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Deployment of a microwave cavity experiment using the Framework for Remote Experiments in Education

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Remote Controlled Laboratories had a great push during the COVID pandemic. In fact, they were already out there but lacking in visibility. This external trigger pushed the academy to face a global challenge to start offering remote experiments in a more consistent and mature way.

Instituto Superior Técnico (IST) has been offering several remote experiments since 2000 but with the need for an update due to technological aging. As such, the Framework for Remote Experiments in Education (FREE) was created based on new web technologies. In addition to the most diverse experiments that had already been developed, FREE includes a new experiment aimed at advanced-level Physics students: the Microwave Cavity. Allowing users to configure the various parameters and access the results in real-time or check back later. All this access is done using a browser (on a PC or mobile phone) without the need to install additional software. The results of an experimental execution are stored in a database and downloadable, allowing users to do a variety of analyses and determine the corresponding plasma density.

In this workshop, we will introduce how FREE was used in the implementation the microwave cavity and give an insight into didactic approach, such as: (i) how to perform an experimental execution and (ii) the typical data set obtained with (iii) the corresponding analysis necessary for the user to retrieve information from it.

Keywords — *Educational technology, e-lab, Electromagnetic Cavity, Remote controlled experiments*

Author: ROSSA, Pedro

Presenter: ROSSA, Pedro