



Laboratório de Instrumentação e  
Física Experimental de Partículas

## Seminário LIP\*

Thursday, 11 January 2018

11:30 to 12:30

### ***Probing the time structure of the quark-gluon plasma with top quark***

By Dr. Liliana Apolinário  
(LIP, IST)

The tiny droplets of Quark Gluon Plasma (QGP) created in high-energy nuclear collisions experience fast expansion and cooling with a lifetime of some fm/c. Despite the information provided by probes such as jet quenching and quarkonium suppression, and the excellent description by hydrodynamical models, direct access to the time evolution of the system remains elusive. We point out that the study of hadronically-decaying W bosons in events with a top-antitop quark pair can provide unique insight into the time structure of the QGP. This is because of the finite lifetimes of the top and W particles, and a time-delay in the interaction of the (colour-singlet) W-boson's decay products with the medium. All three times are correlated with the kinematics of the top quark, allowing the approximate determination of the time at which the interaction with the QGP begins. We carry out a simple Monte Carlo feasibility study and find that the LHC has the potential to bring first, limited information on the time structure of the QGP. Substantially increased LHC heavy-ion luminosities or future higher-energy colliders would open opportunities for more extensive studies.

\* Place: Seminar Room (311)

LIP (Laboratório de Instrumentação e Física Experimental de Partículas)

Instituto Interdisciplinar de Investigação da Universidade de Lisboa

Av. Gama Pinto, 2, piso 3

Coffe and cakes at 11:00 in room 312