

THE CYGNO EXPERIMENT



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F. Rosatelli, A. Russo, G. Saviano, R. Tesauro, S. Tomassini

ACTIVITIES FOR 2021

ACTIVITIES FOR 2021 (MILESTONES)

LIME

- **Test overground (LNF and LNGS) and underground (LNGS):** Setup of Labs at LNGS, LIME installation, development and realisation of GAS and DAQ systems, study and realisation of shieldings (Copper and water);

1 m³ DEMONSTRATOR (CHINOTTO)

- Finalise **design** studies and start material procurement and realisation of detector and shieldings
- **Background reduction:** Development and test of low radioactive GEM, optics, sensors and materials;
- **Simulation:** GEANT4 simulation of 1 cubic meter demonstrator of LIME signals and background;

ROMA1 ACTIVITIES 2021

G. Cavoto, G. D'Imperio, E. Di Marco, F. Iacoangeli, A. Messina, S. Piacentini, D. Pinci, F. Renga (local coord.)

GAS

- Development of the purification system (in collab. with Sheffield group)
- Construction of purification and recirculation system and installation at LNGS to be tested with LIME
- Studies on gas mixture properties (gain, linearity) with UV laser facility in Rome

DAQ

- Development and realisation of a first prototype of DAQ and Trigger system and installation at LNGS to be tested with LIME in collaboration with Brazilian groups

Low radioactivity optics

- Test of optical properties of custom lenses

Simulation

- GEANT4 simulation of 1 cubic meter demonstrator

	FTE
Staff	2.2 (+0.3 INITIUM)
Dottorandi	0.3
TOTALE	2.8

ROMA1 PREVENTIVI 2021

G. Cavoto, G. D'Imperio, E. Di Marco, F. Iacoangeli, A. Messina, S. Piacentini, D. Pinci, F. Renga (local coord.)

GAS

- Gas, Sieves, Residual Gas Analyser, Tooling and Piping;

DAQ -

- PC, crate, frame-grabber;

Low radioactivity optics;

- Material procurement optics design and test

	Richieste
Missioni (LNGS + Sheffield + conferenze)	13 k€
Consumo (gas, optical glass)	10 k€
Impianti (gas analysis & purification, DAQ)	35 k€
TOTALE	58 k€

LNF ACTIVITIES 2021

	FTE
Staff	2.8 (+0.5 INITIUM)

L. Benussi, S. Bianco, C. Capocchia, M. Caponero, E. Danè, G. Maccarrone, A. Mengucci, G. Mazzitelli, A. Orlandi, E. Paoletti, L. Passamonti, D. Piccolo, D. Pierluigi, F. Rosatelli, A. Russo, G. Saviano, R. Tesauro, S. Tomassini

LIME:

- **Test** in lab with ^{55}Fe , ^{137}Cs and AmBe sources ;
- Assembly of Resistive Foil field cage;
- Design and Setup of LNGS **underground** lab (**barrack**) for hosting LIME;
- Design and realisation of LIME shielding (in particular design and test of custom water tanks)
- Installation of LIME underground (detector, shielding and services as DAQ and GAS)
- Setup of **overground** laboratory at LNGS;

Internal Radioactivity Reduction:

- Study, tests, procurement and handling of low **radioactive materials**: Copper and Acrylic in collaboration with Sheffield group.
- Development of **low radioactive GEM** with CERN and T-Rex people.

LNF PREVENTIVI 2021

R. Bedogni, L. Benussi, S. Bianco, C. Capoccia, M. Caponero, E. Danè, G. Maccarrone, A. Mengucci, G. Mazzitelli (local coord.), A. Orlandi, E. Paoletti, L. Passamonti, D. Piccolo, D. Pierluigi, F. Rosatelli, A. Russo, G. Saviano, R. Tesauro, S. Tomassini

LIME:

- Gas, tooling for underground laboratory at LNGS;

Internal Radioactivity Reduction:

- Study, tests, procurement and handling of low radioactive materials: Copper and Acrylic;
- Development of low radioactive GEM with CERN and T-Rex people.

	FTE
Staff	2.85 + (0.5 INITIUM)

	Richieste
Missioni (LNGS + CERN+ conferenze)	18 k€
Consumo (gas)	10 k€
Consumo (tooling, materials and GEM)	20 k€
TOTALE	48 k€

Frequent travels of technicians from LNF to LNGS will be crucial for 2021 activities

LNGS ACTIVITIES 2021

E. Baracchini (local coord.), A. Cortez, G. Dho, A. Prajapati, S. Torelli

	FTE
Staff	0.2 (+0.8 INITIUM)
Dottorandi	4.0 (INITIUM)
TOTALE	5.0

Overground Laboratory

- Setup of **overground** lab for detector tests before underground installation
- Studies and development of innovative **gas mixtures (NID)** and innovative **amplification stages**, in collaboration with the Coimbra and New Mexico groups"

Simulation

- GEANT4 simulation of **LIME background**
- Feasibility and **sensitivity studies** for WIMP DM searches, other DM candidates and solar neutrino measurements"

LNGS PREVENTIVI 2021

E. Baracchini (local coord.), A. Cortez, G. Dho,
A. Prajapati, S. Torelli

- **LIME**
- Gas for overground and underground tests
- **Overground Laboratory**
- gas system and lab tooling
- **Simulation**
- GEANT4 simulation of LIME background
- Statistical study of detector sensitivity to Dark Matter signals

+ we should contribute for barrack refurbishment

	FTE
Staff	0.2 (+0.8 INITIUM)
Dottorandi	4.0 (INITIUM)
TOTALE	5.0

	Richieste
Missioni (LNF + conferenze)	5 k€
Consumo (gas, tooling)	25 k€
Impianti (gas system)	10 k€
Apparati (barrack)	10 k€
TOTALE	50 k€

RM3 PREVENTIVI 2021

F. Petrucci su Dot2

- **Simulation**

- Signal simulation with SRIM, Garfield e sensor noise and response modelization
- Need for a token for computing resources

	FTE
TOTALE	0.3

	Richieste
Missioni (LNGS + conferenze)	1 k€
Consumo (token)	2 k€
TOTALE	3 k€

TOTALE PREVENTIVI 2021

	FTE	Missioni (k€)	Consumo (k€)	Inventariabile (k€)	Totale
LNF	3.35	18	30	0	48
LNGS	5.0	5	25	20	50
RM1	2.8	13	10	35	58
RM3	0.3	1	2	0	3
Totale	11.45	37	67	55	159

THANKS!