



Minutes of 1st LAGUNA's Executive Board's Meeting

Held on September 24<sup>th</sup>, 2008 (11:30-13:30) by phone conference

**Present:** André Rubbia, Agnieszka Zalewska and Federico Petrollo.

**Absent:** Neil Spooner (excused) and Franz von Feilitzsch

**Agenda:**

**1. LAGUNA Progress Status, Grant Agreement and Consortium Agreement:**

Federico reports on status of GA and CA:

- GA: The Grant Agreement is actually reaching its final stage. After having applied the changes required by Partner 15 – KGHM CUPRUM the GA will be sent to the Commission that will produce the Contract (*note added after the meeting: the EC sent us the GA for final approval on September 26<sup>th</sup>*). The final signature is expected towards the end of October.
- CA: Few Partner requested minor changes, which were applied to the CA. An updated text has been sent around in order to collect final comments. ETHZ, Technodyne, IFIN-HH, CEA, U-Bern, U-Aarhus, IFJ-PAN, TUM, UAM, OULU, CNRS/IN2p3, LAL, APC, KGHM-CUPRUM, Lombardi and the University of Jyväskylä have already approved it. Thank you!

The Executive Board was concerned by probable delays in the transfer of the EC funds. Federico will take care of the evolutions of this situation by following the progress in Brussels. (*note added after the meeting: Federico brought this point to the attention of our project officers in a meeting in Bruxelles on September 29<sup>th</sup>*).

In view of transfer of funds from EC: The EB would like to receive from **Academic Partners** information on how they intend to spend money in the first year. In particular, the EB would like to know how much money is anticipated for personnel costs in the period July 2008-June 2009 (1<sup>st</sup> year) and approximately for the 2<sup>nd</sup> year (July 2009-June 2010). Federico will contact the Partners asking them for specific details. **Industrial Partners** expecting to send invoices during that period should inform Federico about details.

**2. WP2:**

The status of the work in WP2 in discussed. After some lengthy discussion, it is concluded that the organization of WP2 should be improved and the work should be planned in advance, and in a way as to avoid potential duplications. Detector specification documents now exist in very preliminary form on the LAGUNA website. The EB decides to propose Luis Labarga's documents, **Main Output from Site Characterization/Feasibility Study** and **Input Data for Site Characterization/Feasibility Study**, (see Annex I) as basis for the reference documents. All sites responsible and corresponding industrial partners are asked to look at those files and comment (*note added after the meeting: the EB assumes that Franz will forward this information*).

It is recalled that members of the EB have to be impartial in respect to the different detectors and/or sites and that an effort of compilation and coordination is expected from WP leaders.



### 3. WP3:

Is postponed until the next E. B. meeting

### 4. WP4:

Agnieszka Zalewska reports on the status of the LAGUNA outreach web site. Some progress has been achieved but the outreach web page is not yet accessible. As announced earlier, the prototype page will be presented at the next LAGUNA general meeting (see point 5).

AZ will contact Silvia Pascoli and Manfred Lindner in order to organize the work concerning the physics studies.

### 5. Bucharest General Meeting:

It was decided to hold the meeting from Wednesday November 5<sup>th</sup> till Friday November 7<sup>th</sup>. Tuesday the 4<sup>th</sup> of November is reserved for arrival in Bucharest.

Tentative Agenda of the meeting:

- First day: presentations, detailed discussions. It is suggested to organize dedicated sessions in the afternoon with WP2/WP3 and WP4 as parallel sessions.
- Second day: visit to the Slanic site.
- Last day: The last day will be focused on a full plenary session and finish early in the afternoon to allow travel on Friday night.
- N.B. an Executive Board Meeting and a Governing Board Meeting will also take place during those days (date to be defined)

### 6. AOB:

- **The European Strategy for Astroparticle Physics** will take place in Brussels on September 29<sup>th</sup>.
- **ASPERA R&D meets industry event** will take place on 28 October 2008 in Amsterdam (follow-up of the January 8th Lisbon meeting). Information on <http://industry-event.aspera-eu.org>
- **French EU Council Presidency** organizes the **5<sup>th</sup> European Conference on Research Infrastructure (ECRI2008)** in Versailles, on December 9<sup>th</sup>/10<sup>th</sup> (on invitation only). André Rubbia was invited and it will be an important opportunity to represent LAGUNA.
- **OECD on astroparticle physics:** ASPERA/ApPEC initiates a process through the global forum of the Organisation for Economic Cooperation and Development (OECD). OECD has already looked into large projects in nuclear physics and particle physics. This could be the right time to do that for Astroparticle physics as well. Michel Spiro's interview: "considering the possibility that on top of ApPEC we should have a more global committee, including the US and Japan and other countries".

Next meeting:

- Wednesday the 8<sup>th</sup> of October 2008 at 12:30 P.M.

Minutes taken by

Federico Petrolò LAGUNA Administrator and approved by EB



# ANNEX I

*Main Output from Site Characterization/Feasibility Study and Input  
Data for Site Characterization/Feasibility Study documents  
from L. Labargas*

# Input Data for Site Characterization/Feasibility Study

## Notes:

- unless explicitly stated the data is for the final laboratory with the experiment running
- purple,s means that it is part of the work to obtain the corresponding data, and that it has to be done with the indicated company, institute etc. It deals mainly with the tank characteristics and construction
- red,s are to be defined by the physicists before the Feasibility Study starts
- (LL) means that it is the best guess by L. Labarga; it **must** be confirmed

# Main Detector Cavern (MDC)

	Water Cherenkov	Liquid Scintillator	Liquid Argon
number of:	3 to 5 of	1 of	1 of
Dimension cavern:	65m $\varnothing$ x 80m height	? / With Technodyne ?	? / With Technodyne
Dimension Tank:	65m $\varnothing$ x 65m height	30m $\varnothing$ x 120m height (vertical preferred)	80m $\varnothing$ x 25m height
Relative Positions:	Aligned in direction to CERN? (LL) ?	N/A	N/A
Interaction with tank:	With Technodyne	With Technodyne	- Tank self-sustained - MDC base: reinforced concrete platform
Geological Stability:	?	?	Base platform stable [ $\pm$ ? cm] over 30 y.
Considerations in case of seismic activity:	?	?	?
<b>tbd</b>	?	?	?

# Auxiliary Underground needs $\Rightarrow$ Auxiliary Caverns (AC $n$ )

	Water Cherenkov	Liquid Scintillator	Liquid Argon
Room1 (R1): Main Control	80 m <sup>2</sup> $\otimes$ 240 m <sup>3</sup> (LL)	80 m <sup>2</sup> $\otimes$ 240 m <sup>3</sup> (LL)	80 m <sup>2</sup> $\otimes$ 240 m <sup>3</sup> (LL)
R2: Office Space	40 m <sup>2</sup>	40 m <sup>2</sup> (LL)	40 m <sup>2</sup> (LL)
R3: Electronics et al.	500 m <sup>2</sup>	200 m <sup>2</sup> $\otimes$ 600 m <sup>3</sup>	?
R4: Water Purification	500 m <sup>2</sup> $\otimes$ 5000 m <sup>3</sup>	N/A	N/A
R5: Air Purification	?	?	N/A
R6: Liquid / gas handling	?	200 m <sup>2</sup> $\otimes$ 600 m <sup>3</sup>	?
R7: Clean Room	?	500 m <sup>2</sup> $\otimes$ 1500 m <sup>3</sup>	?
R8: Low Background Lab.	?	100 m <sup>2</sup> $\otimes$ 1000(?) m <sup>3</sup>	?
R9: Storage space	200 m <sup>2</sup>	200 m <sup>2</sup> (LL)	200 m <sup>2</sup> (LL)
<b>tbd</b>	?	?	?
AC0: for tank assembly	1000 m <sup>2</sup> / w/Technodyne	With Technodyne	With Technodyne
AC1	Rooms 1,2,3,9 ?	Rooms 1,2,3,7,8,9 ?	Rooms 1,2,3,9 ?
AC2	Rooms 4 ?	Room 6	?
<b>tbd</b>	?	?	?
MDC-AC0 relative positions	With Technodyne	With Technodyne	With Technodyne
MDC-AC1 relative positions	See below	?	?
MDC-AC2 relative positions	as close as possible; floor of AC2 at level of top of water tank (LL)	?	?
AC1-AC2 relative positions	Same level (LL)	?	?
<b>tbd</b>	?	?	?

Access Tunnel (AT) *[from main access shaft or tunnel]*  
 Interconnection Tunnels (IT) *[between caverns]*

	Water Cherenkov	Liquid Scintillator	Liquid Argon
AT: minimum width x height	?	?	?
AT: connecting to	?	?	?
<b>tbd</b>	?	?	?
IT[AC0-MDC] characteristics	With Technodyne	With Technodyne	With Technodyne
IT[AC1-MDC]	Sm-s: standard for transport of mid-sized equip. (LL)	Sm-s (LL)	Sm-s (LL)
IT[AC2-MDC]	Sm-s (LL)	Sm-s (LL)	?
<b>tbd</b>	?	?	?

Tank: Implications to the construction of the underground facility  
of procurement of parts + assembly + commissioning + ...

	Water Cherenkov	Liquid Scintillator	Liquid Argon
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To be worked out with Technodyne



## Methods of filling the detector Tank to be considered

	Water Cherenkov	Liquid Scintillator	Liquid Argon
1	Natural nearby water springs	Truck Delivery to filling pipe	Truck Delivery to filling pipe 7 trucks /day (150 tons/day) 7 days / week $\Rightarrow$ 2 years
2		?	Production Plant at Surface 150 tons/day x 7d/w $\Rightarrow$ 2 years

## Main detector-related piping to be considered

	Water Cherenkov	Liquid Scintillator	Liquid Argon
1	?	1 x 1/2'' <i>N-gas from Nitrogen Plant at surface to MDC</i>	1 x double-wall-vacuum-insulated <i>From LArg delivery place to MDC</i>
2	?	4 x 3'' <i>From Liquid Scintillator delivery place to MDC</i>	?
3		4 x 3'' <i>Water plant at surface to MDC</i>	?

# Surface needs; Buildings to house them

	Water Cherenkov	Liquid Scintillator	Liquid Argon
R1: Main Control	80 m <sup>2</sup>	80 m <sup>2</sup> (LL)	80 m <sup>2</sup> (LL)
R2: Offices + Meeting + workshops + etc.	145 m <sup>2</sup>	1000 m <sup>2</sup>	1000 m <sup>2</sup> (LL)
R3: Storage Area	1000 m <sup>2</sup> ⊗ 6000 m <sup>3</sup>	1000 m <sup>2</sup> ⊗ 6000 m <sup>3</sup> (LL)	1000 m <sup>2</sup> ⊗ 6000 m <sup>3</sup> (LL)
R4: Specific 1	100 m <sup>2</sup> + 200m <sup>2</sup> <i>Storage+Assem. PMT</i>	200 m <sup>2</sup> ⊗ 1600 m <sup>3</sup> <i>Water Station</i>	<i>LAr production plant ?</i>
R5: Specific 2	?	100 m <sup>2</sup> ⊗ 300 m <sup>3</sup> <i>Liquid Nitrogen Plant</i>	<i>Cryogenics + Purification plant ?</i>
<b>tbd</b>	?	?	?
<b>Buildings</b>			
B1	R1+R2+R3+R4 (LL)	R1+R2+R3 (LL)	R1+R2+R3 (LL)
B2	?	R4+R5 (LL)	R4+R5 (LL)
<b>tbd</b>	?	?	?

# Regular Operation of the Underground Facility

	Water Cherenkov	Liquid Scintillator	Liquid Argon
Typical / max. no. people	3 / 10 (LL: too few ?)	4 / 10 (LL: too few ?)	3 / 30 (LL)
Temperature of caverns	MDC: ? ± ? °C  AC1: 22 ± 1 °C AC2: ? ± ? °C	MDC: ? ± ? °C (lower preferred) AC1: 22 ± 1 °C ?	MDC: ? ± ? °C  ? ?
~ volume of air MDC / AC's radon at MDC / rest_facility Ventilation: Time to change 1 volume of air MDC 1 volume of air rest facility	? / ? m <sup>3</sup> ~ 40 / ~ 100 Bq/m <sup>3</sup>  ?' ?'	? / ? m <sup>3</sup> ~ ? / ~ ? Bq/m <sup>3</sup>  ?' ?'	? / ? m <sup>3</sup> ~ ? / ~ ? Bq/m <sup>3</sup>  ?' ?'
Crane needs	?	?	?
Own-power-generation	? kW	? kW	? kW
Specific 1	?	?	Hot air forced flow [? m <sup>3</sup> /h] between cavern' walls and tank
Specific 2	?	?	Availability of hot air flow [? m <sup>3</sup> /h] in the whole facility in case LAr leak
<b>tbd</b>	?	?	?

# Regular Operation of the Experiment (underground)

	Water Cherenkov	Liquid Scintillator	Liquid Argon
Power needed:			
- experiment	? kW	5 kW	? kW
- Electronics et al.	? kW	100 kW	? kW
- Specific 1	? kW [air purification]	? kW [air purification]	?
- Specific 2	? kW [water purification]	?	?
Own-power-generation	? kW	? kW	? kW
<b>tbd</b>	?	?	?
Heat dissipation:			
- tank + ancillary in MDC	? kW	? kW	- 60 + ? kW
- Electronics et al. Hut	? kW	? kW	? kW
- Specific 1	? kW [air purification]	? kW [air purification]	?
- Specific 2	? kW [water purification]	?	?
<b>tbd</b>	?	?	?
Flow of liquids (pumping capacity) at pipes	?	Liq. N pipe: 20 m <sup>3</sup> /h Liq. scintil.: 20 m <sup>3</sup> /h Water: 20 m <sup>3</sup> /h	LAr filling: 6 m <sup>3</sup> /h LAr recirculation: 36 m <sup>3</sup> /h
<b>tbd</b>	?	?	?

# **Main Output from Site Characterization/Feasibility Study**

## Notes:

- this is a rough draft-document; it is intended only to serve as a guideline
  - this document is conceived as being in a constant up-to-date process
  - purple,s means that part of the work has to be carried out with the indicated company, institute etc.  
It deals mainly with the tank characteristics and construction
- 
- MDC: Main Detector Cavern
  - AC: Auxiliary Caverns
  - UF: Underground Facility
  - EXP: Experiment

# Mainly Geotechnic

	WC	LS	LA
- Rock analysis along the volume of MDC and rest UF; bore holes desirable	✓	✓	✓
- Water content and MDC and rest UF; removal and disposal of water (pumps, pipes)	✓	✓	✓
- Rock: any environmental issue ?	✓	✓	✓
- MDC: optimal method of excavation	✓	✓	✓
- MDC: optimal access method for excavation	✓	✓	✓
- MDC: Optimal access method for tank construction (with Technodyne)	✓	✓	✓
- Emptying of the tank: procedure and required specific facilities	✓	?	?
- MDC: Recommendations on Cavern geometry (if imp. differences from requested)	✓	✓	✓
- Requirements for rock bolting and extra structures at MDC	✓	✓	✓
- Requirements for rock bolting and extra structures at rest UF	✓	✓	✓
- Treatment and securing of MDC caverns walls	✓	✓	✓
- Treatment and securing of walls of rest of UF	✓	✓	✓
- Special requirements during excavation (dust control, others) ?	✓	✓	✓
- Rock removal from site: method, limitations, others	✓	✓	✓
- Disposal of excavated rock	✓	✓	✓
- Environmental issues of rock excavation and disposal	✓	✓	✓
- Interaction with tunnel/mine company: requirements, costs, protocols, others	✓	✓	✓

# Mainly Geotechnic

	WC	LS	LA
- Geotechnic pre-design of whole UF: MDC, all the ACs, access and interconnection tunnels, others ...	✓	✓	✓
- Estimate of time of construction of MDC and rest UF (at 30%)	✓	✓	✓
- Cost estimate of Full Design of MDC and rest UF (at 30%)	✓	✓	✓
- Cost estimate of full construction of MDC and rest UF (at 30%)	✓	✓	✓

# Mainly Services to EXP and UF (the later non specific to EXP)

	WC	LS	LA
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Specific to EXP			
- System for filling the detector tank	✓	✓	✓
- Power provision (for detector, electronics, others)	✓	✓	✓
- Ventilation system in MDC	✓	✓	✓
- Main pipes and pumps	✓	✓	✓
- Provision of secondary containments / dumps for water/LS/LA (with WP3)	✓	✓	✓
- Safety induced issues (with WP3)	✓	✓	✓
<hr/>			
Non Specific to EXP			
- Power needed; power provision	✓	✓	✓
- Water needed + provision	✓	✓	✓
- Ventilation system	✓	✓	✓
- Air Conditioning system	✓	✓	✓
- Temperature and Humidity control	✓	✓	✓
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- Pre-design of whole UF (buildings, services etc.):	✓	✓	✓
- Estimate of time of construction (at 30%)	✓	✓	✓
- Cost estimate of Full Design (at 30%)	✓	✓	✓
- Cost estimate of Full Construction (at 30%)	✓	✓	✓
	✓	✓	✓



# Mainly at Surface

	WC	LS	LA
Specific to Experiment			
- Pre-design of liquid plants: Liquid Nitrogen, LArg production, LArg purification, LArg purification, ...		✓	✓
- Communications with UF/MDC (piping, pumps, others)		✓	✓
- Pre-design of Building / s for Control-Room, Offices, Meeting rooms, Workshops, Storage etc.	✓	✓	✓
- Communications with UF/MDC (personnel, material)	✓	✓	✓
- Legal / environmental issues (related to most appropriate location of the buildings)	✓	✓	✓
- Estimate of time of construction (at 30%)	✓	✓	✓
- Cost estimate of Full Design (at 30%)	✓	✓	✓
- Cost estimate of Full Construction (at 30%)	✓	✓	✓