

```
place at Melbourne, VIC, Australia on 4-12 July 2012 (see:
http://www.ichep2012.com.au/
). Please Register and book your room
and travel immediately!
> You should prepare and upload draft(s) of your talk slides to
the CINCO web page for inspection and approval. Use approved CMS
results only.
> If not done already, enter the PAS(s) on which the talk is
based. To do so go to Update Bibliography via the pulldown under
Pres. Details.
> Upload the Final Draft talk slides at least one week before the
presentation to: <a href="https://cms-mgt-conferences.web.cern.ch/cms-mgt-">https://cms-mgt-conferences.web.cern.ch/cms-mgt-</a>
conferences/conferences/pres display.aspx?cid=772&pid=5335
> After you upload the file, the system will send an e-mail to the
conference committee and to the appropriate group conveners. Keep
in touch with the conveners to make sure that they approve your
presentation.
> Before giving the talk you should have a rehearsal in front of
your colleagues. A copy of this e-mail is being sent to your
institute team leader(s) who should make sure that the dry run
takes place.
> Information for you to use can be found in the CMS physics and
subdetector web pages.
> Congratulations!
> Kerstin Borras for the CMS Conference Committee
>
>
>
>
```

Connected to Microsoft Exchange



## EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH COMPACT MUON SOLENOID COLLABORATION

URL : https://cms.cem/



Adresse postale / Mailing address\*:

CMS Secretariat CERN – EP Department CH - 1211 GENEVA 23

To Whom It May Concern

Tel.

+41 22 767 2277

Fax

+41 22 767 8940

E-mail cms.secretariat@cern.ch

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

una hunas





# Searches for SUSY in events with two or more leptons in CMS

#### P. Martinez Ruiz Del Arbol\*

On behalf of the CMS Collaboration

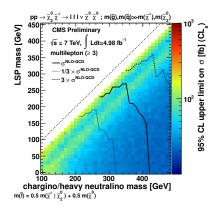
Eidgenössische Technische Hochschule Zürich (ETH Zurich),

E-mail: pablom@cern.ch

We present results of searches for SUSY production at CMS in events with multiple lepton production. These include final states with Z bosons decaying to lepton pairs, non-resonant same-and opposite-sign lepton pairs, and three or more isolated leptons. The results are used to exclude previously unexplored regions of the supersymmetric parameter space assuming R-parity conservation with the lightest supersymmetric particle being either a neutralino or gravitino.

36th International Conference on High Energy Physics, July 4-11, 2012 Melbourne, Australia

\*Speaker.



**Figure 5:** Upper limits on the masses of the chargino or the heavy neutralino and the lightest neutralino in an SMS with direct chargino and neutralino production.

#### 5. Conclusions

Several searches for SUSY in events with two or more leptons have been performed using data collected by the CMS experiment at  $\sqrt{S}$ = 7 TeV and  $\sqrt{S}$ = 8 TeV. These include searches with two opposite sign leptons inside and outside the Z mass, searches with two same sign leptons, requiring also one b-tagged jet, and searches with three or more leptons. In all the cases the observation is in good agreement with the data driven predictions, and upper limits are set in terms of mSUGRA and simplified models.

#### References

- [1] The CMS Collaboration, "The CMS experiment at the CERN LHC", JINST 3 S08004(2008), doi:10.1088/1748-0221/3/08/S08
- [2] The CMS Collaboration, "Interpretation of Searches for Supersymmetry", CMS-PAS-SUS-11-016
- [3] The CMS Collaboration, "Search for physics beyond the standard model in events with a Z boson, jets, and missing transverse energy in pp collisions at  $\sqrt{s} = 7TeV$ ", Physics Letters B, 716, 2, 260-284, doi:10.1016/j.physletb.2012.08.026
- [4] The CMS Collaboration, "Search for new physics in events with opposite-sign leptons, jets, and missing transverse energy in pp collisions at  $\sqrt{s} = 7TeV$ ", CMS-PAS-SUS-11-011
- [5] The CMS Collaboration, "Search for New Physics with Same-Sign Isolated Dilepton Events with Jets and Missing Transverse Energy", Phys. Rev. Lett., 109, 7, 071803, 16, doi:10.1103/PhysRevLett.109.071803
- [6] The CMS Collaboration, "Search for new physics in events with same-sign dileptons and b-tagged jets in pp collisions at  $\sqrt{s} = 7TeV$ ", Journal of High Energy Physics, 2012, 8, doi:10.1007/JHEP08(2012)110
- [7] The CMS Collaboration, "Search for Supersymmetry in events with same-sign dileptons", CMS-PAS-SUS-12-017
- [8] The CMS Collaboration, "Search for anomalous production of multilepton events in pp collisions at  $\sqrt{s} = 7 \, TeV$ ", Journal of High Energy Physics, 2012, 6, doi:10.1007/JHEP06(2012)169