

PTOLEMY

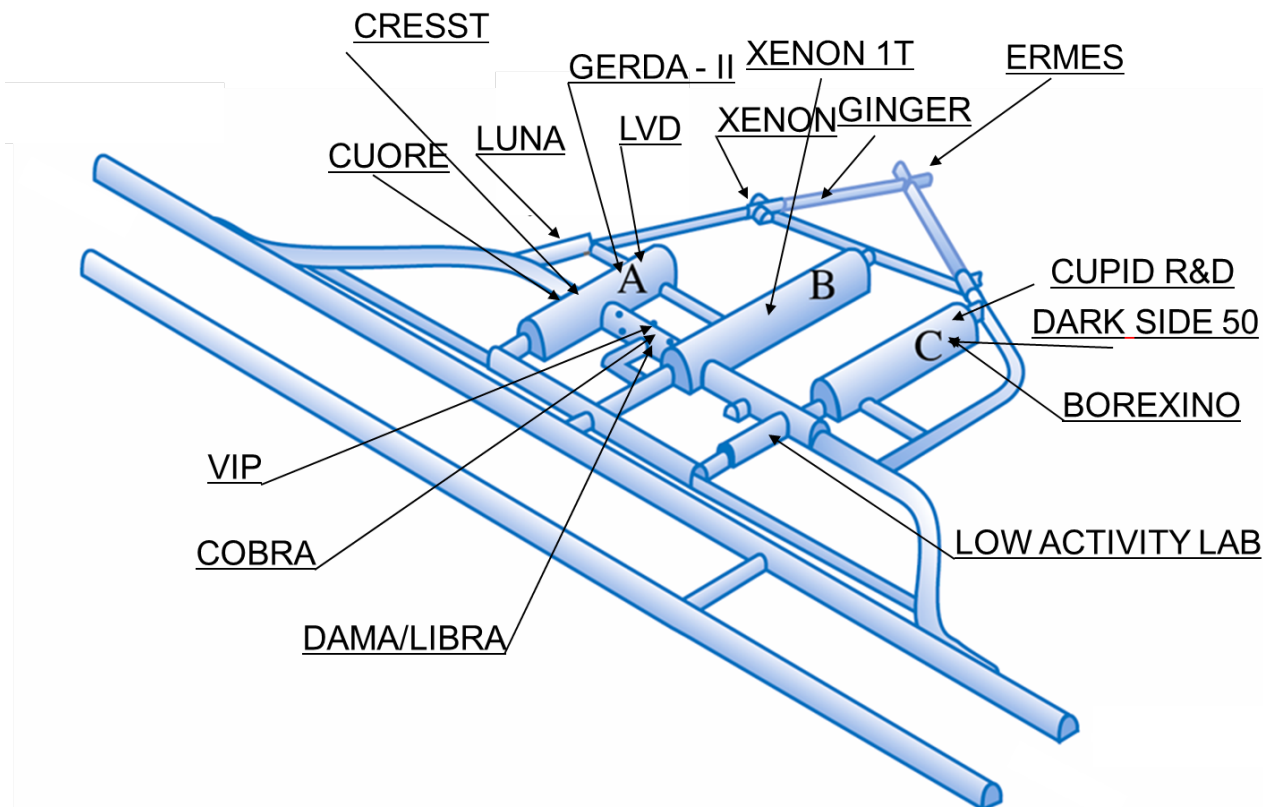
(PonTecorvo Observatory for Light Early-Universe Massive-Neutrino Yield)

at LNGS

Kick-off meeting, December 11-12, LNGS, L'Aquila Italy
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Underground physics at LNGS

- ✓ **Neutrinos** (BOREXINO, LVD, GERDA, CUORE, COBRA)
- ✓ **Dark Matter** (DAMA/LIBRA, DARKSIDE-50, XENON, CRESST)
- ✓ Nuclear Astrophysics (LUNA)
- ✓ Fundamental Physics (VIP)
- ✓ Multidisciplinary ACTIVITY (GINGER, Cosmic Silence, ERMES-W)



The three experimental halls (A, B, C) are ~100 long 20 m wide and 18 m height.

Aim of the meeting

The main goal of the meeting is to gather physicists interested in the PTOLEMY project and give a clear picture the state of art of the technology.

By the end of the meeting will hopefully start a collaboration that is interested in staying engaged in a common effort, for example on:

- Participate to the prototype activities at LNGS
- Share R&D progress at collaboration meetings
- Design the final detector for Relic Neutrino search
- Pursue grant applications to self-fund their groups
- Contribute to collaboration proposals for next generation prototypes and a full-scale experiment
(More details will be discussed tomorrow)

PTOLEMY prototype at LNGS

The proof of principle requires to show the capability of transporting single electron from the source to the measuring point with minimal impact on the total energy.

Background free environment is required for:

- Electrodes bias voltage stability
- Reducing background electrons from the Graphene
- Reducing noise on RF pick-up signal
- Reducing counts in the TES micro-calorimeter
- Reducing background particles in the MAC-E filter.

Running the prototype at LNGS will allow to evaluate the effect of the overburden on the PTOLEMY detector performance.

LNGS is a special place

- Mechanical, electronic and chemistry workshops have the know how that is key to the accomplishment of the proof of principle of PTOLEMY.
- Local community of Researchers have expertise
 - in low temperature apparatus,
 - ultra clean materials selection and operation in clean environment,
 - in setting up and run temperature sensors which will have a special role in the final detector design.
- Common location where the collaboration can meet and work together.

Potential Sites for the Relic Neutrino Experiment with full T load

Other sites are also under consideration in Europe (Canfranc in Spain and in Sweden) and also in Italy.

In Bologna region an old tunnel, used by civil aeronautics in the late 40, has been refurbished by University of Bologna to host a wind tunnel. A second tunnel is available to be used for other type of research. This is a shallow depth site.





Garpenberg Mine

Distance from ESS Lund **540 km**

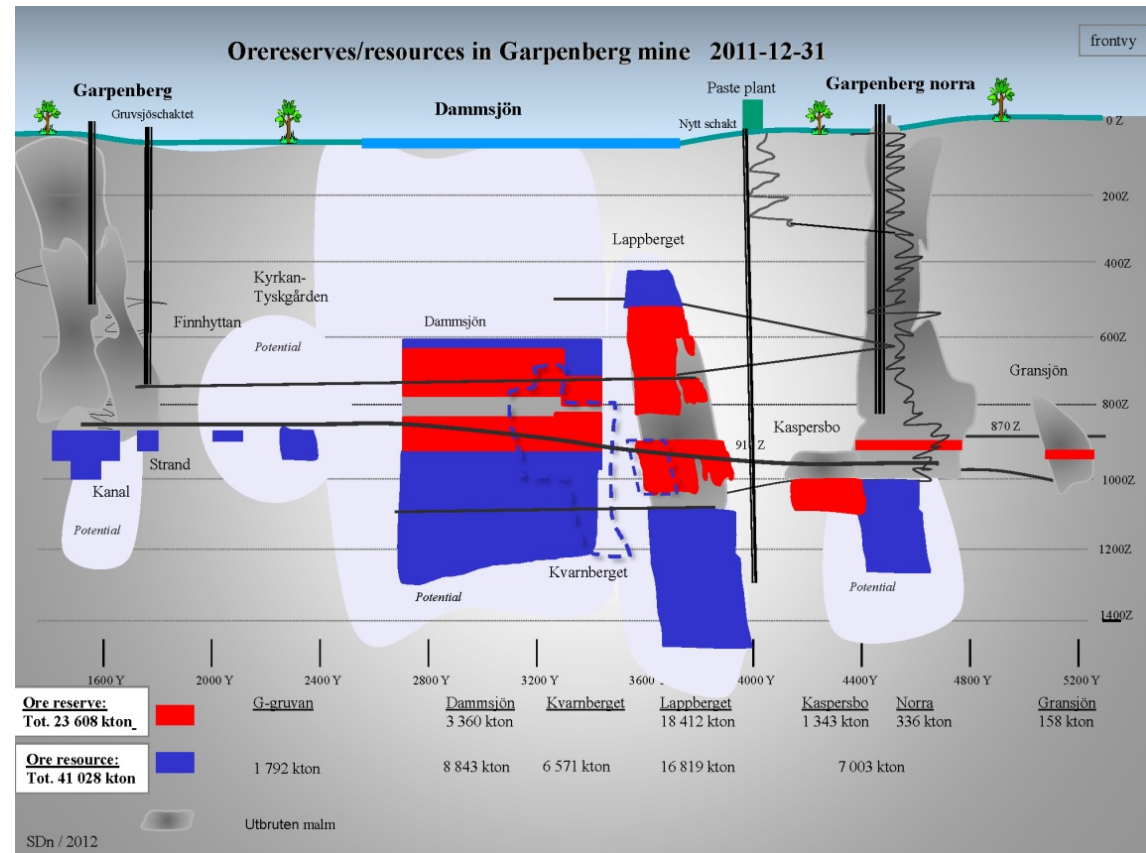
Depth 1232 m

Truck access tunnels

Previously two ore-hoist shafts



Recently a new ore-hoist shaft was taken into operation, leaving the Garpenberg Norra shaft free for other uses



Granite drill cores