



Pablo Martinez Ruiz del Arbol <pablo.martinez.ruizdelarbol@gmail.com>

[CINCO] [LP2019] Pablo Martinez Ruiz Del Arbol (Universidad de Cantabria) accepted invitation to give a talk at LP2019

1 message

[CINCO] Cms INformation on COnferences <cms-conf-cinco@cern.ch>

Sun, May 19, 2019 at 12:10 PM

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Dear Committee,

Pablo Martinez Ruiz Del Arbol (Universidad de Cantabria) [mailto:Pablo.Martinez@cern.ch] just accepted to give a talk "Precision Timing with the CMS MIP Timing Detector"

https://cms-mgt-conferences.web.cern.ch/cms-mgt-conferences/conferences/pres_display.aspx?cid=2470&pid=19968

at "LP2019: 29th International Symposium on Lepton Photon Interactions at High Energies, 5-10 Aug 2019, University of Toronto, Toronto (Canada)"

https://cms-mgt-conferences.web.cern.ch/cms-mgt-conferences/conferences/conf_display.aspx?cid=2470



EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
COMPACT MUON SOLENOID COLLABORATION

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Geneva, 07.01.2010

Votre référence / Your reference :

Notre référence / Our reference : CMS-Z.G

Certificate of Presence

We hereby certify that Pablo Martínez Ruiz del Árbol, member of the CMS Collaboration, has given the following oral presentations at conferences, workshops, and seminars on the dates and places indicated below:

"Precision Timing with the CMS MIP Timing Detector" at "LP2019: 29th International Symposium on Lepton Photon Interactions at High Energies, 5-10 Aug 2019, University of Toronto, Toronto (Canada)".

"Dark matter at LHC" at "Split2018: 2018 LHC days in Split, 17-22 Sep 2018, University of Split - FESB and Faculty of Science, Split (Croatia)".

"Searches for BSM physics in the 2 leptons y MET final state" at "IX CPAN days: IX CPAN days, Centro Nacional de Partículas, Astropartículas y Nuclear, 23-25 Oct 2017, CPAN, Santander (Spain)".

"Review of Supersymmetry Searches at 13 TeV with the CMS experiment" at "DM2016: Dark Matter 2016: From the smallest to the largest scales, 27 Jun-1 Jul 2016, Santander (Spain)".

"CMS SUSY searches at 13 TeV" at "LPCC Seminar: CERN LPCC EP-LHC Seminar Series, 9 Feb 2016, Geneva (Switzerland)".

"Search for Beyond the Standard Model Physics in multi-leptonic and photonic final states with the CMS detector" at "ICHEP 2014: 37th International Conference on High Energy Physics, 2-9 Jul 2014, Valencia (Spain)".

"Searches for SUSY in events with two or more leptons at CMS" at "ICHEP 2012: International Conference on High Energy Physics, 4-12 Jul 2012, Melbourne, VIC (Australia)".

"Susy searches in the Z+Jets+MET final state in 7 TeV pp collisions with the jet-z balance method" at "Bienal RSEF: XXXIII Reunión Bienal de la Real Sociedad Española de Física, 19-23 Sep 2011, Universidad de Cantabria, Santander (Spain)".

"Commissioning and Performance of the CMS Detector" at "Blois2010: 22nd Rencontres de Blois on "Particle Physics and Cosmology; First Results from the LHC", 15-20 Jul 2010, Blois (France)".

"The CMS Muon System Alignment: First results from commissioning runs " at "BIENALFISICA09: XXXII Bienal de Física, 7-11 Sep 2009, Ciudad Real (Spain)".

"Muon Alignment in ATLAS and CMS" at "Detector Understanding with First LHC Data, 29 Jun-3 Jul 2009, DESY, Hamburg (Germany)".

"The CMS Muon System Alignment" at "CHEP09: International Conference On Computing In High Energy Physics And Nuclear Physics, 21-27 Mar 2009, Prague (Czech Republic)".


CMS Secretariat



Precision timing with the CMS MIP timing detector

Pablo Martinez Ruiz del Arbol* on behalf of the CMS Collaboration

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The Compact Muon Solenoid detector at the CERN Large Hadron Collider is undergoing an extensive Phase II upgrade program to prepare for the challenging conditions of the High-Luminosity LHC. In particular, a new timing layer with hermetic coverage up to a pseudo-rapidity of $|\eta|=3$ will measure minimum ionizing particles with a time resolution of 30 ps. This MIP Timing Detector will consist of a central barrel region based on LYSO:Ce crystals read out with SiPMs and two end-caps instrumented with radiation-tolerant Low Gain Avalanche Detectors. The precision time information from the MTD will reduce the effects of the high levels of pile-up expected at the HL-LHC and will bring new and unique capabilities to the CMS detector. The time information assigned to each track will enable the use of 4D reconstruction algorithms and will further discriminate interaction vertices within the same bunch crossing to recover the track purity of vertices in current LHC conditions. For instance, in the analysis of di-Higgs boson production, a timing resolution of 30-40 ps is expected to improve the effective luminosity by about 25% through gains in b-tagging and isolation efficiency. We present motivations for precision timing at the HL-LHC and overview the MTD design, while also highlighting specific physics studies benefiting from the improved timing information.

XXIX International Symposium on Lepton Photon Interactions at High Energies - LeptonPhoton2019
August 5-10, 2019
Toronto, Canada

*Speaker.

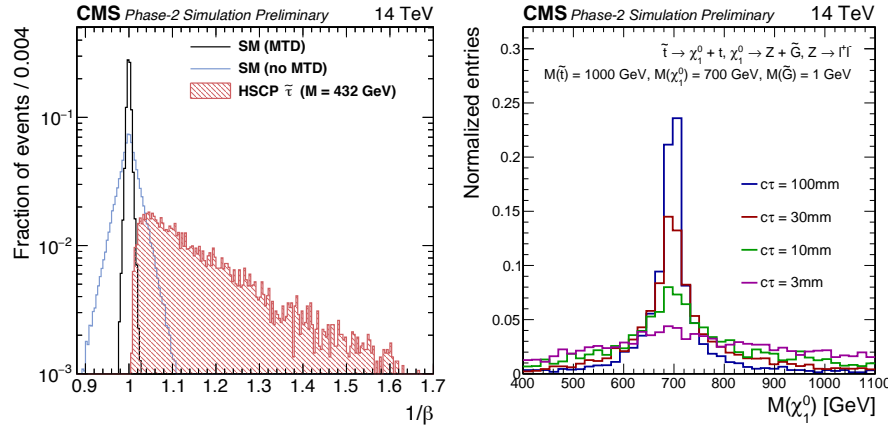


Figure 6: Distribution of the inverse of the particle velocity for the HSCP signal, the background, and the background estimated with the MTD (left), and neutralino mass estimated using the timing information for a SUSY GMSB model with different lifetimes (right).

tion. This detector will be composed of two parts: the Barrel Timing Layer based on LYSO crystals and the Endcap Timing Layer based on silicon sensors (LGADs). The inclusion of timing information is expected to have a strong impact in the mitigation of the harsh pile-up conditions at the HL-LHC. By associating a time stamp to the tracks, the number of spurious tracks not compatible in time with the primary vertex will be reduced improving the physics object performance for jet reconstruction, b-tagging algorithms, lepton isolation, transverse missing momentum resolution, etc. These improvements will translate into a sensitivity increase for important analyses such as the double Higgs search, and will also bring unique physics potential for complicated topologies such as those involving the production of long-lived particles.

References

- [1] Apollinari, G. and Bruning, O. and Nakamoto, T. and Rossi, Lucio. *High Luminosity Large Hadron Collider HL-LHC*. CERN Yellow Rep. 5 1-19, 2015. 10.5170/CERN-2015-005.1.
- [2] Chatrchyan, S. and others. *The CMS experiment at the CERN LHC*. JINST, 3 S08004, 2008, 10.1088/1748-0221/3/08/S08004.
- [3] D. Anderson et al. *On timing properties of LYSO-based calorimeters*. Nucl. Instrum. Meth. A 794 (2015) 7, doi:10.1016/j.nima.2015.04.013.
- [4] G. Pellegrini et al. *Technology developments and first measurements of Low Gain Avalanche Detectors (LGAD) for high energy physics applications*. Nucl. Instrum. Meth. A 765 (2014) 12, doi:10.1016/j.nima.2014.06.008.