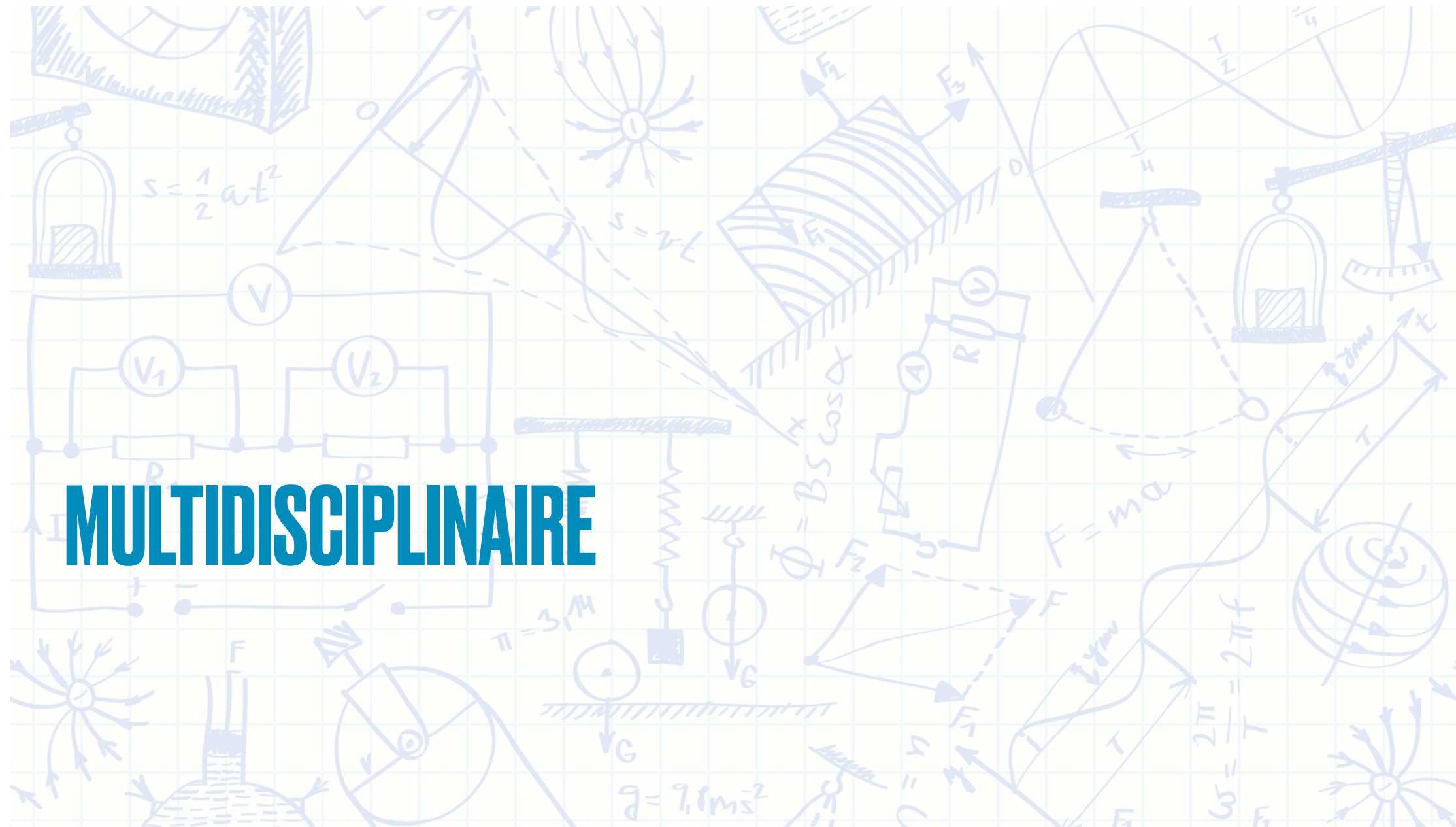
Ease of operation (LN₂ refill)



FOCUS IN 2024

- SuperNEMO data taking
 - DAMIC-M data taking and possibly R&D in DAMIC-LBC
 - Installation and commissioning of BINGO
 - Design study for underground integration of new low-mass dark matter experiment
- Readiness of HP germanium detectors
 - Readiness Radon Reduction System
 - Boost interdisciplinary activities

MULTIDISCIPLINAIRE



WORKSHOP @LSM

Goal: to promote and enhance interdisciplinary activities at the Underground laboratory of Modane

Foreign underground lab representative Boulby^r, LNGS^r, LSBB, LSC^r, SNOLAB et SURF.

Workshop Committee

➡ Recommendations document centered on a strategic plan for the development of interdisciplinarity at LSM sent to IN2P3.

OCTOBER 2023

	Introduction	<i>Silvia Scorza</i>	09:30 - 09:45		Bio at LSM	<i>Vincent Breton</i>	13:45 - 14:02
	LSM	<i>Jules Gascon</i>	09:45 - 10:00		Medicine at LSM	<i>Fabrice Piquemal</i>	14:02 - 14:19
10:00	SURF	<i>Jaret Heise</i>	10:00 - 10:20		GDR MI2B - LabEx PRIMES	<i>Denis Dauvergne</i>	14:19 - 14:36
	SNOLAB	<i>Sekula Steve</i>	10:20 - 10:40		EDYTEM, INSU and INEE	<i>Fabien Arnaud</i>	14:36 - 14:53
	Boulby	<i>Sean Paling</i>	10:40 - 11:00	15:00	Radon & Co.	<i>José Busto</i>	14:53 - 15:10
11:00	Coffee Break		11:00 - 11:15		Gamma Spectroscopy	<i>Guillaume Warot</i>	15:10 - 15:27
	LSBB	<i>Ignacio Lazaro</i>	11:15 - 11:35		Qbits @underground	<i>Silvia Scorza</i>	15:27 - 15:44
	LSC	<i>Carlos Pena Garay</i>	11:35 - 11:55		Coffee Break		15:45 - 16:00
12:00	LNGS	<i>Gaetano De Luca et al.</i>	11:55 - 12:15	16:00	Discussion	<i>Jules Gascon</i>	16:00 - 18:00
				17:00			
				18:00			

CONCLUSIONS

- New procedures for HPGe operations
- New testing for purging system - efficiency and performances
- Possibility of 1:1 meeting with Ge users and/or satisfactory survey
- Opening monthly user meeting to Ge users (next meeting April 4th at 15:00 CET)
- Common mailing list to share labs information



QUESTIONS?