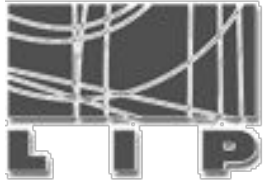# Competence Center in Monitoring and Control - Status Update -

F. Neves on behalf of the CCMC

Jornadas LIP, Braga
14-16 February 2020

Objectives + Core Team

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 reused.
 - Avoid time/costs associated of development of new products.
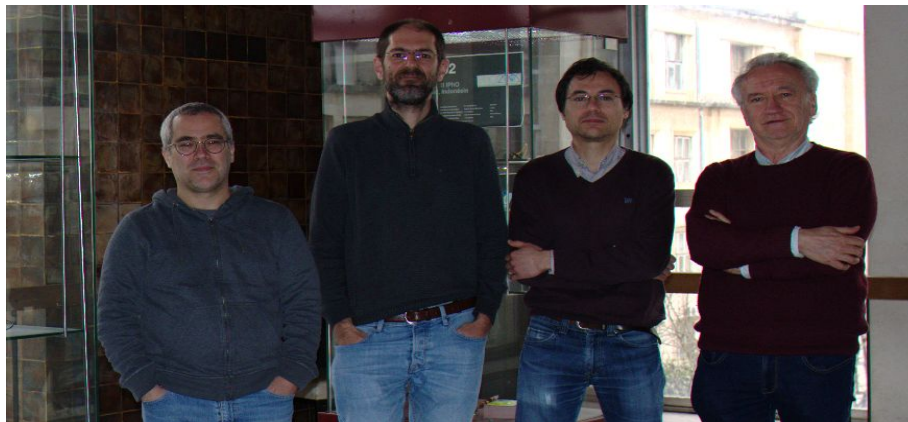
Left to right:
- Francisco neves
- João Silva
- Filipe Veloso
- Helmut Wolters

# Temperature and heart monitor (ext.): ECOTOP Group (2019)

- **Field testing and final delivery** of the non-invasive devices (**version 1, x2 units**) for the monitoring of the temperature and heart rate of birds during nesting in their natural habitat;

- Acquisitions (by ECOTOP group) in 3 different sites (Algarve, Berlengas and Porto);

- The **co-analysis** of the data allowed to identify some issues (e.g. drift of the Arduino clock frequency with temperature and from device to device) which were/are being addressed in **version 2** of the hardware (see next slides);

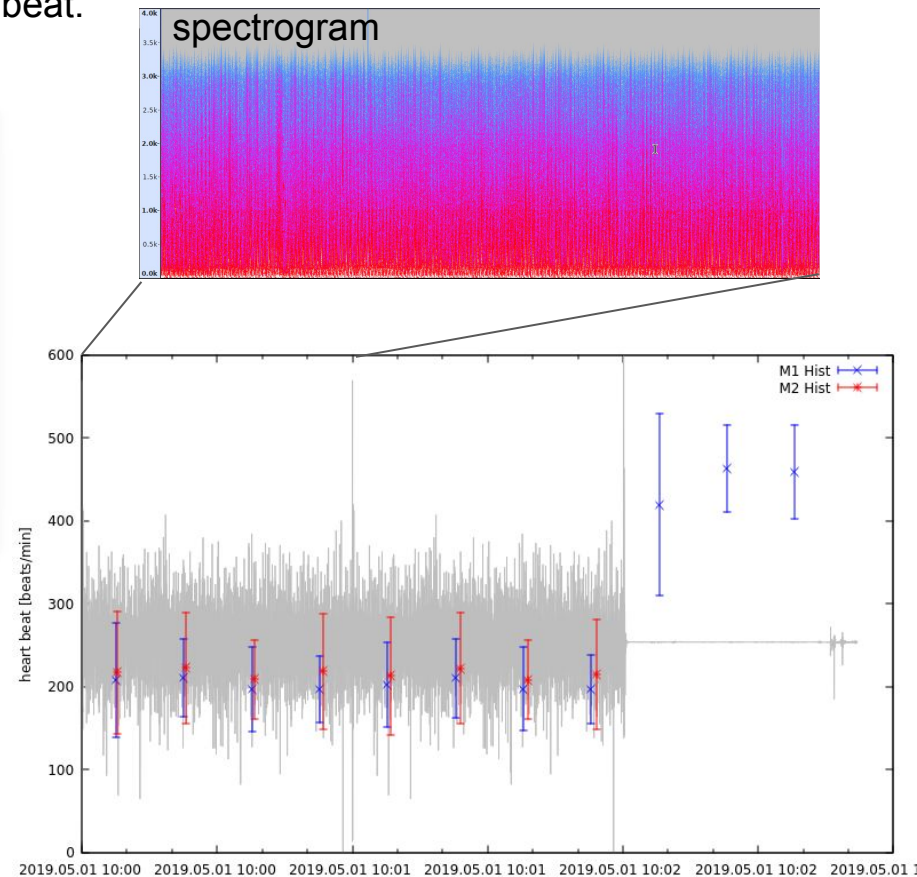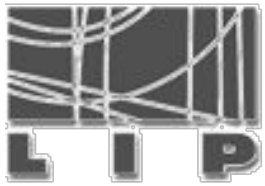Membrana acústica
MUITO SENSIVEL!

Cartão SD
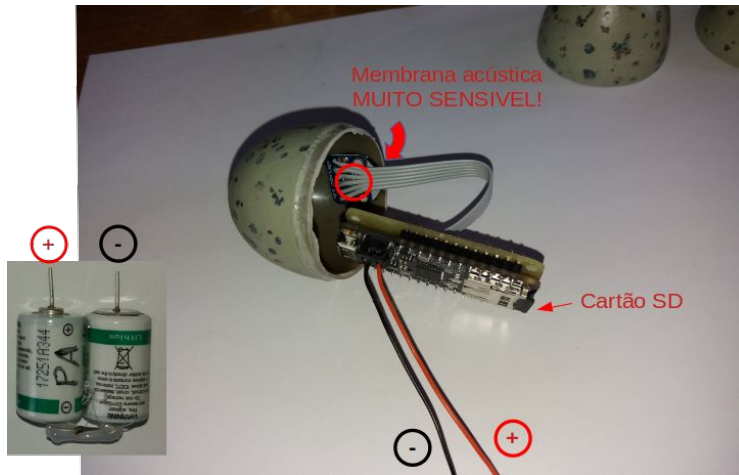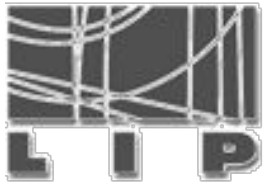
Analysis Software (ext.): ECOTOP Group (2019)

- Develop a **software tool** to extract and process information from the **temperature and heart rate monitors** developed for the ECOTOP group (MARE UC):
  - filter ambient noise;
  - detect the presence of birds and their heart beat.
- LIP will co-author published analysis.
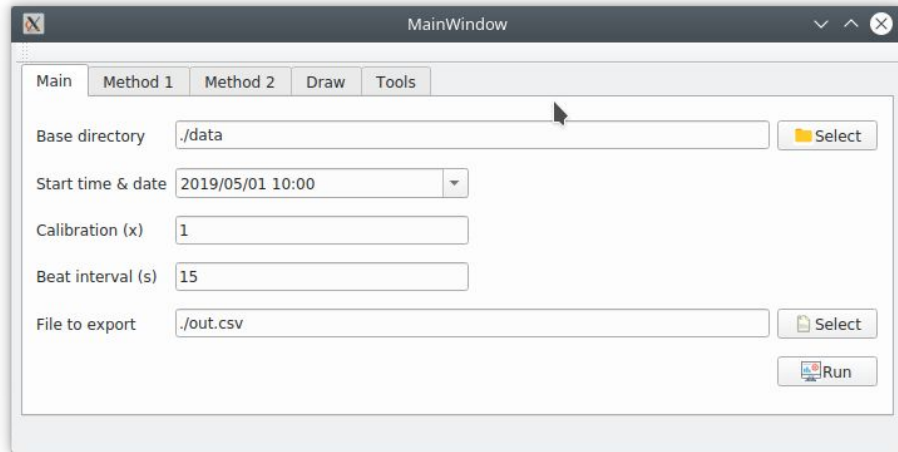
- Implements 2 different heart beats analysis methods:
  - Method 1 uses a sliding window threshold finder;
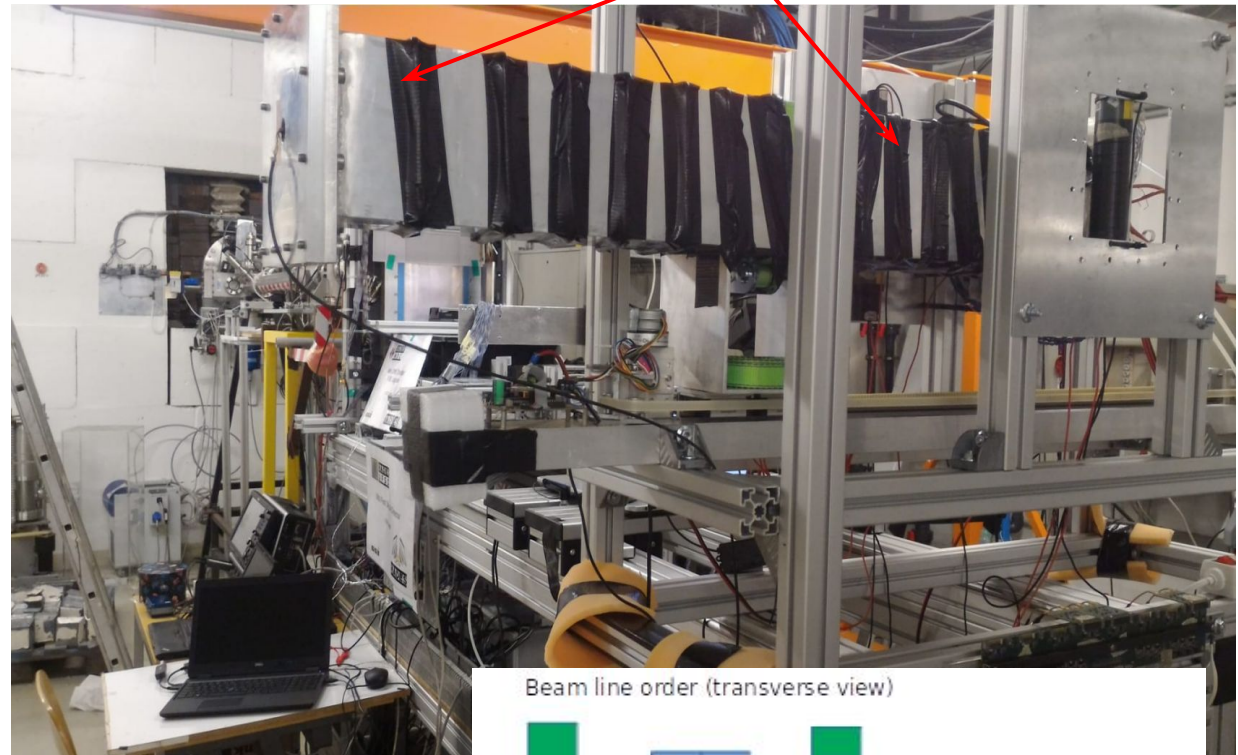 - Method 2 uses the Pulse Finder developed for LZ by the LIP DM Group.

Collaboration with the RPC HADES Group (2019)

Objective:

- Check efficiency and timing accuracy (as a function of the detector working temperature) of the future TOF detector for the forward region of the **HADES** spectrometer
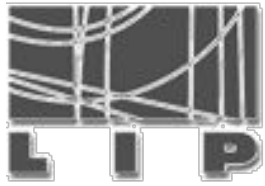
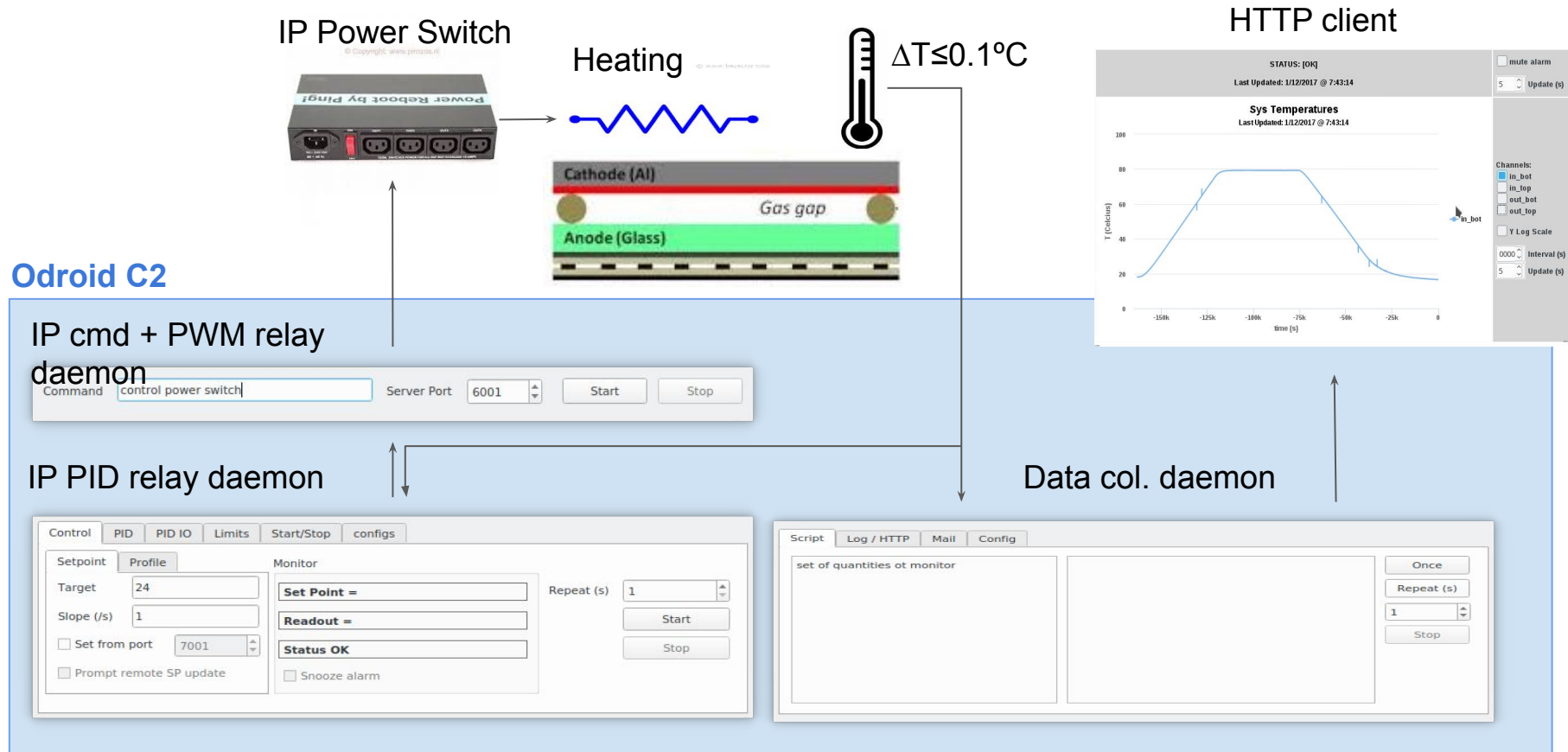test performed at Forschungszentrum Jülich, www.fz-juelich.de

RPC + heating system for count rate improvement

Beam line order (transverse view)

sc1 sc2   RPC4 RPC3 RPC2 RPC1   sc3
           1 mm 1 mm 2 mm 2 mm

2.7 GeV/c protons

Collaboration with the RPC HADES Group (2019)

IP Power Switch

Heating

$\Delta T \leq 0.1°C$

HTTP client

Odroid C2

IP cmd + PWM relay daemon

| Command | control power switch | Server Port | 6001 | Start | Stop |

IP PID relay daemon

Data col. daemon

| Control | PID | PID IO | Limits | Start/Stop | configs |

Setpoint	Profile	Monitor
Target	24	Set Point =	Repeat (s)	1
Slope (/s)	1	Readout =	Start
☐ Set from port	7001	Status OK	Stop
☐ Prompt remote SP update	☐ Snooze alarm

| Script | Log / HTTP | Mail | Config |

set of quantities ot monitor

Once
Repeat (s)
1
Stop

- **Modular framework** allowing to virtually "assemble" **any monitor+control** infrastructure (LXe Group);
- **Plots/alarms** readily available through a HTTP Client for any quantity collected;

Artificial Nests (ext.): ECOTOP Group (2020)

- Develop and build a device to **control and monitor** ambient parameters of nests installed in the natural habitat of birds (e.g. temperatura, pressure, sound);
- A set of these devices will be installed **scatter over a large forest area** aiming at studying potential **effects of the temperature increase** associated with **climate changes** in the nesting of birds;
- Evaluation of technical solutions underway with ECOTOP;

Test nests

Choupal, Coimbra
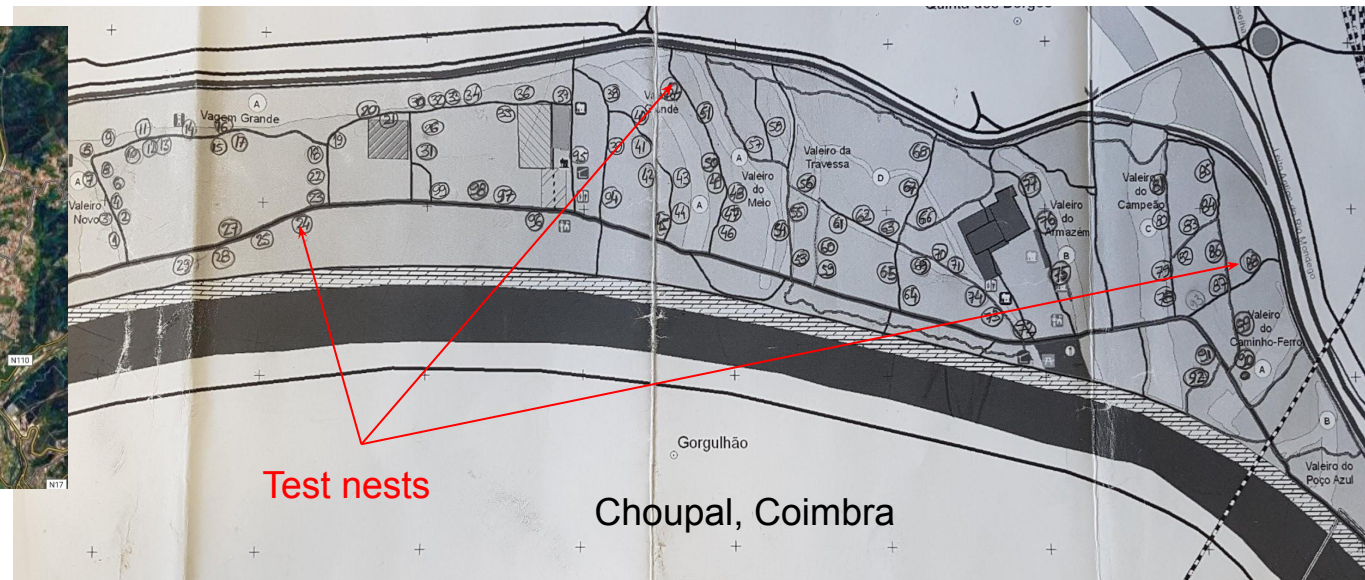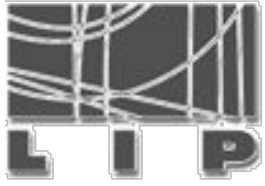
Other activities (2020)

- Continue to mature the **software framework** currently being developed and **benchmark** it within the activities of one or more **LIP groups**. A thorough testing of the software in real conditions is crucial to ensure its robustness before its deployment to third parties;

- Field testing of **version 2** of the devices for **monitoring the temperature and heart rating** of birds before the final product delivery to ECOTOP (schedule for mid March, x10 units);

- Install an environmental monitoring system for the server room at LIP-Coimbra;

- Participation at the event **"Techdays: Building our future"** in Aveiro, in the context of the work developed with the group ECOTOP from the MARE-UC institute. This participation presents also an opportunity to **expose the CCMC** to other **opportunities and potential clients**;

- Organize a workshop on "Monitoring and Control for scientific and industrial applications" (last quarter of the year). The event aims not only at disseminating LIP-CCMC's capabilities but also at getting a better insight on the needs of potential clients and/or partners.
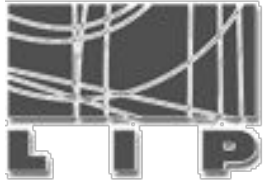
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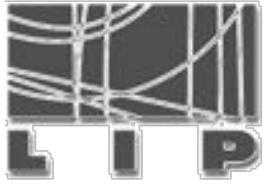
Other activities (2020)

- ***NEW!*** ECOTOP/MARE-UC proposed LIP/CCMC a joint participation in a PTDC project in which both the monitors, software and artificial nest (see previous slides) would be included. Needs:

  - Definition of the terms of our participation;

  - Evaluation of LIP manpower/resources availability;

  - … make a decision *ASAP!*

  … Great!

Swat & Future

Strengths

- A large body of knowledge (e.g. software, electronics);

Opportunities

- The ability to deploy very **high quality and personalized** products and services;

Weaknesses

- Do not have (explicitly) **allocated FTEs or resources**;

Threats

- The ability to **meet deadlines** and ensure the **manpower** required;

CCMC/LIP **doesn't have out of the shelf products**, so before production (e.g. MW, DL) there is the need to personalize/adapt our tools to the client requirements: that demands **availability of human resources**, which is our current worst Achilles' heel...