



### in a nutshell....





Mário Pimenta, Lisboa, Abril 2023 LIP was created in 1986, in the context of the Portuguese accession to CERN, the first international scientific organization Portugal became a member of



# WHAT

The reference institution for experimental particle physics in Portugal and the Portuguese reference partner of CERN as well as other international scientific infrastructures

Nation-wide laboratory working in close collaboration with the local universities



#### Governance











Universidade do Minho







#### Governance











Universidade do Minho







#### Human **Resources**





### Four main areas of activities



## **Research: Lines and groups**



### **Research: timeline**



# **Distributed Computing and digital Infrastructures**



Software management<br/>coordinationCloud for researchEGI pan-European<br/>middleware coordinationPiloting data repositoriesIBERGRID coordinationWLCG national<br/>nodeHPC and virtualization<br/>for machine learningEUDAT national node10

### **Science and Society**



Knowledge transfer and societal impact

Radiation, health and environment



Muon tomography



Advanced training



Education, communication and outreach



# Impact in the Society

- Computing and Information Technologies
- Health applications
- Space (including Earth Observation)
- Social Physics
- Knowledge Transfer
- Advanced training
- Education and public outreach

#### Brain PET



### **IDPASC**



### Bridge over troubled waters



# Resistive Plate Chambers (RPC)

Taking RPC performance and flexibility to a new level to expand their range of applications

#### t-RPCs: very precise timing

#### High-resolution RPC-PET

#### **Autonomous RPCs**



95% efficiency <70 ps time resolution, mm position resolution







Working towards Sealed RPCs,

# **Scientific Infrastructures**

# Precision mechanical Workshop production of prototypes and small series Coimbra

# Detectors laboratory key role in gaseous detector development Coimbra



Electronics laboratories A key role in CMS, Auger and medical applications Lisboa Coimbra CERN

## **Competence Centres**

Enhance synergies between groups and boost collaboration with industry and academia

#### Big data and simulation CC



#### Monitoring and Control



Symposium with a strong participation of companies and an advanced school 2017: Lisboa; 2018: Braga; 2022 Coimbra

A device to monitor the temperature and heart rate of seagulls



#### **SPAC**:

# **Social Physics and Complexity**



The Social Physics and Complexity (SPAC) group uses large scale computational tools to study societal challenges, especially in disease forecasting, human behavior, and public policy, using a complex systems approach.

SPAC is a multidisciplinary team with members coming from distinct backgrounds, including Physics, Mathematics and Computer Sciences, but also Biology, Neurosciences, Psychology, and Law. Together, the group takes advantage of "Big-Data" and aims at understanding how individual behavior impacts on society.

SPAC also focuses on the risks that these upcoming technologies might entail, from privacy to human biases, and works to establish guidelines for ethical uses of data science and artificial intelligence.

In parallel, SPAC participated in the pandemic control efforts, in collaboration with different entities. As part of these efforts, a roadmap for COVID-19 surveillance was publicly released.

# LIP ESA contracts

**ESA JUICE mission** •RADEM – Radiation Hard Electron Monitor (\*) •EEE component testing for the Jovian environment



In collaboration with the industry and other Research institutes (\*)

ESA Mars Energetic Radiation Environment Models (\*)

**CODES-** Component Degradation Simulation Tool

GEO Radiation Environment: •Radiation Environment Measurement (MFS) (\*) •EEE component test bed (CTTB) (\*)

