INFIERI2020-UAM School (21-02-2020)

PRELIMINARY LIST of LAB SESSIONS for UAM
(work in progress)

Lab section	Coordinators	Expected Labs sessions on
FEE-oriented Labs	*David Barney (CERN), Jose Luis Pau (UAM)*	1-Pixels FEE RD53-based (Analog part) 2-Pixels FEE RD53-based (Digital part) 3-High Gain Avalanche CMOS pixels with embedded FEE 4-Low Gain LGAD detectors with embedded FEE 5-FDSOI pixels 6-Edgeless Si sensors for HL-LHC trackers 7- Cold (very cold) Electronics 8- FEE for High Granularity Calorimetry 9- New PMTs for Neutrino/D.M. search
Data transmission Labs	*Vicente Martin, UPM, Universidad Polytechnica de Madrid*	1- Data transmission technology based on Fibers and Photonics (tba) 2- Quantum communication Lab (tba) 3- Fast clock transmission systems for HL-LHC (Ozgur Sahin IRFU-CEA,FR) 4-LiDAR (Light Detection and Ranging), in collaboration with HPK. It is a simple desktop/lab setup, measure and display the distance (up to 100 m) in a viewing angle of 30 deg. For use here on telecom : Y. Unno (KEK)+HPK
Test bench-marking Platforms	**1- For Particle Physics** *Carlos Lacasta (IFIC, UV)* *A. Savoy-Navarro (IRFU-CEA)* ----------	1- ALIBAVA based test bench (C. Lacasta, IFIC, UV, SP) 2-Real-time triggering for HL-LHC tracking based on the use of new FPGAs (I. Tomalin, RAL, UK) 3- LHCb "no trigger system" (tbd) 4- Application of IA tools to real time 1st level trigger selection in HEP (S. Jindariani, FNAL, USA) 5- HGCAL signal processing test bench (LLR, FR, tbc) 5'- Cluster based L1 trigger (DUNE example), RAL (tbc) 6- Micromegas Gas detector technology prototype for HEP & other applications (IRFU-CEA, tbc) ----------
	2- For Astrophysics *J.G. Cuby(LAM/INSU-CNRS, Fr)* *German Sierra (IFT)?*	1-Instrumentation Lab(s) for DESI/ DES Dark Matter based experiments: 2- EUCLID based instrumentation Labs 3- Atom Interferometry based Lab

Medical test bench Labs	*Nicola d'Ascenzo (HUST), CN, Juan Jose Vaquero (UC3M), J. del Peso (UAM)*	1. Clinical Lab on use of High Intensity Ultra Sound to eliminate Essential Tremors *(UFRJ, Prof. Norberto Malpica))* 2- Deep Brain Simulation (DBS) (*D. Ortega Ponce, SP)* DBS uses implanted electrodes to treat several brain-related conditions like movement disorders, depression, dystonia, etc. Since 2002, it became an FDA-approved therapy for the treatment of Parkinson's disease. Basically, pulses are delivered through the electrodes of a neurone stimulator to deliver electrical stimulation to targeted areas in the brain. In this practical session, we will simulate the electric field distribution and currents on the brain, as well as the related impact on neuronal activity. 3- Manufacture a Bio-Material using a Proton Beam and Study of the Behaviour of Living Cells on a Bio-Material (CMAM-UAM, SP) 4- New digital SiPM for PET-MRI (N. d'Ascenzo, (HUST, CN) 5- Electronics system design for heart pulse & electrocardiogram + DAQ *(J.L. Pau & Basilio J. Garcia, UAM)*
Technology for Accelerators	*Pierre Vedrine (DACM, IRFU-CEA), Fr Concepcion Oliver (CIEMAT)*	1 Design of superconducting magnets using Roxie, quickfield or Opera (to be defined), including an introductory talk at the beginning of the lab. 2. Cryogenic experiments to cool in nitrogen a small HTS SC magnet (still to be checked if students can manufacture a small one based on HTS technology in the given time). In this lab the manufacturing tools can also be visited and depending on the current activity it can be seen the fabrication process of some of the magnets CIEMAT are working on or at least one video. 3. Using available accelerator to explain how an accelerator works, how the magnets are tuned to change beam parameters, etc. 4. (still in discussion) an introduction lab to the third lab, for students to have a

		feeling of the effect of the different magnets on the beam transport, using beam dynamic codes to modelize the accelerator including a short introducing talk on accelerator physics for dummies.
Masterclass on Theory	*Alberto Casas (IFT-UAM/CSIC)*	*Master classes by Theoreticians on: Introducing non-theoretician experts to some of the hotest issues in Fundamental Theory (HEP, Astrophysicss/Cosmology)* *1.* **Can we feel the dark matter?** *1. D. Cerdeno (UAM, IFT-CSIC)* Dark matter particles from the Milky Way halo are passing through our bodies in large amounts. Yet, we are completely unaware, as they do not seem to produce any effect that we can feel. In particle physics terms, this happens because the interactions between dark matter particles and ordinary ones are very weak. In this laboratory we will further investigate into this question: considering the human body as some sort of detector, is there any way that we can observe (feel) the dark matter? If this is not the case, what kind of experiment would we need to design? 2. **Exploring the world of particle physics** (tentative tittle) *by Sven Heinemeyer (IFT,UAM-CSIC, SP)*
Computational Labs	*Rogerio L. Iope (UNESP, BR)* *Gonzalo Martinez (Polytechnic School, UAM)*	1- Introduction to Massive Parallel Computing (*R. Iope eventually jointly with INTEL new MPC platform)* 2- Machine Learning and deep learning (eventually through the applications see other sections) 3- Introduction to Quantum computing (tbd) *Introduction to FPGA or GPU computing is foreseen through their applications in other Labs*

Preliminary Table of Labs

Here below some more details about this preliminary list of Labs with names of experts already or to be contacted. The TARGET is to have O(30) Labs to train a total of about 100 school attendants.

Following the tradition of the INFIERI Schools, most Labs will be organized at UAM (in different Schools and Faculty following the topics) and a few at CIEMAT or in Hospital places or eventually even in other Universities/Research Labs or eventually Industrial Firms in Madrid.

New Feature in the Labs organization:

FOR EACH of the 7 MAIN SECTOR here above listed, there WILL BE two coordinators, *e.g. an expert from abroad and a local expert.*

This new feature in the organization of the INFIERI School series is based on the gained experience and because of the evolution of this school series. Indeed this is motivated by the increase in importance of the Labs sessions (even if already important since the start of this school series) and of the number of school attendants (this year we expect 100 school attendants).
It will be more efficient and lighten the LOC and the IAC chairpersons' workload.

For each section (apart for the Theoretical dedicated masterclasses) there is a team with a Lab organizer from abroad and a one local, both experts in the field.

This team is expected:

1) to verify and finalize the Labs program of their section ; the ones listed here above (and in the Lab summary table) have already been presented at previous IAC+LOC meetings ; but the list can be revised, and updated. Only requirement : the Labs must be related to the topics included in the School program and must complete them and/or give complementary inputs wrt to the Lecture(s) they are related to.
2) to establish the contact with the Lab organizers, by first invitating them.
3) to make sure the Lab organizers are complying to the schedule (see below) and will be ready for setting and running the proposed Lab session.
4) The local Lab organizer must, in addition, make sure that the logistics required to settle and run the Labs are locally provided.
5) The LOC and IAC chairpersons will be kept informed.

Expected Schedule for the Labs organization:

- *By January 15: to have a first almost complete list of Labs with people in charge and tittle of the Lab, provided by the Lab organizers*
- ***By February 15: complete list and for each Lab and abstract describing the main features of the proposed Lab, provided by the Lab organizers !!!!!! Move it to March 15 !!!***
- ***From April 1st to May 30: a 2 pages description including photos, plots and some recommended references, provided by the Lab organizers : DEADLINE of MAY 30 TO BE KEPT !!***

***OFTEN ASKED QUESTIONS**:*
1)The Labs are addressed to advanced students: aome high skilled Master students and mainly PhDs or young postdocs.

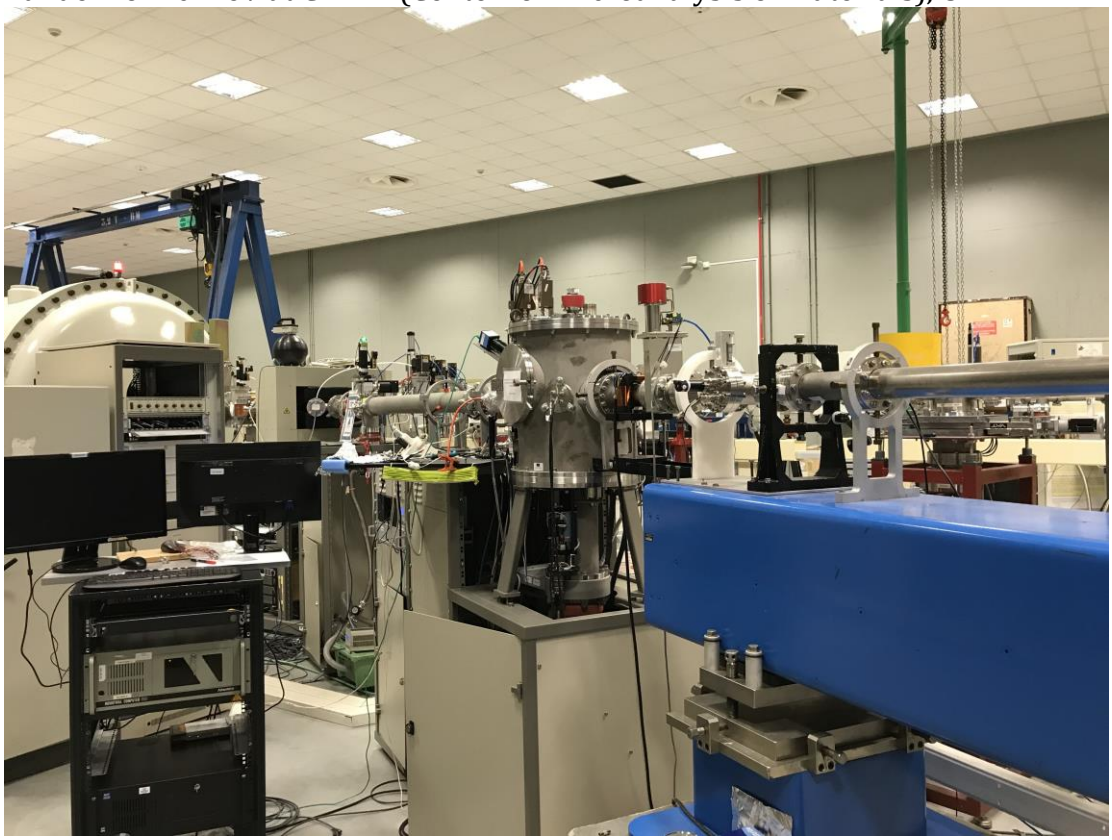
2) It is an essential part of this school series, complementary to the Lectures
3) The Lab sessions are not demonstrator Labs; they allow the school attendants to get their hands on the topic and to the Lab organizers to explain in more depth some topics presented in the corresponding lecture.
4) The Lab organizers are high skilled researchers or academics experts in the field. The Labs are not to be handled by PhDs or even young postdocs.
5) The Lab sessions are an obligatory part of the School programme.
6) The Students have to follow a total of 10 Labs, covering topics outside of their own expertise or ongoing research activity, and choosing to be in teamwork not with their best friend(s) or students from their country.
7) These are not demonstrator but HANDs ON LABS ➔ EACH LAB OCCURS, EACH DAY I.E. FROM TUESDAT JULY 7 to FRIDAY JULY 17 (10 sessions in total), WITH EACH DAY A DIFFERENT TEAM OF STUDENTS (typically a maximum of 3 students if Hardware based Lab or up to 5 if Computer-only based Lab).

Thus a Lab will train about 1/3 of the total school attendance.

Typical Labs of electronics for installing set-up and with material available at Faculdad de Ciencias at UAM.

Faculdad de Ciencias: Rooms for computer-aide Labs; this is a large one, also available smaller room with same installations.
Also to be look at Computing Labs at the School of Computing at UAM.

Tandem of 10 MeV at CMAM (Center for Microanalysis of Materials), UAM



One beam line at the tandem at CMAM (Center for Microanalysis of Materials), UAM