LABORATÓRIO DE INSTRUMENTAÇÃO
E FÍSICA EXPERIMENTAL DE PARTÍCULAS
partículas e tecnologia

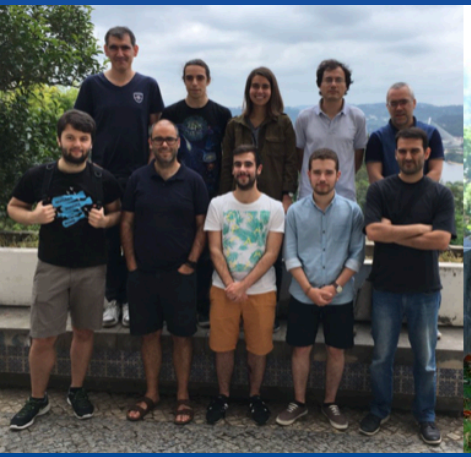
Summer Student Program 2018

Final Presentations Workshop

Lisbon - Coimbra - Braga
September 5-6, 2018

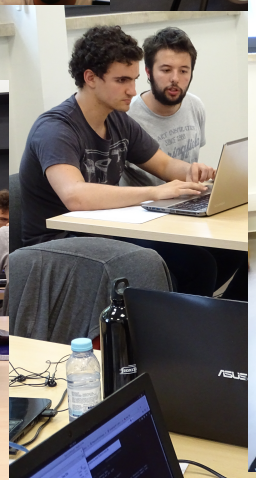
NUNO@CERN.CH

Thank you for taking part !



Foremost to You, **the Students**, for spending the summer engaging in research work with us.
And also the **Supervisors** for their investment of time and dedication to the program.

Productive



Enjoyable

Social Networks

CERN ✓
@CERN

Seguir

This year, 66 students participated in the LIP Summer Student Programme in Portugal: nine in Braga, six in Coimbra and 51 in Lisbon.

#studentsLIP18 #PTatCERN

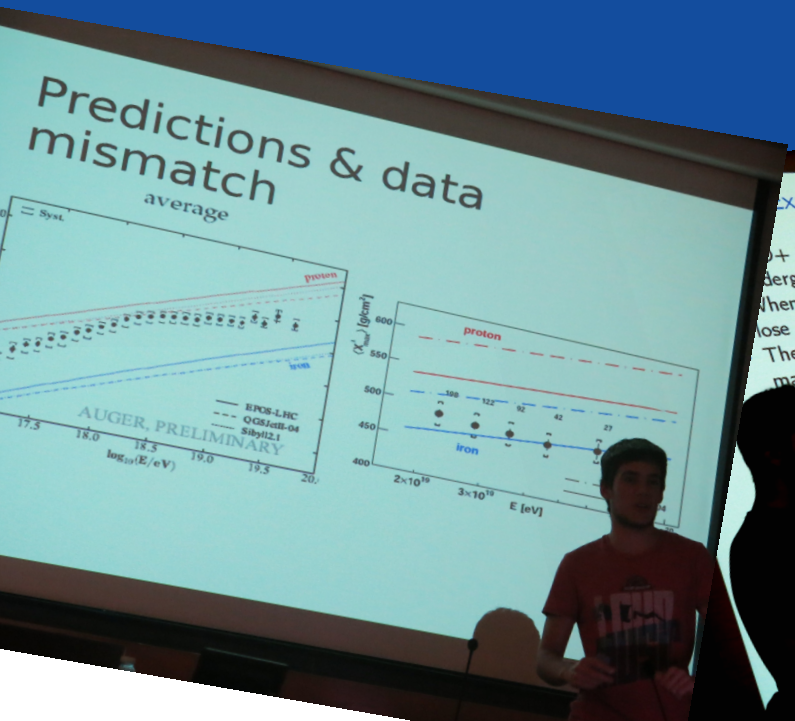
#FollowFriday @lipwebapps

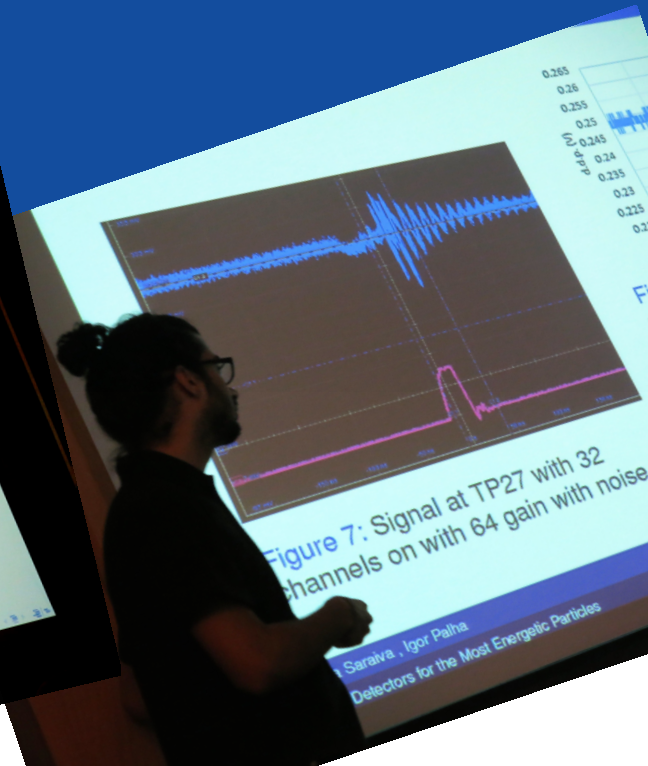
LIP - Laboratório de Instrumentação e Física Experimental de Partículas shared a post.
August 10 at 1:26 PM ·

Os estudantes de verão do LIP e orientadores em destaque no Follow Friday do #CERN 🙂

SET
05

but it isn't over just yet !





The Agenda

- 2 days of presentations
- 8 sessions
- 1 report per project
- 15 min per report
- +5 min discussion

- slides uploaded before session
- try to keep within time

	Wednesday, 5/9	Thursday, 6/9
09:00	Welcome	
09:20		Braga
09:40	Session I	Session V (UM)
10:00		
10:20	Multimessenger | chaired by Lozza	LHC | chaired by Peixoto
10:40	Coffee break	
11:10		
11:30		Coimbra
11:50	Session II	Session VI (UC)
12:10	Heavy Flavor | chaired by Seixas	Detector | chaired by Lindote
12:30	Lunch	
14:00		
14:20	Session III	Session VII
14:40		
15:00	Astro | chaired by Sarmento	Detectors | chaired by Galaviz
15:20	Coffee break	
15:50		
16:10	Session IV	Session VIII
16:30		
16:50	LHC | chaired by Gonçalo	QGP | chaired by Santos
17:10		Farewell

Summer Student Program 2018 | Final Workshop

5 Sep 2018, 09:00 → 6 Sep 2018, 18:00 UTC

Certificates

of participation

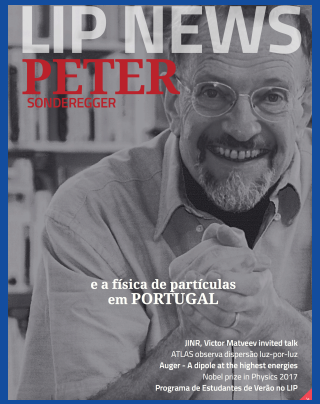
WILL BE HANDED IN TOMORROW
FOLLOWING THE FINAL SESSION OF THE WORKSHOP

LIP Summer Student 2018

Book of Abstracts

You are invited to prepare a terse summary describing what was achieved in each project.

How much: O(200) words
When: by early next week



LIP Summer Students Programme 2017

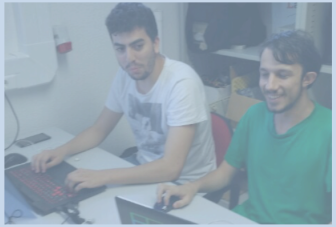
Book of abstracts

Entre Julho e Setembro de 2017, decorreu no LIP-Lisboa a 1ª edição do Programa de Estudantes de Verão do LIP, dirigidos a estudantes universitário de Física, mas também de áreas relacionadas, como a Engenharia.

Nesta secção, os participantes apresentam um breve resumo do projecto de investigação que desenvolveram integrados nos grupos de investigação do LIP.

Development of a numerical tool for signal and time estimation on the SNO+ experiment

Students: Carlos Couto, João Antunes
Supervisor: Fernando Barão



SNO+ is a huge almost spherical liquid scintillator detector that will study neutrinos. The experiment is located approximately 2 km underground in Sudbury, Canada. The aim of this project was to develop a numerical tool that could estimate the arrival time distribution and the signal on the many photomultipliers (PMTs) that are located on the surface of the SNO+ detector. We focused on finding a deterministic algorithm that could serve as an alternative to the existing Monte Carlo simulations. The [illegible] that it could later be almost fully parallelized. [illegible] was made versatile, that is, [illegible] geometry, [illegible] the algorithm [illegible] code. We [illegible] the implementation [illegible] Monte Carlo simulations [illegible] computing has yet to be implemented.

The advantage of this deterministic approach is that whereas Montecarlo simulations require a huge number of tests to gather data on less likely detections the likelihood of a detection does not impact the accuracy of its probability given by our algorithm.

b-tagging in Heavy Ion Collisions

Students: Manuel Xarepe, Pedro Gabriel
Supervisors: Helena Santos, Rui Pereira

The ATLAS experiment is strongly committed with the LHC Heavy Ion program. One distinctive goal of heavy ion collisions is the creation of a quark-gluon plasma (QGP). The study of this plasma could open the door to new physics and, as such, it is important to develop and optimize tools to help us in that sense. One way of studying the QGP is through the special properties of the B mesons which, due to their long lifetime, perceive the entire QGP formation as they travel through it. In order to perform this task, it is important to increase the efficiency of tagging these mesons (b-tagging) in the context of heavy ion collisions. During the course of this project, we used samples of simulated jets embedded on real, reconstructed

The project consisted in exploring heavy-flavor signals in recent Run2 data from heavy-ion collisions collected by the CMS experiment at the LHC. The extreme environment produced in heavy-ion collisions at the highest energies is both interesting and experimentally challenging. Interesting because it leads to the creation of the primordial state of matter, the plasma of quarks and gluons (QGP), and facilitates the exploration of its properties. Challenging because of the very high occupancy of the detector systems and the resulting difficulty in identifying and measuring specific processes of interest. B-hadrons are exclusively reconstructed for the first time in ion collisions, thanks to the charged particle and vertex capabilities of the CMS detector. The exploration of these novel probes of the QGP allow to study the effect of the medium on different heavy-flavor particles that traverse it, including the flavor dependence of energy loss.

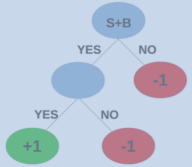
The project aimed at searching for Bs mesons in PbPb collisions, and measuring their suppression relative to pp collisions. It consisted correspondingly of three parts: the detailed measurement of Bs signals in proton collisions, the search in ion collisions, and the estimation of the yield suppression. The work resulted in the measurement of the Bs differential production cross section in proton collisions at 5.02 TeV, which is here achieved for the first time. The confirmation of the B+ mesons (reference signal) and first evidence for Bs mesons in ion collisions. While the amount of PbPb data collected so far is not yet sufficient to perform a precise measurement of the suppression factor, selection optimizations exploring multivariate methods may be next

from last year's

[illegible]ried out over a period of two months in LIP-[illegible]stay at CERN. It was developed as part of and [illegible]the CMS heavy-ion physics analysis group. The [illegible]gularly reported at the LIP-CMS group meetings, [illegible]final results were presented in September to LIP, at the final internship workshop, and to CMS, at a physics analysis group meeting.

Search for the Higgs boson decaying into b quarks at the ATLAS experiment

Students: Ana Patrícia Afonso e Joshua Winter
Supervisors: Patrícia Conde, Ricardo Gonçalo, Mário Sousa, Rute Pedro



The goal of the internship was to study the possibility to improve the sensitivity of the searches for the Higgs boson in the b quarks decay channel. The study was focused on the search channel in

LIP Summer Student 2018

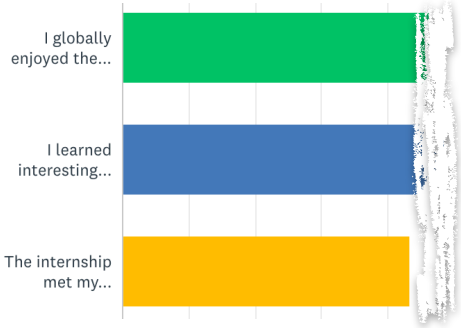
Your Feedback

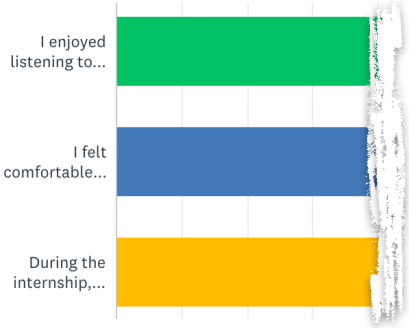
You shall receive shortly an invitation to fill in a survey to share with us your feedback on the program:

- what you think went well
- how it could be improved

Your feedback is important so we can improve on future editions of the program for your colleagues.

Survey on the 2017 LIP Summer Student Porgram





	5 Sep 2018	
AM	09:00	Welcome (Auditorium)
	09:20	**Session 1** (until 10:40) (Auditorium)
	09:20	Multimessenger search - Bernardo Dias Nelson Silva (Auditorium)
	09:40	Solar modulation of cosmic rays - Clara Severino Beatriz Bordadágua (Auditorium)
	10:00	Measuring radiation effects in Space - Pedro Freixo Pedro Moreira Beatriz Ferreira (Auditorium)
	10:20	Cosmic ray muons reconstruction in the SNO+ experiment - Daniel Gonçalves (Auditorium)
	10:40	--- Coffee break ---
	11:10	**Session 2** (until 12:30) (Auditorium)
	11:10	Lepton universality test in top quark pair decays - José Neves Joana Vital (Auditorium)
	11:30	Rare beauty decays - Maria Faria (Auditorium)
	11:50	Quarkonia polarization studies - Ana Gaspar Beatriz Lopes (Auditorium)
	12:10	Hadron production at the highest energies - Miguel Martins (Auditorium)
PM	12:30	--- Lunch ---
	14:00	**Session 3** (until 15:20) (Auditorium)
	14:00	Reconstrução e visualização de acontecimentos no observatório Pierre Auger - Pedro Fernandes Rui Morais Tiago Simões Anaísa Carvalho (Auditorium)
	14:20	Desenvolvimento de um display de taxas de muões - Pedro Piçarra Ricardo Amadeu (Auditorium)
	14:40	Looking for astrophysical gammas with a next generation detector - André Torcato Melissa Serra José Cordeiro (Auditorium)
	15:20	--- Coffee break ---
	15:50	**Session 4** (until 17:10) (Auditorium)
	15:50	Estudo do desempenho do triggers de jactos difractivos - Eduardo Ferreira (Auditorium)
	16:10	Measurement of H -> 2 tau with multivariate analysis tools - Ricardo Cipriano Tomás Alvim Luís Sintra (Auditorium)
	16:30	Acoplamentos do bosão de Higgs a quarks pesados - Vânia Nunes Alexandre Santos Filipe Barroso (Auditorium)

	6 Sep 2018	
	09:00	**Session 5** (until 10:40) (Physics Department Auditorium)
	09:00	Medida da secção eficaz ttbar em acontecimentos dileptónicos usando o ATLAS Open Data - José Fernandes Maria Neiva (Physics Department Auditorium)
	09:20	Pesquisa de acontecimentos Z'->ttbar em topologias semileptónicas usando o ATLAS Open Data - Pedro Chaves José Neto Sara Salgado (Physics Department Auditorium)
	09:40	Rare decays of the Higgs - Miguel Afonso (Physics Department Auditorium)
	10:00	High-precision timing detectors for HL-LHC - Nelson Rebelo ()
	10:20	COMPASS (TBC) - Ana Ribeiro Nuno Teixeira Lara Neves Rui Gonçalves Elisa Garabello ()
	10:40	--- Coffee break ---
	11:10	**Session 6** (until 12:30) ()
	11:10	Análise de dados em física de altas energias e astropartículas - Manuel Lima Guillaume Domingues Miguel Carvalho (Departamento de Fisica, sala E10A)
	11:30	Building a muon detector - Maria Pereira João Silva Manuel Silva (Departamento de Fisica, sala E10A)
	11:50	Develop an RPC - a gaseous particle detector - Rodolfo Matias ()
	12:10	Caracterização de materiais óticos para os upgrades do calorímetro hadrónico TileCal - Carlos Vítor ()
	12:30	--- Lunch ---
	14:00	**Session 7** (until 15:20) (Auditorium)
	14:00	Reações nucleares com feixes radioactivos a energias relativistas - Rita Silva Francisco Matias (Auditorium)
	14:20	Produção e caraterização de filmes finos - Andriy Myakush (Auditorium)
	14:40	Uso e automatização do código AlfaMC - Beatriz Pereira (Auditorium)
	15:00	Exclusive top quark pair production - Beatriz R. Lopes (Auditorium)
	15:20	--- Coffee break ---
	15:50	**Session 8** (until 17:10) (Auditorium)
	15:50	Understanding the quark-gluon plasma in heavy-ion collisions - João M. Lopes Rafael Orelhas Luis Bugalho (Auditorium)
	16:10	Probing quark-gluon plasma with b-jets - João Bravo Francisco Lelewell (Auditorium)
	16:30	Hadrons as probes of the primordial plasma - João Lourenço (Auditorium)
	16:50	Di-Higgs searches with machine learning - Miguel Bengala Rodrigo Santo (Auditorium)
	17:10	Farewell (Auditorium)