

# **Competence Center in Monitoring and Control - *Status Update* -**

F. Neves

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# What is the Objective?

The **Competence Center in Monitoring and Control (CCMC)** is intended to:

- Gather the accumulated expertise in **sensors, electronics** and **software** used in Monitoring and Control (aka “*Slow Control*”) by several experiments where LIP participate and have direct responsibilities;
- Facilitate the sharing of **know how, solutions in electronic** and **software design** among LIP persons/groups:
  - ▶ Reduce development and delivery times;
  - ▶ Better debugging and quality control;
- Establish partnerships/contracts with third parties (e.g. other laboratories, industry) where our scientific deliverables can be re-used.
  - ▶ Avoid time/costs associated of development of new products.



# Who participates, how to collaborate?

- Anyone with work/expertise in monitoring and control can/should!
- Who already shown interest in participating?
  - ▶ The **LUX-LZ** group;
  - ▶ The **COMPASS** group;
  - ▶ The **RPC** group.
- How to participate:
  - ▶ **Add and keep updated** a detail list of your competences in [https://docs.google.com/document/d/1VWyzHzw4\\_FlStcoijuN9el\\_jXeNavSnck1vgs0UpGTw/edit#heading=h.msgbkdcodkp1](https://docs.google.com/document/d/1VWyzHzw4_FlStcoijuN9el_jXeNavSnck1vgs0UpGTw/edit#heading=h.msgbkdcodkp1)
  - ▶ Whenever specific **competence(s)**, **sensor(s)**, **driver(s)**, **software integration** and **GUI tool(s)** may be required, the **CCMC** will know who **to contact** and can **coordinate efforts!**
- Will this work? Doomed to fail? **Better to try!**

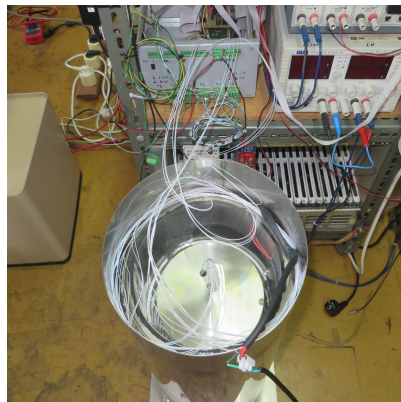
# 1<sup>nd</sup> pilot trial inside LIP [ongoing]: Annealing of PMMA containers for radioactive sources in the framework of SNO+ activities

1



Machining  
container.  
(MW)

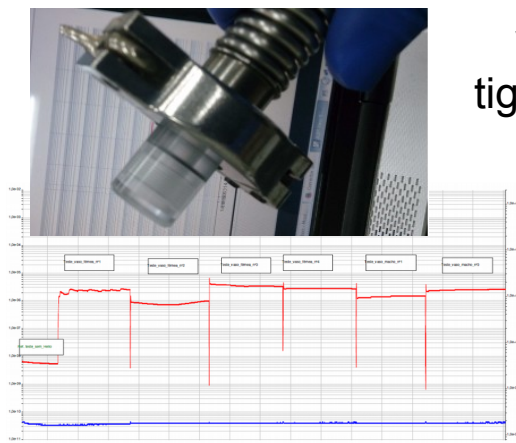
2



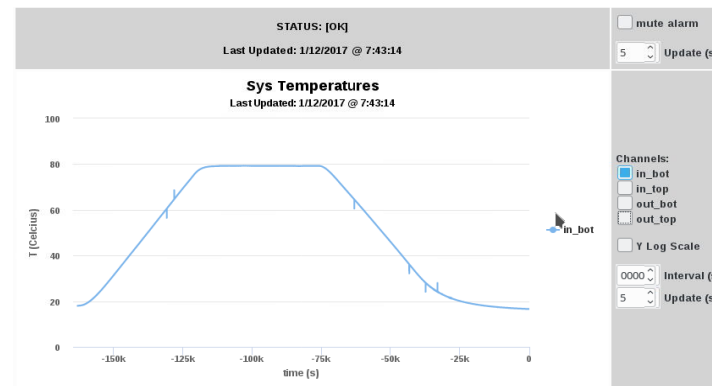
Home made oven with  
temperature sensors  
for control (MW).

Controlled temperature profile  
during the test (~48h)  
(CCMC: LXe/LUX/LZ tools)

3



Vacuum  
tightness test  
(DL)



Excellent collaboration work between the **MW**, **DL** and **CCMC**!

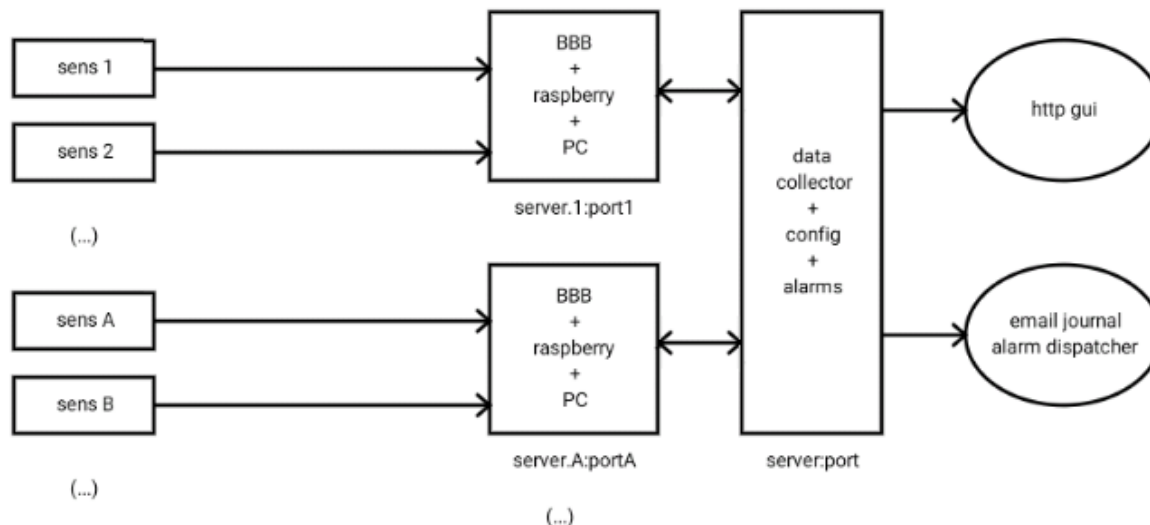


## 2<sup>nd</sup> pilot trial with CNC [**ongoing**]: An Environmental Monitoring System

- At 16 Oct 2017 LIP initiated negotiations with the CNC (Centro de Neurociências, Coimbra) towards the installations of an **Environmental Monitoring System** for their laboratory rooms;
- The system will be based in hardware and software tools developed/used by the **LUX-LZ** group;
- As a 1<sup>st</sup> step (*also because we are new in business...*) we agree to instrument a single laboratory room with:
  - ▶ A small **electronics box** (Raspeberry Pi + breakout electronics) allowing for the readout of up to **27 temperatures** (water baths, storage refrigerator and room temperatures);
  - ▶ An **integrated database/journal** system which sends period emails/SMS with the system status for a set of defined users;
  - ▶ An **alarm system** which sends emails/SMS (for a set of defined users) if any temperature falls out of a given range;
  - ▶ A **HTTP page** where users can check the evolution of all the temperatures with time;

## 2<sup>nd</sup> pilot trial with CNC [ongoing]: An Environmental Monitoring System

- At this 1<sup>st</sup> stage, they will just pay the equipment (~400€) and we would test/tune the system for free.
- After this trial period, we would **re-negotiate the terms of the contract** and **eventually extend the system for other rooms** (that would also include measuring pressures in virus rooms, etc);
- ... and, after a couple of (very positive) meetings with their facility managers we are still waiting for the official approval of the CNC direction to proceed...



Schematic of the proposed infrastructure (base on tools developed/used by the LXe/LUX/LZ group)



## [future] Setup for the characterization of hydrocarbon reservoirs

- Development and construction of a setup for the characterization of hydrocarbon (crude) reservoirs for the U. Fernando Pessoa;
  - At LIP, the project would involve a collaboration between the **MW** (e.g. pressure vessels) and **CCMC** (monitoring and control system);
  - A (very) preliminary draft of the project points to values of ~100k€ and ~21 months for design, building and testing.
- ... Needs detailed project for assessment of MW needs, electronics, personnel requirements, costs, etc. Are you interested to pursuit this contact/project?



# [future] COMPASS upgrade

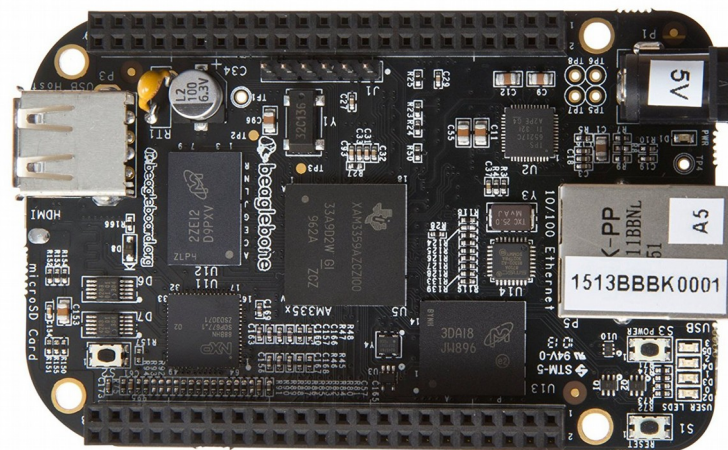
- During CERN 2019 Long Shutdown (LS2), **COMPASS** will be updating its **Monitoring and Control system**;
- In that process, COMPASS will be studying the possibility of replacing their Embedded Local Monitor Board boards (**ELMB**) by **Raspberry/Beaglebone -based boards** for measuring of temperatures, pressures, humidities, etc;
- **Within the CCMC there is accumulated experience using this boards, so:**
  - ▶ COMPASS could benefit from the already existing solutions and know how!
  - ▶ ... also this would result in accumulated knowledge for the CCMC!



ELMB board



Beaglebone  
black







# Future work...

- Improve the format of the competences database;
- ... Find more potential projects (both internal and external) where the CCMC can contribute!
- ... Contact (or join) us: [monitor-control@lists.coimbra.lip.pt](mailto:monitor-control@lists.coimbra.lip.pt) !